Designing with Details TS025B and TS025C

Purpose

Until now, there have been no Standard Details addressing truss to truss connections where vertical and horizontal reactions are present. Standard Details TS025B and TS025C were created to fill this gap, with cantilevered 45º hip corners in mind as a prime use. However, these new details are applicable to any 45º truss condition where the supported trusses have both horizontal and vertical reactions.

Connection Information on Truss Conditions with Vertical and Horizontal Reactions

In the past, customers have received general guidance from TrusSteel engineers similar to Figure 1 below for designing conditions where the supported trusses have both horizontal and vertical reactions.

TRUSS WITH HORIZONTAL AND VERTICAL REACTIONS – SUPPORT ONE END

GIRDER WEB SIZE (Girder Supports Truss with Horizontal Reactions)	MAXIMUM AXIAL FORCE IN GIRDER WEB (LBS.)	MAXIMUM LENGTH OF GIRDER WEB (in.)	MAXIMUM HORIZONTAL REACTION OF SUPPORTED TRUSS (LBS.)
33W.75X.75	N\A	N\A	N\A
33W.75X1.5	542	36	175
33W.75X2.25	850	39	250
33W1.5X1.5	860	56	175
33W1.5X2.0	900	60	280
47W1.5X2.5	1350	60	570
63W1.5X3.5	3550	60	950

•NOTE: There must be an equal and opposite supported truss on both sides of the supporting girder web

Figure 1

Figure 1 is a partial set of information included in Standard Detail drawings TS025B and TS025C, shown in the chart format that TrusSteel engineers have sent out to customers in the past. Using the information given in Figure 1, the truss designer would compare the horizontal reaction on the truss shop drawing to the “Maximum Horizontal Reaction of Supported Truss” column. If the truss horizontal reaction exceeds what is shown in Figure 1, then the chart cannot be used. Likewise, the axial force in the supporting girder web and the length of the supporting girder web cannot exceed the values shown for the sizes shown. As noted in Figure 1, there must be an equal and opposite supported truss on both faces of the supporting girder web. **IMPORTANT** – When using Standard Details TS025B and C, there are other items referenced in the Standard Details, not shown in Figure 1, that need to be checked to determine the adequacy of the designs. For these items refer to TS025B and TS025C.

The information in charts like Figure 1 is very general in nature, and is not connection specific. Depending on the connection designed to attach the supported truss web to the girder web, the values in the above chart are subject to change. Details TS025B and TS025C provide specific information to the truss designer, the truss manufacturer and the truss installer by calling out the connection required and the corresponding design values for that connection.

Important Factors Regarding the Use of TS025B and TS025C

When using Standard Details TS025B and TS025C, the following limitations must be understood.

1. The placement of the girder web is specified in the Detail. When designing the girder, the truss designer must correctly place the supporting girder web in order for the allowable reactions in the Details and the clip dimensions given in Table 1 of this Technical Bulletin to be applicable. The concentrated load from the supported trusses must also be applied in line with the correctly placed girder web in truss analysis.
2. There must be identical supported trusses on both faces of the supporting girder web.
3. The screws applied to the exterior clips (on the supported truss webs) may NOT be placed further than 1.00" from the interior edge of the supported truss. This limit is detailed on TS025B and TS025C. (For 1.5"X1.5" supported truss webs, this is not an issue, so regular end, edge and spacing distances apply.)
4. Two clip pairs are required for all connections. Clip pairs may not be placed further than 6 ¾" away from TSC4.00 girder chords or 5 ¼" away from TSC2.75 girder chords. This distance is measured from the open edge of the girder chords to the closest edge of the clip pairs, and is detailed on TS025B and TS025C.
5. The 33W.75X.75 is **NOT** acceptable to be used for the girder web.
6. Clip dimensions are specific for each supported truss web to girder web connection. These dimensions are given in Table 1 of the next section entitled "Utilization of Details TS025B and TS025C".
7. The truss designer must verify that not only do the vertical and horizontal reactions of the supported trusses comply with the values given in the Details, but also that the axial force in the supporting girder web and the length of the supporting girder web does not exceed the values given in the Details.

Utilization of Standard Details TS025B and TS025C

Both Details use two pairs of 16 gauge ASTM A653 SS Grade 50 Class 1 G60 steel plates to connect the supported trusses to the supporting girder web at 45º. The height of all clips is 3.5", as shown in Figure 2. TS025B is to be used for the connection of supported trusses to TSC2.75 girders, while TS025C is to be used for the connection of supported trusses to TSC4.00 girders.

