# Design Span® hp

## Installation Guide

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General Notes

The attached installation details are intended to be a design aid and do not depict all situations. Modifications are the responsibility of the designer/user and should take into account climate conditions such as wind and snow, governing code requirements, and the actual usage and maintenance of the structure.

Flashings:
Where possible, flashings should be lapped away from prevailing winds. Certain flashings should be supported if it is likely that equipment (ladder, etc.) will be used against them or if foot traffic is anticipated. Check with AEP Span any time you intend to specify a prefinished flashing in a gauge or finish different than the roof panels. It is good practice to specify that all flashings be of the same material (gauge, color, finish) as the roof panels to ensure long-term durability. Field-painted flashings rarely equal the durability and color fastness of factory baked-on paint systems. The enclosed details have minimized the use of exposed fasteners where possible. The edges of flashings have also been shown hemmed to strengthen and to minimize the exposure of cut edges.

Flashing design and fabrication is generally the responsibility of the contractor. For convenience, we have provided some flashing drawings on our website at http://www.aepspan.com/roof/prodDetailad08.html?id=35. Applicable Design Span® hp flashing part numbers are referenced within this installation guide.

Slope Requirements:
Panels should be used on slopes of 2:12 or greater. Inquire for slopes below 2:12.

Panel Attachment:
Consult the Design Span® hp fastener attachment schedule or contact your AEP Span representative for proper clip spacing and fastener size, type, and quantities to meet the project’s wind uplift (negative) load requirements. The details in this guide show two fasteners per clip. A minimum of two fasteners is always recommended although three fasteners may be required based on panel load requirements.

Condensation, Insulation, & Ventilation:
It is the designer's responsibility to determine the need and composition of condensation control materials including insulation and vapor retarders, as well as ventilation requirements. Metal roofing is susceptible to condensation and its control should be carefully considered. Applications over rigid insulation may require solid blocking/framing for installation of perimeter flashings and drag load fasteners.

Underlayment:
Prior to installation, an underlayment material may be installed over the roof substrate. The designer should select and specify an appropriate material. The specified material must have a non-abrasive top surface that will not mar, scratch, or abrade the underside of the metal panels and flashings.

Substrates:
Design Span® hp roofing panels can be used over solid substrates or over spaced supports.
"Pinning" Requirements:
The panels must only be "pinned" at one location only to resist the "drag" loads caused by the panel weight, live loads, and snow loads. The intensity of the drag load is a function of the slope, the loads involved, and the length of the panels. Panels must not be pinned at more than one location otherwise damages induced by thermal movement will occur. Appendix ‘A’ gives the drag loads for various slopes and snow loading conditions, and Appendix ‘B’ shows the number of fasteners required to resist the drag loads.

Thermal Movement:
Both panels and flashings must allow for thermal movement (expansion and contraction) of the materials, especially where long lengths are used. Appropriate gaps or provisions must be provided to accommodate thermal movement.

Snow Design:
If possible, valleys, gutters, roof elevation changes and penetrations should be minimized or eliminated in snow areas. Roof penetrations should be located as close to the ridge or peak of the roof as possible to minimize accumulations of ice and snow and the effects of thermal movement of the roof panels. Premium membrane underlayments should be used. Valleys in snow areas require special consideration due to the accumulation of snow and ice from tributary roof areas.

Valleys:
Valley dimensions must be the proper width to account for slope, snow, ice, and rain conditions. Valleys should receive a premium underlayment since they are susceptible to water buildup. Valleys must have positive slope for drainage and be kept free of debris so that water does not back up and intrude under the panels.

Oil Canning:
Flat metal surfaces often display waviness commonly referred to as 'oil canning'. This can be caused by variations in raw material, processing variations, product handling, or variations in the substrate and roofing underlayments. Oil canning is a characteristic, not a defect, of panels manufactured from light-gauge metal. Panels are available with striations and are factory "corrective leveled" to minimize oil canning. Oil canning is not a cause for panel rejection. Additional information is available upon request.

