# Recommended Details for Hot-Dip Galvanized Structures

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<td>COMBINATION SECTION - CHANNEL &amp; ANGLE</td>
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1. THE CONTENTS OF THIS PUBLICATION ARE THE RESULT OF A WIDESPREAD SURVEY CONDUCTED AMONG AGA MEMBERS. SOME GALVANIZERS MAY PREFER DIFFERENT DETAILS, BASED UPON THEIR OWN EXPERIENCES, TO ACHIEVE DESIRED RESULTS IN THE GALVANIZED PRODUCT.

2. CERTAIN DETAILS CALL FOR WELDING AFTER GALVANIZING. MORE INFORMATION CONCERNING WELDING AND SUBSEQUENT TOUCH-UP OF GALVANIZED STEEL IS AVAILABLE IN THE AMERICAN GALVANIZERS ASSOCIATION’S (AGA) WELDING & HOT-DIP GALVANIZING PUBLICATION. IF POSSIBLE, STEELWORK SHOULD BE DESIGNED TO BE BOLTED RATHER THAN WELDED AFTER GALVANIZING.

3. WELDING SYMBOLS ARE THOSE DEFINED IN AWS A2.4-2012 WELDING & HOT-DIP GALVANIZING PUBLICATION. SHOP WELDING SYMBOLS ARE USUALLY ACCOMPANIED BY A NOTATION “INTERMITTENT” OR BY “CONT.” MEANING CONTINUOUS. IN THE ABSENCE OF ANY OTHER NOTATION, IT IS ASSUMED THE WELD WILL BE CONTINUOUS (AWS A3.0-2010 INCLUDES STANDARD WELDING TERMS AND DEFINITIONS.)

4. CLASS I
DETAILS ARE THOSE CONSISTING OF PARTS JOINED TOGETHER BY A FULL SEAL WELD, OR PARTS WHICH ARE BOLTED TOGETHER AFTER GALVANIZING. THIS CLASS REPRESENTS THE HIGHEST DEGREE OF CORROSION PROTECTION ATTAINABLE, BUT DOES REQUIRE MORE FABRICATION COST.

5. CLASS II
DETAILS ARE THOSE CONSISTING OF OVERLAPPING PARTS JOINED TOGETHER BY SEAL WELDING AND WHICH HAVE AN OVERLAP AREA LARGE ENOUGH TO NEED VENTING IN ACCORDANCE WITH THE APPROPRIATE GUIDELINES OF NOTE 7. A VERY HIGH DEGREE OF CORROSION PROTECTION IS AVAILABLE WITH THESE DETAILS, ALTHOUGH NOT QUITE EQUAL TO CLASS I. MORE WORK IS REQUIRED THAN IS CUSTOMARY FOR NORMAL FABRICATION STANDARDS. IT SHOULD BE NOTED CLASS II CAN BE UPGRADED TO CLASS I BY PLUGGING VENTS AFTER GALVANIZING.

6. CLASS III
DETAILS DO NOT INCLUDE SEAL WELDING AND MAY REQUIRE ONLY SLIGHTLY MORE FABRICATION EFFORT THAN NORMALLY EMPLOYED ON A NON-GALVANIZED STRUCTURE. CLASS III DETAILS ENABLE THE GALVANIZING TO PROVIDE A DEGREE OF CORROSION PROTECTION THAT MEETS OR EXCEEDS THE PROTECTION PROVIDED BY MOST INDUSTRIAL COATINGS TO IDENTICAL DETAILS.

7. PIN HOLES MAY EXIST IN SEAL WELDS AROUND OVERLAPS IN CLASS I DETAILS. LIQUIDS FROM GALVANIZER’S CLEANING BATHS MAY PASS THROUGH THE PIN HOLE AND ENTER THE OVERLAP AREA, WHERE IT WILL REMAIN AS IT IS IMMERSED IN THE MOLTEN ZINC. POSSIBILITY OF EXPLOSION EXISTS AS THE TRAPPED LIQUID VAPORIZES AND EXPANDS AT A TEMPERATURE OF APPROXIMATELY 850 F. DANGER OF EXPLOSION IS MORE ACUTE FOR LARGER OVERLAPPED AREAS. IT IS RECOMMENDED THE FABRICATOR PROVIDE A VENT IN ONE OF THE OVERLAPPING PLATES ACCORDING TO THE FOLLOWING GUIDELINES. LOCATION OF THE VENTS NEED NOT BE EXACT, PROVIDED THEY ARE IN THE SAME GENERAL LOCATION AS SHOWN ON THE DRAWING. ARRANGEMENTS MAY BE MADE FOR INSTALLATION OF VENT HOLES BY THE GALVANIZER.