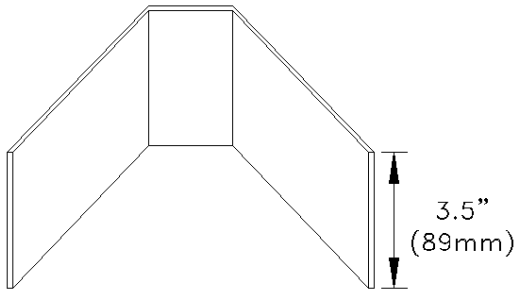

Figure 2

Each clip pair is comprised of an "interior clip" and an "exterior clip", as shown in Figure 3. The interior clip connects the girder web to the inside faces of the supported trusses, while the exterior clip connects the girder web to the outside faces of the supported trusses.

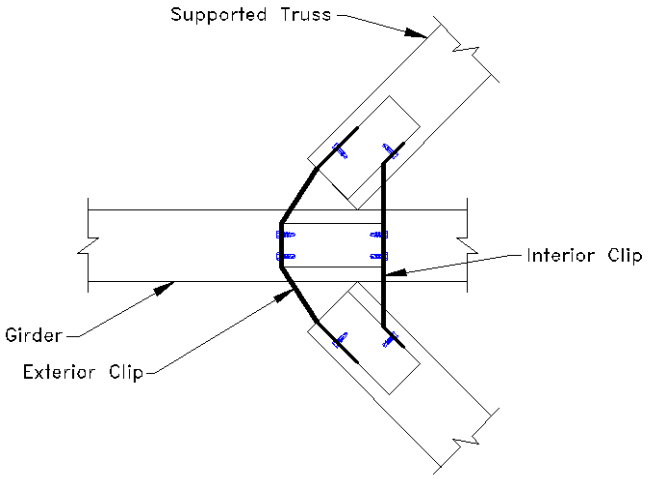

Figure 3

For each supported truss web to girder web combination, the corresponding clip shapes and dimensions are unique. For all possible connections, each clip will be one of the 3 basic shape types shown below in Figure 4; “Type A”, “Type B”, or “Type C”. Although all the clips will conform to one of these basic shapes, the dimensions “L1”, “L2”, “L3”, and the angles “A” and “B” will vary for each different connection.

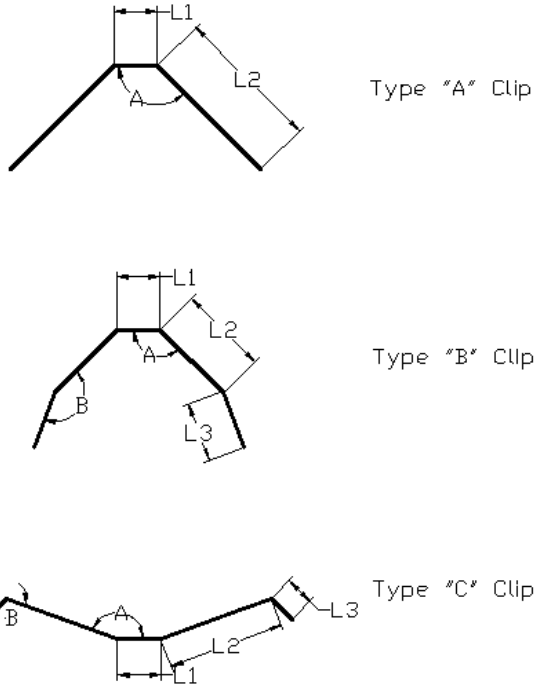

Figure 4

Table 1 gives a listing of all possible supported truss web to girder web combinations with corresponding clip shape types and specific dimensions for both the interior and the exterior clips. Keep in mind that the 33W.75X.75 is not acceptable for the girder web.