References:
The Sheet Metal and Air Conditioning Contractors' National Association Inc. (SMACNA) manual is an excellent reference for sheet metal contractors. It’s guidelines for underlayments, gutter and downspout size requirements, and expansion/contraction of metals and flashing joints should be followed.

Technical Assistance:
Contact your AEP Span Sales Representative for additional information.
Design Span HP Panel

Installed View

Note: Be certain that adjoining panels fully engage ("snap") to achieve rated panel performance.
MALE LEG OF DESIGN SPAN HP PANEL

PANEL CLIP

PANCAKE HEAD FASTENERS
NOTE: FASTENER REQ'TS (SIZE, QTY) DEFINED BY PANEL ATTACHMENT CALCS.

SPECIFIED UNDERLAYMENT (NOT BY AEP-SPAN)

BEARING PLATE (IF REQUIRED)

STAINLESS STEEL CLIP (FOR COPPER PANELS)

BEARING PLATE (FOR INSTALLATIONS OVER RIGID INSULATION)

WIDE BATTEN CLIP (FOR OPTIONAL WIDE BATTEN)
CLIP

PANEL

SPECIFIED UNDERLAYMENT (NOT BY AEP–SPAN)

EAVE TRIM

1/8” RIVETS IN SEALANT LINE IF NECESSARY TO CLOSE "FISHMOUTH"

3/8” BEAD NON–SKINNING BUTYL SEALANT ON BOTH SIDES OF MALE RIB

JOGGLE CLEAT

TRIM CLEAT

PANCAKE HEAD FASTENER 12” O.C.

3/16” x 7/8” BUTYL TAPE

PANCAKE HEAD FASTENER 12” O.C.

JOGGLE CLEAT (JC095)

3/16”x7/8” BUTYL TAPE

ROOF PANEL

PANEL CLIP

CLEARANCE FOR THERMAL MOVEMENT PER CALCULATIONS

EAVE TRIM

3” (ET041)

4” (ET043)

SPECIFIED UNDERLAYMENT (NOT BY AEP–SPAN)

SUBSTRATE

PANCAKE HEAD FASTENERS @ 12” O.C.

TRIM CLEAT (TC209)
APPLY 3/8" BEAD OF NON-SKINNING BUTYL SEALANT ON BOTH SIDES AND TOP OF MALE PANEL RIB BEFORE ENGAGING FEMALE RIB OF NEXT PANEL

CLEARANCE FOR THERMAL MOVEMENT PER CALCULATIONS

GUTTER STRAP (GS063)

1" MIN

3/16"x7/8" BUTYL TAPE

JOGGLE CLEAT (JC095)

ROOF PANEL

PANEL CLIP

6" MIN

8"

SPECIFIED UNDERLAYMENT (NOT BY AEP–SPAN)

PANCAKE HEAD FASTENERS @ 12" O.C.

3/16"X7/8" BUTYL TAPE

OPTIONAL IF REQUIRED TO COVER INSIDE COLOR OF GUTTER (ET049)

SUBSTRATE

GUTTER (EG029)
**STEP 1**

Design span HP panel

**FACTORY OR FIELD NOTCH,* (BOTH RIBS)**

1 1/8"

1/8"

**STEP 2**

Use hemming tool to field bend tab under panel.

**STEP 3**

Apply 3/8" bead of non-skimming butyl sealant on both sides and top of male panel rib before engaging female rib of next panel.

3/4"

Male panel rib

Joggle cleat (JC095)

Clearance for thermal movement per calculations

**NOTE:**

Standard factory notch is 1-1/8". Long length panel installations require greater field notching depth.

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**DESIGN SPAN HP**

**EAVE HEM**

DS-05
FIELD NOTCH CAP AND BEND OVER TO CLOSE OFF END OF BATTEN CAP.

