Section 2.6 of the book.

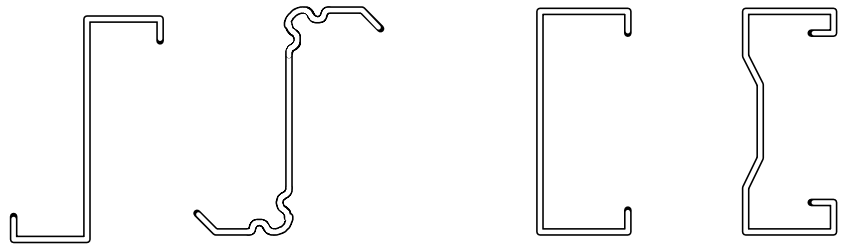
Other international standards for cold-formed steel structures which are in limit states format are the British Standard (Ref. 1.18), the Chinese Standard (Ref. 1.19) and the Eurocode (Ref. 1.20).

### 1.2 Common Section Profiles and Applications of Cold-Formed Steel

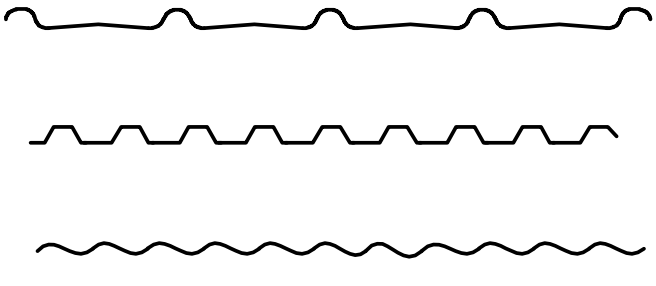
Cold-formed steel structural members are normally used in the following applications:

(a) Roof and wall systems of industrial, rural and commercial buildings

Typical sections for use in roof and wall systems are Z(Zed) or C(Channel) sections as purlins with channel sections as bracing and shallow or deep profile sheeting spanning across the purlins. Screw fasteners are usually located through the crests for roofs and through the pans for walls. Concealed fasteners can also be used and eliminate penetrations in the roof sheeting. Typical sections and profiles are shown in Fig. 1.1, with the innovative Supazed™ Section in Fig. 1.2, and the Kliplok™ Concealed Fixed Sheeting in Fig. 1.3. A purlin lap at a cleat support is shown in Fig. 1.4.




(a) Typical Sections



(b) Typical sheeting profiles for screwed connections

(c) Typical sheeting profiles for concealed fasteners

**Fig. 1.1 Roof and wall section profiles**

**Fig. 1.2 Innovative SupaZed™ section**

**Fig. 1.3 Kliplok™ concealed fixed sheeting**

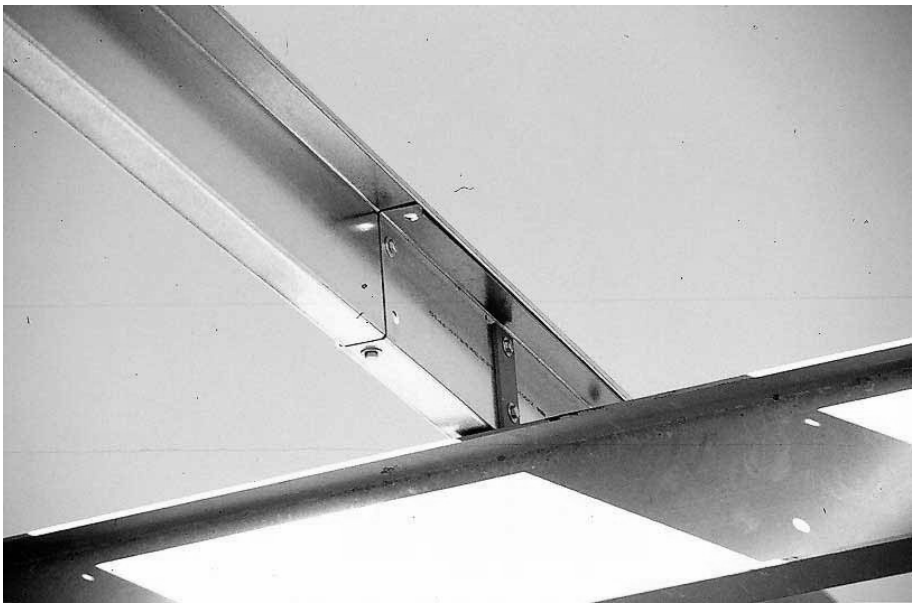


**Fig. 1.4 Purlin lap at cleat support**

(b) Steel racks for supporting storage pallets

Typical uprights are channels with or without additional rear flanges, or tubular sections. Tubular or pseudo-tubular sections such as lipped channels intermittently welded toe to toe are normally used as pallet beams. Typical sections are shown in Fig. 1.5 and a complete steel storage rack in Fig. 1.6. Detailed definitions are given in the Australian Standard AS 4084 (Ref. 1.21). A storage rack system under test is shown in Fig. 1.7.