Table 1. Clip Shapes and Dimensions for TS025B and TS025C Connections

		Exterior Clip						Interior Clip					
Girder Web	Supported Truss Web	Type	L1 (in)	L2 (in)	L3 (in)	A (º)	B (º)	Type	L1 (in)	L2 (in)	L3 (in)	A (º)	B (º)
33W.75x1.5	33W.75x1.5	B	3/4	1 1/4	1 5/8	158	158	A	3	1	N/A	135	N/A
	33W.75x2.25	B	3/4	1 1/4	1 5/8	158	158	A	3	1	N/A	135	N/A
	33W1.5x1.5	B	3/4	1 3/4	1 5/8	173	142	A	2 5/8	1	N/A	135	N/A
	33W1.5x2.0	B	3/4	1 3/4	1 5/8	173	142	A	2 5/8	1	N/A	135	N/A
	33W1.5x2.5	B	3/4	1 3/4	1 5/8	173	142	A	2 5/8	1	N/A	135	N/A
	33W1.5x3.5	B	3/4	1 3/4	1 5/8	173	142	A	2 5/8	1	N/A	135	N/A
33W.75x2.25	33W.75x1.5	A	3/4	3	N/A	144	N/A	C	3/4	1 1/4	1	164	119
	33W.75x2.25	A	3/4	3	N/A	144	N/A	A	3 3/4	1	N/A	135	N/A
	33W1.5x1.5	B	3/4	1 7/8	1 5/8	162	153	A	3 3/8	7/8	N/A	135	N/A
	33W1.5x2.0	B	3/4	1 7/8	1 5/8	162	153	A	3 3/8	1	N/A	135	N/A
	33W1.5x2.5	B	3/4	1 7/8	1 5/8	162	153	A	3 3/8	1	N/A	135	N/A
	33W1.5x3.5	B	3/4	1 7/8	1 5/8	162	153	A	3 3/8	1	N/A	135	N/A
33W1.5x1.5	33W.75x1.5	B	1 1/2	1 3/8	1 5/8	159	156	A	4	1	N/A	135	N/A
	33W.75x2.25	B	1 1/2	1 3/8	1 5/8	159	156	A	4	1	N/A	135	N/A
	33W1.5x1.5	B	1 1/2	1 7/8	1 5/8	173	142	A	3 5/8	1	N/A	135	N/A
	33W1.5x2.0	B	1 1/2	1 7/8	1 5/8	173	142	A	3 5/8	1	N/A	135	N/A
	33W1.5x2.5	B	1 1/2	1 7/8	1 5/8	173	142	A	3 5/8	1	N/A	135	N/A
	33W1.5x3.5	B	1 1/2	1 7/8	1 5/8	173	142	A	3 5/8	1	N/A	135	N/A
33W1.5x2.0	33W.75x1.5	B	1 1/2	1 1/2	1 5/8	150	165	C	1 1/2	1 1/4	1	171	126
	33W.75x2.25	B	1 1/2	1 1/2	1 5/8	150	165	A	4 1/2	1	N/A	135	N/A
	33W1.5x1.5	B	1 1/2	2	1 5/8	166	149	A	4 1/8	1	N/A	135	N/A
	33W1.5x2.0	B	1 1/2	2	1 5/8	166	149	A	4 1/8	1	N/A	135	N/A
	33W1.5x2.5	B	1 1/2	2	1 5/8	166	149	A	4 1/8	1	N/A	135	N/A
	33W1.5x3.5	B	1 1/2	2	1 5/8	166	149	A	4 1/8	1	N/A	135	N/A
33W1.5x2.5	33W.75x1.5	A	1 1/2	3 1/4	N/A	143	N/A	C	1 1/2	1 3/8	1	161	116
	33W.75x2.25	A	1 1/2	3 1/4	N/A	143	N/A	A	5	1	N/A	135	N/A
	33W1.5x1.5	B	1 1/2	2	1 5/8	159	156	C	1 1/2	1 3/8	1	172	127
	33W1.5x2.0	B	1 1/2	2	1 5/8	159	156	A	4 5/8	1	N/A	135	N/A
	33W1.5x2.5	B	1 1/2	2	1 5/8	159	156	A	4 5/8	1	N/A	135	N/A
	33W1.5x3.5	B	1 1/2	2	1 5/8	159	156	A	4 5/8	1	N/A	135	N/A
33W1.5x3.5	33W.75x1.5	A	1 1/2	3 5/8	N/A	132	N/A	C	1 1/2	1 5/8	1	144	99
	33W.75x2.25	A	1 1/2	3 5/8	N/A	132	N/A	C	1 1/2	1 7/8	1	167	122
	33W1.5x1.5	A	1 1/2	3 7/8	N/A	147	N/A	C	1 1/2	1 1/2	1	154	109
	33W1.5x2.0	A	1 1/2	3 7/8	N/A	147	N/A	C	1 1/2	1 3/4	1	169	124
	33W1.5x2.5	A	1 1/2	3 7/8	N/A	147	N/A	A	5 5/8	1	N/A	135	N/A
	33W1.5x3.5	A	1 1/2	3 7/8	N/A	147	N/A	A	5 5/8	1	N/A	135	N/A

Points to Remember

Details TS025B and TS025C are intended for 45º truss to truss connections with horizontal as well as vertical reactions. There must be identical supported trusses on both faces of the girder, and two clip pairs are required for all connections. In order to use the allowable values given in these Details and the dimensions given in Table 1 of this Technical Bulletin, the girder web must be positioned as specified in the Details. For any special situations not given in these Details or in this Technical Bulletin, please contact a TrusSteel engineer.

Reference Documents

- Standard Details TS025B and TS025C

Revisions

- This Bulletin was originally issued on 04/26/07. It was issued the designation TB06.06.28 in order to coordinate with the Standard Details.