<table>
<thead>
<tr>
<th>OVERLAPPED AREA (IN²)</th>
<th>VENTING REQUIREMENTS</th>
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</thead>
<tbody>
<tr>
<td>&lt; 16</td>
<td>NONE</td>
</tr>
<tr>
<td>&gt; 16 AND &lt; 64 WHEN STEEL IS ≤ 1/2&quot; THICK</td>
<td>ONE 3/8&quot; Dia. hole, or leave 1&quot; of weld undone adjacent to same location</td>
</tr>
<tr>
<td>&gt;16 AND &lt; 64 WHEN STEEL IS &gt; 1/2&quot; THICK</td>
<td>NONE</td>
</tr>
<tr>
<td>≥ 64 AND &lt; 400</td>
<td>ONE 1/2&quot; DIAMETER HOLE, OR leave 2&quot; of weld undone adjacent to same location</td>
</tr>
<tr>
<td>EACH INCREMENT OF 400</td>
<td>ONE 3/4&quot; DIAMETER HOLE, OR leave 4&quot; of weld undone adjacent to same location</td>
</tr>
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</table>

8. EMISSIONS FROM THE UNSEALED OVERLAPS OF CLASS II AND CLASS III DETAILS MAY CAUSE A STAIN ON THE SURFACE OF THE COATING. THIS APPLIES WHETHER THE COATING IS PAINT OR GALVANIZING. THE STAIN IS USUALLY SUPERFICIAL AND WILL DISAPPEAR IN TIME AS THE GALVANIZING WEATHERS.

9. MOISTURE STEAMING FROM UNSEALED OVERLAPS IN CLASS II AND CLASS III JOINTS MAY RESULT IN SLIGHT BARE SPOTS ALONG THE LINE OF THE EXHAUST. IF TOUCH-UP OF THESE IS REQUIRED IT MAY BE ACCOMPLISHED BY ANY OF THE MATERIALS DESCRIBED IN ASTM A780 STANDARD PRACTICE FOR REPAIR OF HOT-DIP GALVANIZED COATINGS.

10. AFTER GALVANIZING, FINISHED ENDS OF COLUMN SECTIONS SHALL BE GROUND SMOOTH TO REMOVE PROJECTIONS.
CLASS I
IF NO VENT HOLE IS REQUIRED PER NOTE 7

CLASS II
IF VENT HOLE IS REQUIRED

CLASS III
CONT. OR INTERMITTENT TO MEET DESIGN LOAD

CONT. WELD

SEE NOTE 7

BOLT AFTER GALVANIZING

FRAME BEAM CONNECTION

AMERICAN GALVANIZERS
ASSOCIATION

EST. 1935

DRAWING 1
CAUTION: THIS SECTION IS SUBJECT TO WARPAGE AND MAY REQUIRE STRAIGHTENING AFTER GALVANIZING. TO MINIMIZE WARPAGE, REFER TO THE RECOMMENDATIONS OF THE AGA AND ASTM A384.
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CLASS I

IF NO VENT HOLE IS REQUIRED PER NOTE 7

CLASS II

IF VENT HOLE IS REQUIRED

CLASS III

(FOR GUSSETS USED WITH SINGLE SECTIONS)

* CONNECTION MAY BE CUT FROM W.M. OR S HOPE AT DESIGNER'S OPTION

CLASS III

(FOR GUSSETS USED WITH COMBINED SECTIONS)

CLASS I IS NOT USUALLY ATTAINABLE FOR THIS DETAIL WHEN COMBINED SECTIONS ARE USED, EXCEPT WHEN GUSSET AND ANGLE DIMENSIONS PERMIT A SEAL WELD ON BOTH ANGLES ALONG LINE Y THEN SEE CLASS I FOR VENTING.

NOTE: FOR CONNECTION FROM PLATES USE CONT. OR INTERMITTENT WELD AS REQUIRED TO MEET DESIGN LOAD.
CONT. WELD FOR CONNECTION FROM PLATES

BOLT AFTER GALVANIZING

NOTE: FOR CONNECTION FROM PLATES
USE CONT. OR INTERMITTENT WELD AS REQUIRED TO MEET DESIGN LOAD

CLASS I

FOR GUSSETS USED WITH SINGLE OR COMBINED SECTIONS

* CONNECTION MAY BE CUT FROM W, M, OR S SHAPES AT DESIGNER'S OPTION.