BATTEN CAP AND PANEL CLIP REFER TO PANEL CLIP DETAIL FOR INSTALLATION

BATTEN CAP

DESIGN SPAN HP PANEL

SPECIFIED UNDERLAYMENT (NOT BY AEP-SPAN)

PANCAKE HEAD FASTENER 12” O.C.

3/16”x7/8” BUTYL TAPE

3/8” BEAD OF NON-SKINNING BUTYL SEALANT ON BOTH SIDES OF MALE RIB

1/8” RIVETS IN SEALANT LINE IF NECESSARY TO CLOSE "FISHMOUTH"

EAVE TRIM 3” (ETO41) 4” (ETO43)

JOGGLE CLEAT (JC09S)

TRIM CLEAT (TC209)

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DESIGN SPAN HP

EAVE (WIDE BATTEN)

DS-06

REV. 11/19/12
APPLY CURING SEALANT TO BOTH SIDES OF RIB PRIOR TO INSTALLING RIB COVER

DESIGN CAUTION:
ROOF SLOPE TRANSITIONS SUCH AS FASCIA MAY ESTABLISH AN UNWANTED POINT OF PANEL FIXITY. CONTACT YOUR AEP SPAN REPRESENTATIVE FOR ASSISTANCE.

1/8" RIVET BOTH SIDES

DESIGN SPAN HP PANEL

FIELD CUT PANEL RIBS AND BEND OVER EDGE. SEAL OPEN ENDS OF ROOF PANEL RIBS WITH CURING SEALANT BEFORE INSTALLING RIB COVER

SPECIFIED UNDERLAYMENT (NOT BY AEP-SPAN)

1/4" MIN. CLEARANCE FOR WEEPAGE

PANCAKE HEAD FASTENERS

FIELD NOTCH AND HEM 1" (OPTIONAL FACTORY PANEL NOTCH)

DRIP FLASHING (DF009)

SHOULD BE MINIMUM 1/4" GREATER THAN PANEL RIB HEIGHT.

NOTE:
THE USE OF THIS DETAIL IS NOT RECOMMENDED IN SNOW CLIMATES.
**DESIGN CAUTION:**

Roof slope transitions such as fascias may establish an unwanted point of panel fixity. Contact your AEP Span representative for assistance.

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Apply curing sealant to both sides of rib prior to installing rib cover.

Field cut panel ribs and bend over edge. Seal open ends of panel ribs with curing sealant before installing rib cover.

Specified underlayment (not by AEP-Span)

1/8" rivets both sides

Rib cover

Note:
The use of this detail is not recommended in snow climates.

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Design Span HP

Fascia Transition

DS-08

REV. 11/19/12
FIELD CUT SIDES OF BATTEN CAP. NOTCH BOTTOM LEGS OF UPPER PORTION OF BATTEN CAP AS REQUIRED (VARIES PER ROOF SLOPE). BEND LOWER PORTION OF BATTEN CAP INTO PLACE. FASTEN IN PLACE WITH 1/8" RIVETS, BOTH SIDES.

SPECIFIED UNDERLAYMENT (NOT BY AEP–SPAN)

DESIGN SPAN HP RIB COVER
FIELD CUT PANEL RIBS AND BEND OVER EDGE. SEAL OPEN ENDS OF PANEL RIBS WITH CURING SEALANT BEFORE INSTALLING RIB COVER. APPLY 1/8" RIVETS TOP & BOTTOM AND BOTH SIDES.

