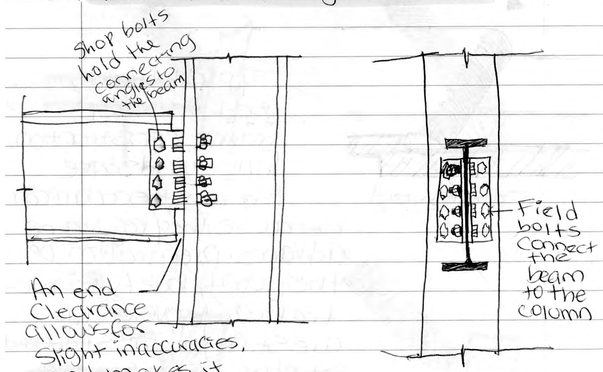
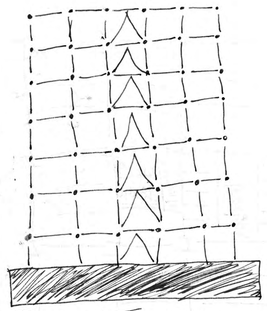
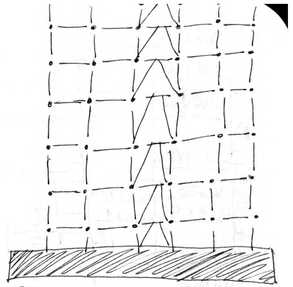
Details of Steel Framing
Typical Connections

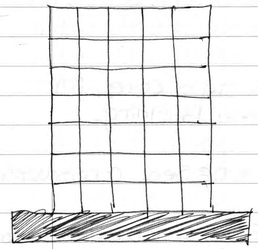
Most steel frame connections use angles, plates, or tees as transitional elements between the members being connected.

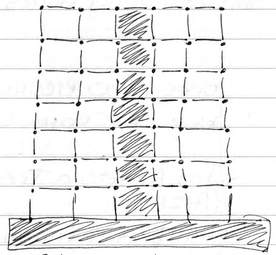
To produce a moment connection, one capable of transmitting bending forces between a beam and column, it is necessary to connect the beam ~~single~~ anges strongly across the joint, most commonly by means of Full-Penetration Groove Welds.



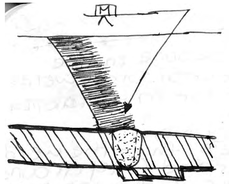

Braced Frame


Eccentrically Braced Frame

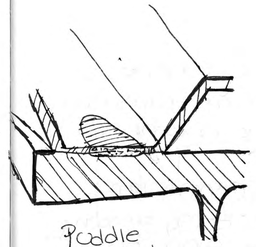

Moment-resisting Frame

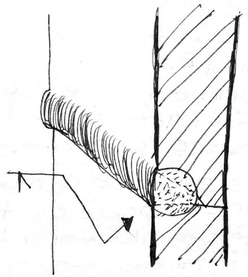

Shear Walls

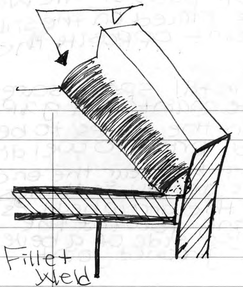
- A special case of the braced frame is the eccentrically braced frame.
- Shear walls are stiff walls made of steel, concrete, or reinforced concrete masonry.

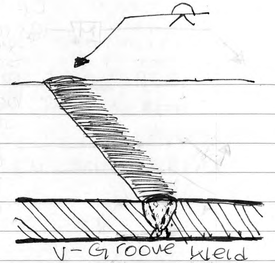

V-Groove Weld with Backup bar.

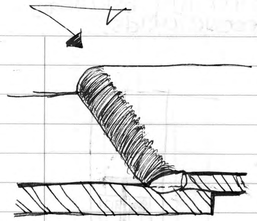
Single-Bevel Groove Weld with Backup Bar.

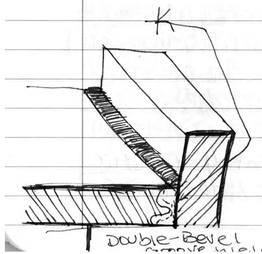

Puddle Weld

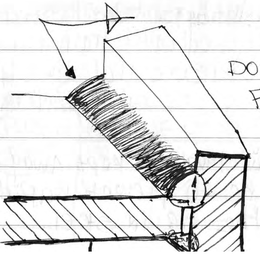

Partial-penetration Single-Bevel Groove Weld


Fillet Weld


V-Groove Weld


Fillet Weld


Double-Bevel Groove Weld


Double Fillet Weld

Typical Welds used in steel frame construction. Fillet welds are the most economical because they require no advance preparation of the joint, but full-penetration groove welds are stronger. ~~The standard symbols used here are explaine~~

Standard welds symbols, as used on steel connection detail drawings.

The Arrow

The reference line carries the descriptive symbols

The arrow points to the weld.

