Flush-Frame CONNECTIONS

Up to 35% weight savings with performance equal to wide-flange beams

Steel joists with flush-frame end connections offer significant weight savings compared to wide-flange beams while providing equivalent stiffness and vibration performance. An innovative design from the engineers at New Millennium, our connections feature a joist reaction point designed to occur at the center line of the wide-flange girder. This better-performing design eliminates girder torsion concerns during erection and/or due to final design loading of a perimeter wide-flange girder.

Reduce design time, coordination and costs

Simplifying the flush-frame specification process, our published set of standards improve coordination between the specifier, joist manufacturer, steel fabricator and erector. Our standards for flush-frame end connections reduce design time, accelerate joist and girder fabrication and streamline erection.

Benefits of flush-frame design by New Millennium

- Enhanced floor vibration performance equivalent to wide-flange beams
- Published standards simplify specification
- Eliminates girder torsion concerns
- Eliminates blocking between joist seats for diaphragm shear transfer

Benefits of Joists vs. Wide-Flange Beams

- Up to 35% reduction in weight lowers material and construction costs
- Reduced floor-to-floor height with steel joist MEP integration
- Joist camber built into the manufacturing process with no additional time or cost

NEW MILLENNIUM

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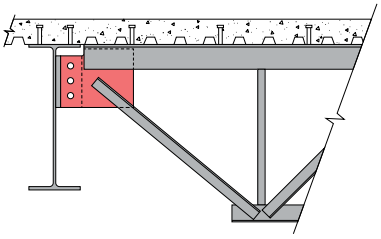
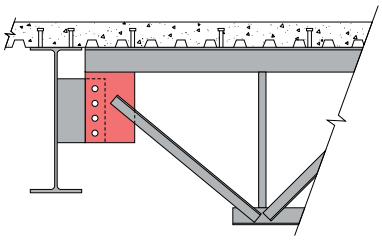
FLUSH-FRAME CONNECTIONS

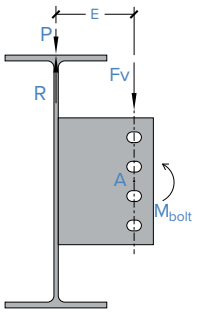
Standard bolted shear connections for flush-frame joists

Under-Flange Flush-Frame Connection



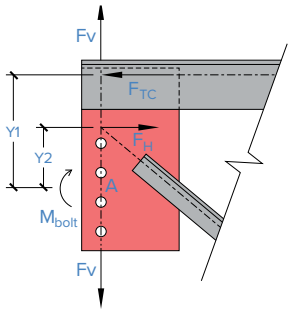
Extended-Tab Flush-Frame Connection





$\Sigma M_A = 0 \quad +\circlearrowleft$

$-R(E) + P(E) + M_{BOLT} = 0$



$\Sigma M_A = 0 \quad +\circlearrowleft$

$F_{TC}(Y1) - F_H(Y2) - M_{BOLT} = 0$

Notes:

- **P** = Resultant of uniform load which is tributary to the end of the joist (½ of the top chord end panel loading, which is not carried by the end web)
- **R** = Joist end reaction
- **E** = Distance from the girder ℄ to bolt ℄
- **M_{bolt}** = Design moment of bolt group (R*E)
- **F_V** = Vertical component of end web (=R-P)
- **F_H** = Horizontal component of end web (=FTc)
- **F_{TC}** = Top chord force (=FH)
- **Y_1** = Distance from top chord centroid to bolt centroid
- **Y_2** = Distance from intersection of end web centroid and bolt ℄ to bolt centroid

EASE OF VIBRATION ANALYSIS USING SJI'S FLOOR BAY ANALYSIS TOOL

steeljoist.org

Under-Flange (UF) Connections

Connection Number	Max Girder Flange Width (in)	Max Joist Vertical LRFD Reaction (kips)	Number of Bolts	Bolt Diameter (in)	Bolt Grade ASTM	Hole Diameter in Joist End Plate (in)	Slot Width in Shear Tab (in)	Slot Length in Shear Tab (in)	Connection Drawing on Website
NMUFC-1	11.50	62	3	1.00	A490-N	1.125	1.125	1.3125	NMUFC-1.pdf
NMUFC-1A	17.50	62	3	1.00	A490-N	1.125	1.125	1.3125	NMUFC-1A.pdf
NMUFC-2	11.50	97	4	1.00	A490-N	1.125	1.125	1.3125	NMUFC-2.pdf
NMUFC-2A	17.50	97	4	1.00	A490-N	1.125	1.125	1.3125	NMUFC-2A.pdf
NMUFC-3	11.50	124	4	1.25	A490-N	1.375	1.375	1.625	NMUFC-3.pdf
NMUFC-3A	17.50	124	4	1.25	A490-N	1.375	1.375	1.625	NMUFC-3A.pdf

Extended-Tab (ET) Connections

Connection Number	Max Girder Flange Width (in)	Max Joist Vertical LRFD Reaction (kips)	Number of Bolts	Bolt Diameter (in)	Bolt Grade ASTM	Hole Diameter in Joist End Plate (in)	Slot Width in Shear Tab (in)	Slot Length in Shear Tab (in)	Connection Drawing on Website
NMETC-1	11.50	26	3	1.00	A490-N	1.125	1.125	1.3125	NMETC-1.pdf
NMETC-2	11.50	47	4	1.00	A490-N	1.125	1.125	1.3125	NMETC-2.pdf
NMETC-2A	17.50	35	4	1.00	A490-N	1.125	1.125	1.3125	NMETC-2A.pdf
NMETC-3	11.50	74	4	1.25	A490-N	1.375	1.375	1.625	NMETC-3.pdf
NMETC-3A	17.50	55	4	1.25	A490-N	1.375	1.375	1.625	NMETC-3A.pdf
NMETC-4	11.50	109	5	1.25	A490-N	1.375	1.375	1.625	NMETC-4.pdf
NMETC-4A	17.50	82	5	1.25	A490-N	1.375	1.375	1.625	NMETC-4A.pdf
NMETC-5	11.50	136	6	1.25	A490-N	1.375	1.375	1.625	NMETC-5.pdf
NMETC-5A	17.50	113	6	1.25	A490-N	1.375	1.375	1.625	NMETC-5A.pdf

DESIGN RESPONSIBILITY NOTICE: Our published set of standards for flush-frame connections are provided as design aids to expedite the design and coordination of open-web steel joists with flush-frame connections to wide-flange girders. The project engineer of record (EOR) is solely responsible for the design of the structure, the specification of the joists, and the selection of appropriate connections between the joist and wide-flange girder. To that end, these details may be used as-is or adapted by the EOR as appropriate to the specific project conditions, including the size of the beam shear tab, size of bolts, grade of bolts, quantity of bolts, and weldment of beam tab plate to the wide-flange girder with appropriate weld size proportionate to the web thickness of the wide-flange girder. New Millennium provides design calculations for each standard connection detail for the EOR to use in validating strength and assessing appropriateness to the specific project. New Millennium is not responsible for verifying whether these connection designs are appropriate for use in any given condition on any given project.

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SCAN QR CODE TO ACCESS CONNECTION DRAWINGS AND CALCULATIONS

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