DESIGN CAUTION:
ROOF SLOPE TRANSITIONS SUCH AS FASCIAS MAY ESTABLISH AN UNWANTED POINT OF PANEL FIXITY. CONTACT YOUR AEP SPAN REPRESENTATIVE FOR ASSISTANCE.
**NOTE:**
FIELD CUT FIRST AND LAST PANELS TO EQUAL WIDTH

**ALTERNATE DETAIL**

**GABLE TRIM**
- 4.0" (RT175)
- 4.5" (RT183)
- 5.0" (RT177)
- 5.5" (RT185)
- 6.0" (RT193)

**RECEIVER TRIM** (PR138)

**FIELD CUT AND BEND PANEL UP 1 1/2"**

**3/16"x7/8" BUTYL TAPE**

**ANGLE TRIM** (AT004)

**3/8" BEAD NON-SKINNING BUTYL SEALANT**

**ROOF PANEL**

**SUBSTRATE**

**SPECIFIED UNDERLAYMENT (NOT BY AEP-SPAN)**

**PANCAKE HEAD FASTENER @ 12" O.C.**

**CONTINUOUS TRIM CLEAT (TC209)**

**GABLE STARTER** (JS096)

**FILL POCKET WITH NON-SKINNING BUTYL SEALANT PRIOR TO INSERTING ROOF PANEL**

**SEAL END WITH CURING SEALANT**

**3/4" MIN. ENGAGEMENT**

**PANCAKE HEAD FASTENER @ 12" O.C.**

**3/16"x7/8" BUTYL TAPE**

**SPECIFIED UNDERLAYMENT (NOT BY AEP-SPAN)**

**PANCAKE HEAD FASTENER @ 12" O.C.**

**CONTINUOUS TRIM CLEAT (TC209)**

**SUBSTRATE**
NOTE:
FIELD CUT FIRST AND LAST PANELS TO EQUAL WIDTH.

CONSTRUCTION SEALANT (NOT BY AEP-SPAN)
3/8" BEAD NON-SKINNING BUTYL SEALANT

ENGINEERED FASTENER (NOT BY AEP-SPAN)
4" (RG145)
5" (RG147)
6" (RG149)

REGLET TRIM
RAKE WALL TRIM (RW209)

1/8" RVETS @ 12" O.C.

3/8" BEAD NON-SKINNING BUTYL SEALANT

SUBSTRATE
PANCAKE HEAD FASTENER
FASTENERS @ 12" O.C.

RECEIVER TRIM (PR135)
FIELD CUT AND BEND PANEL UP 1"

SPECIFIED UNDERLAYMENT (NOT BY AEP-SPAN)
CONSTRUCTION SEALANT (NOT BY AEP–SPAN)

ENGINEERED FASTENER (NOT BY AEP–SPAN)

CONTINUOUS NON–SKINNING BUTYL SEALANT

SURFACE MOUNT REGLET TRIM (RG157)

RAKE WALL TRIM

ALTERNATE UPPER DETAIL

3/4" MIN. ENGAGEMENT

ALT. RAKE WALL TRIM (RW207)

SPECIFIED UNDERLAYERMENT (NOT BY AEP–SPAN)

PANCAKE HEAD FASTENER 12" O.C.

FILL POCKET OF TRIM WITH NON–SKINNING BUTYL SEALANT PRIOR TO INSERTING ROOF PANEL

ALTERNATE LOWER DETAIL
1/8" RIVETS @ 12" O.C.

RIDGE CAP

1/8" RIVETS IN SEALANT LINE IF NECESSARY TO CLOSE "FISHMOUTH"

3/16"x7/8" CONTINUOUS BUTYL TAPE

ZEE CLOSURE TRIM AT PANEL RIB USE NON-SKINNING BUTYL SEALANT TO FILL ALL GAPS

SPECIFIED UNDERLAYMENT (NOT BY AEP–SPAN)

FASTENERS

NON-SKINNING BUTYL SEALANT AT ENDS, FILL ALL GAPS

ROOF PANEL

RIDGE CAP

3/16"x7/8" CONT. BUTYL TAPE

6" (RH162)
7" (RH164)
8" (RH166)

ZEE CLOSURE (ZC219)

1/8" RIVETS @ 12" O.C.

SUBSTRATE

EQUALY SPACED FASTENERS*
(3) MIN. FOR 12"
(4) MIN. FOR 16", 17" & 18"

NOTE:
* ADDITIONAL FASTENERS MAY BE REQUIRED IN HIGH SNOW LOAD AREAS. SEE APPENDIX.
1/8" RIVETS IN SEALANT LINE IF NECESSARY TO CLOSE "FISHMOUTH"

1/8" RIVETS @ 12" O.C.

