Welded Connection Design

- considerations
  - shear stress
  - yielding
  - rupture

Welded Connection Design

- weld terms
  - butt weld
  - fillet weld
  - plug weld
  - throat

- field welding
- shop welding

(AISC - Steel Structures of the Everyday)
Welded Connection Design

- **weld process**
  - melting of material
  - melted filler - electrode
  - shielding gas / flux
  - potential defects

- **weld materials**
  - E60XX
  - E70XX
  - \( F_{EXX} = 70 \text{ ksi} \)

Welded Connection Design

- **minimum**
  - table

- **maximum**
  - material thickness ( to ¼”)
  - 1/16” less

- **min. length**
  - 4 x size min.
  - ≥ 1 ½”

Welded Connection Design

- shear
  - \( \frac{R_a}{\Omega} \leq \phi R_n \)
  - \( \phi = 0.75 \)

\[ R_n = 0.6 F_{EXX} T l = S l \]

area

- **shear failure assumed**
- **throat**
  - \( T = 0.707 \times \text{weld size} \)
- **area**
  - \( A = T \times \text{length of weld} \)
- **weld metal generally stronger than base metal (ex. } F_y = 50 \text{ ksi} \)

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Welded Connection Design

- **shear**
  - \( R_a \leq \frac{R_n}{\Omega} \)
  - \( \phi = 0.75 \)

\[ R_n = 0.6 F_{EXX} T l = S l \]

area

- **table for } \phi S \)
Framed Beam Connections

- welded example (shear)

(AISC - Steel Structures of the Everyday)

Framed Beam Connections

- welded moment example

(AISC - Steel Structures of the Everyday)

Framed Beam Connections

- welded/bolted moment example

(AISC - Steel Structures of the Everyday)
Light-gage Steel

- sheet metal
  - shaped
- studs, panels, window frames
- gage
  - based on weight of 41.82 lb/ft² / inch of thickness
  - 24, 22, 18, 16, i.e.
  - 0.0239, 0.0329, 0.0474, 0.0598 in
  - 0.6, 0.85, 1.0, 1.3, 1.6 mm

Steel Decks

- “Texas” style
  - corrugated
- common
  - 1 – 3 spans
  - can be insulated
  - composite
    - with concrete

Steel Decks

- load tables

<table>
<thead>
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<th>VERTICAL LOADS FOR TYPE 3N</th>
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Notes: 1. Load tables are calculated using sectional properties based on the steel design thickness shown in the Steel Deck Institute (SDI) Design Manual.
2. Loads shown in the shaded areas are governed by the live load definition net in excess of 1000 at the span.
3. 3N, 5N, NA, NIA are not covered under Factory Mutual.