CLASS III

FOR GUSSETS USED WITH SINGLE OR COMBINED SECTIONS

BOLT AFTER GALVANIZING

SEE NOTE BELOW
INSTEAD OF CUT-OUT, AS SHOWN, A 1/2" DIA. HOLE OR NOTCH (SEE DETAIL) MAY BE LOCATED AS CLOSE TO THE EDGE OF THE "T" DISTANCE AS POSSIBLE.

CLASS 1

ALTERNATE DETAIL FOR DRAIN IN WEB

STIFFENER PLATE, IF REQUIRED
INSTEAD OF CUT-OUT, AS SHOWN, A \( \frac{1}{2} \)" DIA. HOLE OR NOTCH (SEE DETAIL) MAY BE LOCATED AS CLOSE TO THE EDGE OF THE "T" DISTANCE AS POSSIBLE.

BASE PLATE SHOP WELDED TO COLUMN SHAFT BEFORE GALVANIZING

CLASS I

BASE PLATE SHOP WELDED TO COLUMN SHAFT BEFORE GALVANIZING

CLASS III

ALTERNATE DETAIL FOR DRAIN IN WEB

USE CONT. OR INTERMITTENT WELD AS REQUIRED TO MEET DESIGN LOAD.
CLASS 1

SEE NOTE 2

FINISH COL.

SEE NOTE 10

SLEEP TEXT BLANK
CLASS I

ALL DETAILS SHOWN FOR CLASS III ALSO APPLY TO CLASS I

CLASS III

MOMENT RESISTING COLUMN BASE (BASE PLATE FIELD WELDED)
SEE NOTE 7
VENT HOLES (IF ANY) IN OTHER OVERLAP PLATES, ON EITHER FLANGE OF THE COLUMN, SHALL BE LOCATED CLOSE TO THE SAME EDGE, AS ABOVE, REGARDLESS OF WHICH WAY THE OTHER PLATE PROJECTS.

CLASS I
IF NO VENT HOLE IS REQUIRED PER NOTE 7

CLASS II
IF VENT HOLE IS REQUIRED

ALTERNATE DETAIL FOR
DRAIN IN WEB

CLASS III

USE CONT. OR INTERMITTENT WELDS AS REQUIRED TO MEET DESIGN LOADS.

INSTEAD OF CUT-OUT, AS SHOWN, A 1/2" DIA. HOLE, OR NOTCH (SEE DETAIL), MAY BE LOCATED AS CLOSE TO THE EDGE OF THE "T" DISTANCE AS POSSIBLE.
CLASS I

CLASS III

NOTE FOR BOTH CLASSES: BEVEL WELD MAY BE USED INSTEAD OF FILLET WELD, AT DESIGNERS OPTION.
**CLASS I**

Depth of $D_u$ and $D_l$ nominally the same

**CLASS I**

Depth $D_u$ nominally 2" less than $D_l$
Instead of cut-out, as shown, a 1/8" dia. hole or notch (see detail) may be located as close to the edge of the "T" distance as possible.

Bolt after galvanizing

Use cont. or intermittent weld as required to meet design load.

Alternate detail for drain in web.
Instead of cut-out, as shown, a 1/2" dia. hole or notch (see detail) may be located as close to the edge of the "T" distance as possible.

Use cont. or intermittent weld as required to meet design load.

Alternate detail for drain in web.

Class II

Class III

Butt plate column splice welded.

Drawing 19

American Galvanizers Association, est. 1935
NOTE:
VENT HOLES (IF ANY) IN OTHER OVERLAP PLATES ON EITHER FLANGE OF THE COLUMN SHALL BE LOCATED CLOSE TO THE SAME EDGE, AS ABOVE, REGARDLESS OF WHICH WAY THE OTHER PLATE PROJECTS.

CLASS I
CLASS II
CLASS III

IF NO VENT HOLE IS REQUIRED PER NOTE 7
BOLT AFTER GALVANIZING

AMOUNT OF WELD IN THIS DETAIL MUST NOT EQUAL AMOUNT SHOWN FOR CLASS I DETAIL.
CLASS I
IF NO VENT HOLE IS REQUIRED PER NOTE 7

CLASS II
IF VENT HOLE IS REQUIRED

VENT HOLES, IF ANY, IN LACING SHALL BE LOCATED APPROXIMATELY AT THE CENTER OF EACH OVERLAP AREA. SEE NOTE 7.