3/16"x7/8" CONTINUOUS BUTYL TAPE

ZEE CLOSURE TRIM (ZC219)
NOTCH AROUND PANEL RIBS.
USE NON-SKINNING BUTYL SEALANT AROUND NOTCH FOR PANEL RIB.
WIDE BATTEN STOPS AT ZEE CLOSURE

SPECIFIED UNDERLAYMENT (NOT BY AEP-SPAN)

EQUALLY SPACED FASTENERS*
(3) MIN. FOR 12"
(4) MIN. FOR 16", 17" & 18"

NOTE:
* ADDITIONAL FASTENERS MAY BE REQUIRED IN HIGH SNOW LOAD AREAS. SEE APPENDIX.
1/8" RIVETS @ 12" O.C.

3/16"x7/8" CONTINUOUS BUTYL TAPE

ZEE CLOSURE (ZC219)

OPEN VENT AREA

NON-SKINNING BUTYL SEALANT AT ENDS FILL ALL GAPS

RIDGE CAP
10" (RH168)
12" (RH170)

#8-18 x 3/4" HWH W/ SEALING WASHER @ PANEL RIBS AND POP RIVET BETWEEN @ 12" MAX.

OPEN VENT AREA

SPECIFIED UNDERLAYMENT (NOT BY AEP-SPAN)

SUBSTRATE

PANEL

EQUALLY SPACED FASTENERS*
(3) MIN. FOR 12"
(4) MIN. FOR 16", 17" & 18"

NOTES:
▲ CUSTOMER MUST PROVIDE VENT AREA REQUIREMENTS
* ADDITIONAL FASTENERS MAY BE REQUIRED IN HIGH SNOW LOAD AREAS. SEE APPENDIX.
1/8" rivets in sealant line if necessary to close "fishmouth".

HIGH EAVE TRIM

Non-skinnin BUTYL SEALANT AT ENDS FILL ALL GAPS

Equally spaced fasteners*
(3) min. for 12"
(4) min. for 16", 17" & 18"

PanCake HEAD fastener 12" o.c.

TRIM CLEAT

3/16"x7/8" continuous butyl tape

Specified underlayment (not by AEP-Span)

ZEE CLOSURE TRIM (ZC219)

6" (HE069)
7" (HE071)
8" (HE073)

ZEE CLOSURE TRIM (ZC219)

1/8" pop rivets @ 12" o.c.

HIGH EAVE FLASHING

Specified underlayment (not by AEP-Span)

PanCake HEAD fastener @ 12" o.c.

TRIM CLEAT (TC209)

Equally spaced fasteners*
(3) min. for 12"
(4) min. for 16", 17" & 18"

3/16"x7/8" continuous butyl tape

SUBSTRATE

Non-skinnin BUTYL SEALANT AT ENDS FILL ALL GAPS

NOTE:
* Additional fasteners may be required in high snow load areas. See Appendix.

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DESIGN SPAN HP EAVE - HIGH

REV. 11/15/12

DS-17
NOTE:
REFER TO EAVE & RIDGE DETAILS FOR FURTHER INFORMATION ON PROPER PANEL TERMINATIONS.
**ROOF JACK**

- **Design Span HP Panel**
- **Pipe Penetration**
- **Stainless Steel Hose Clamp**
  - (Not by AEP-Span)
- **Specified Underlayment**
  - (Not by AEP-Span)
- **3" Min Both Sides**
- **Roof Jack (Dektite or Equiv.)**
  - Refer to manufacturer's instructions for installation
- **Notes:**
  1. Penetrations should be centered in panels if at all possible
  2. Substrate must be cut out enough so that roof jack is only attached to roof panel.
- **Field Cut Hole 1" Min. Larger Than Pipe. Locate All Pipe in the Broad Flat of the Panel.**