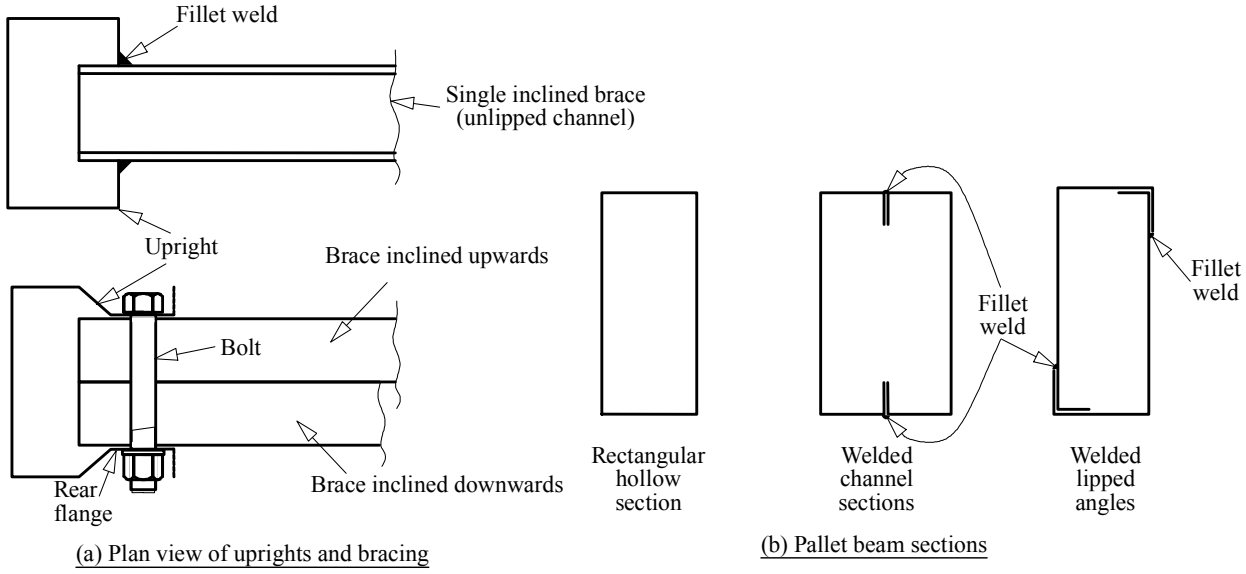



**Fig. 1.5 Storage rack sections**

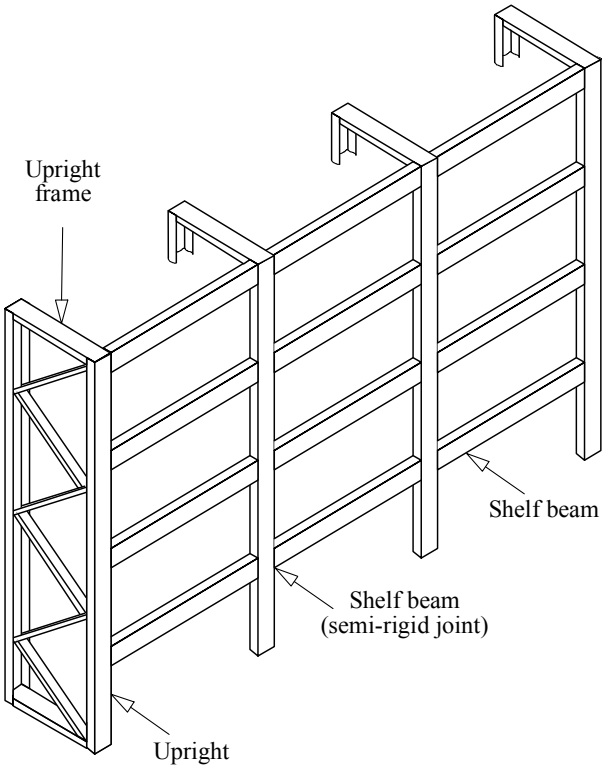



**Fig. 1.6 Complete storage rack system**

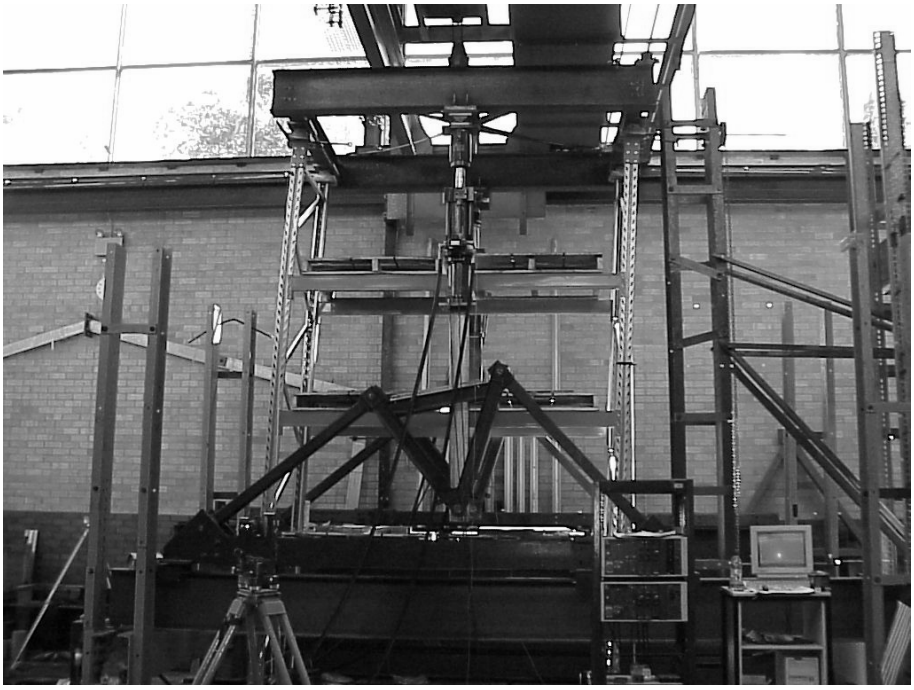


**Fig. 1.7 Storage rack system under test**

(c) Structural members for plane and space trusses

Typical members are circular, square or rectangular hollow sections both as chords and webs usually with welded joints as shown in Fig. 1.8(a). Bolted joints can also be achieved by