The basic symbols

The basic weld symbol is located on either side of the reference line as follows:

symbols on the top of the reference line refer to welds on the side of the reference line opposite the arrow

symbols on the bottom refer to welds on the side of the reference line on the same side of the joint as the arrow.

Welding

Welding offers a unique and valuable capability to the structural designer: It can join the members of a steel frame as if they were a monolithic whole.

Electric arc welding is conceptually simple.

The basic symbols are

BACK	FILLET	PLUG or SLOT	GROOVE OR BUTT					
			Square	V	Bevel	U	J	Flare V

Flare Bevel

Supplementary symbols

FIELD WELD
This weld must be done in the field during erection. Other welds are done earlier in the fabricator's shop.

WELD ALL AROUND
This indicates that the weld should be carried fully around the perimeter of the joining pieces.

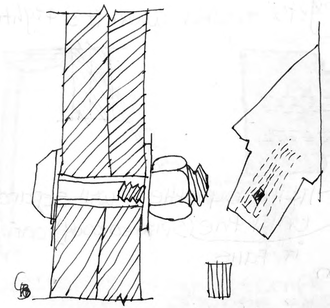
BACKUP BAR
As indicated in this example, a backup bar to support the first pass of the weld must be placed on the side of the joint opposite the arrow.

SPACER
Small metal spacers are used to maintain a gap between the pieces to be joined, prior to welding.

A sharp bend near the end of the arrow indicates that the arrowhead is pointing toward the grooved side of a bevel or J-grooved joint.

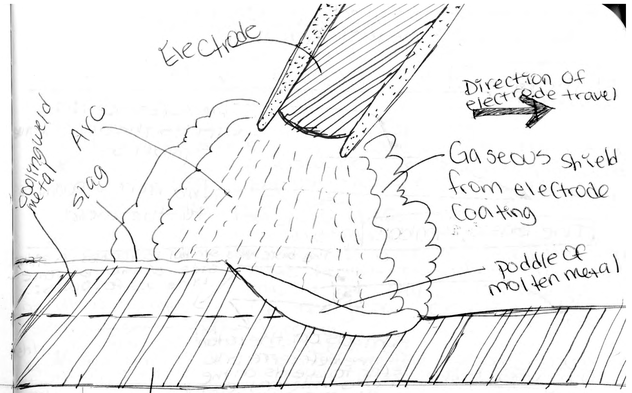
- Workers who do structural welding are methodically trained and periodically tested to ensure that they have the required level of skill and knowledge.

Air must be kept away from the electric arc to prevent rapid oxidation of the liquid steel.



In another method, a load indicator washer, also called a direct tension indicator (DTI), is placed under the head or nut of the bolt.

Less frequently used to verify bolt tension is the calibrated wrench method, in which a special torque control wrench is used to tighten the bolts.

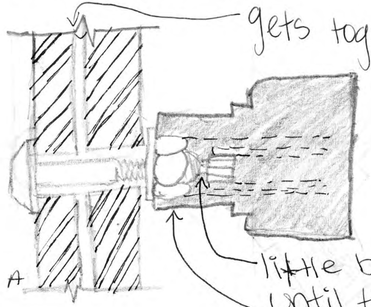


Close-up diagram of the electric arc welding process.

Yet another method of bolt tension verification employs tension control bolts.

An alternative to the high strength bolt is the lockspin and collar fastener or swedge bolt, a bolt like a steel pin with annular rings that relies on a steel collar in lieu of a conventional nut to hold the pin.

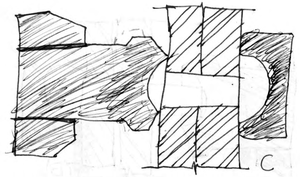
Structure: Steel

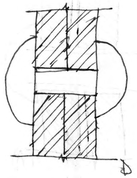


gets together when it's tighten

little by little it will separate until the (splined body) until it falls.

~~Tightening~~
Tightening a tension control ~~bot~~ bolt.
The wrench holds both the nut and the splined body of the bolt and turns them against one another to tighten the bolt.
When the required torque has been achieved, the splined end twists off in the wrench.
A plunger inside the wrench discharges the splined end into a container.

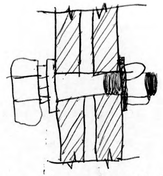


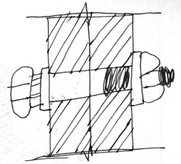


(D) The rivet shrinks as it cools, drawing the members tightly together.

Open-web Steel Joists
Among the many structural steel products fabricated from hot- and cold-rolled shapes, the most common is the open web steel joists (OWSJ), a mass-produced truss used in closely spaced arrays to support door and roof decks

Steel Joist Institute (SJI)





Top: An untightened high-strength bolt with a load indicator washer under the head.
Bottom: The bolt and washer after tightening, notice that the protrusions on the load indicator washer have flattened.

Joining Steel Members (Rivets)
A rivet is a steel fastener consisting of a cylindrical body and a formed head.

BOLTS
The manner in which a bolted structural steel connection derives its strength ~~depending~~ depends on how the bolts are ~~instrat~~ installed.