**ROOF CURB**

- **Contact AEP Span Representative if additional roof penetration information is required.**
- **Slope**
- **Roof Curb**
- **Design Span HP Panel**
- **4" Min Clearance**
- **PanCake Head Fasteners**
  - Under curb flashing to fix lower panel to substrate.
- **Cricket / Uphill Flashing**
  - Refer to detail #DS-21
- **Lower Panel Must Extend 9" Min Under Curb Flashing.**
- **Curb Side Wall Flashing**
  - Refer to detail #DS-20
- **Curb Downhill Flashing**
  - Refer to detail #DS-21

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**Design Span HP**

**Roof Penetrations**

DS-20

REV. 11/15/12
EQUIPMENT TRIM (NOT BY AEP-SPAN)
1/8" RIVETS @ 12" O.C.
1 1/2" MIN.
3/16"x7/8" CONTINUOUS DOUBLE BEAD BUTYL TAPE

ROOF CURB (NOT BY AEP-SPAN)

FIELD FABRICATED SIDEWALL TRIM

4" MIN.

ZEE CLOSURE (ZC219)
NOTE:
CURBS 24" WIDE OR GREATER REQUIRE USE OF CRICKETS. CRICKETS OPTIONAL ON NARROWER CURBS.
## Appendix A: Snow Drag Loads (lbs/ft of panel)

### 12" Design Span hp

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### 16" Design Span hp

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### Notes:
- To determine drag load forces per panel, multiply the tabulated value by the panel length. Then refer to Appendix B for fastener schedule.
- Values assume Ground Snow Load ($P_g$) is provided. Drag Loads may be reduced if actual Roof Snow Loads ($P_r$), per ASCE-7, are provided by customer.
- For roof slopes and snow loads greater than listed above, please contact your AEP Span representative.
### Appendix A: Snow Drag Loads (lbs/ft of panel)

#### 17" Design Span hp

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#### 18" Design Span hp

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Notes:
- To determine drag load forces per panel, multiply the tabulated value by the panel length. Then refer to Appendix B for fastener schedule.
- Values assume Ground Snow Load ($P_g$) is provided. Drag Loads may be reduced if actual Roof Snow Loads ($P_s$), per ASCE-7, are provided by customer.
- For roof slopes and snow loads greater than listed above, please contact your AEP Span representative.
### Appendix B: Drag Load Resistance

<table>
<thead>
<tr>
<th>Fastener Type</th>
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<th>Capacity (lbs)</th>
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<td>234</td>
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<td>1/4-14 x 7/8&quot; Lap SD HWH</td>
<td>22ga Steel min.</td>
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<td>#14 x 1&quot; Type A Mill. Point HWH</td>
<td>1/2&quot; Plywood min.</td>
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<td>2x Douglas Fir</td>
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<td>114</td>
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<td>22ga Steel min.</td>
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<td>#10-12 x 1&quot; Type A Pancake Head</td>
<td>1/2&quot; Plywood min.</td>
<td>108</td>
<td>216</td>
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<tr>
<td>#10-12 x 1&quot; Type A Pancake Head</td>
<td>2x Douglas Fir</td>
<td>54</td>
<td>108</td>
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**Example:**

16" Design Span hp attached to 1/2" plywood.
- 4:12 slope
- 30psf snow load
- 40ft maximum panel length
- #10-12 pancake head fasteners used

a) From Appendix A, find the drag load per linear foot of panels: 4:12 & 30psf snow load = 15.2 lbs/ft
b) Multiply the load by the panel length = 15.2lbs/ft X 40ft = 608lbs drag load per panel.
c) Find the drag load in Appendix B.

The nearest value is 648 lbs for Qty=6, #10-12 x 1" type A pancake head fasteners.

**Notes:**
- Contact your AEP Span representative if there are any questions regarding the use of these appendices.
- Fasteners must be located a minimum of 1" from each other and from the end of the panel.