bolting onto splice plates welded to the tubular sections. Channel section chord members can also be used with tubular braces bolted or welded into the open sections as shown in Fig. 1.8(b). Cold-formed channel and zed sections are commonly used for the chord members of roof trusses of steel framed housing. Trusses can also be fabricated from cold-formed angles. A roof truss under test is shown in Fig. 1.9.

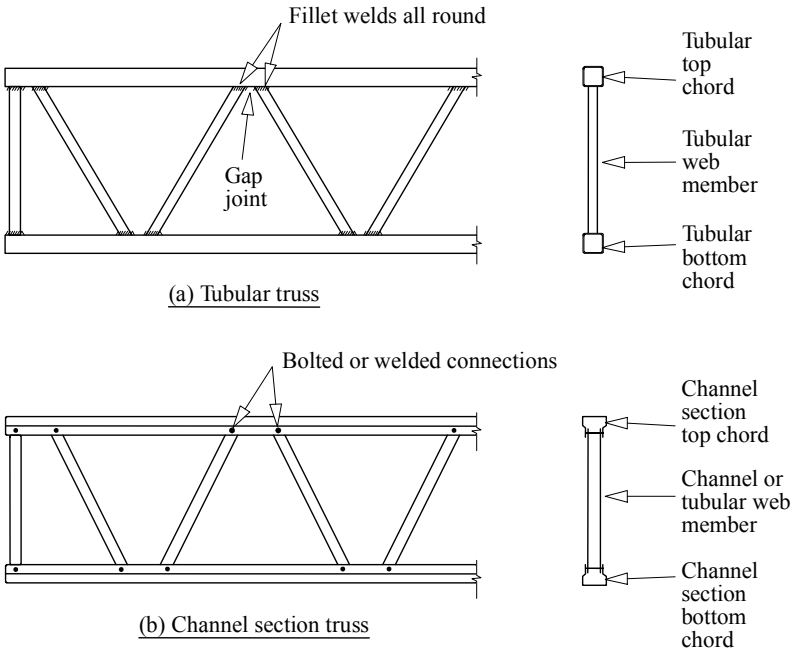



**Fig. 1.8 Plane truss frames**

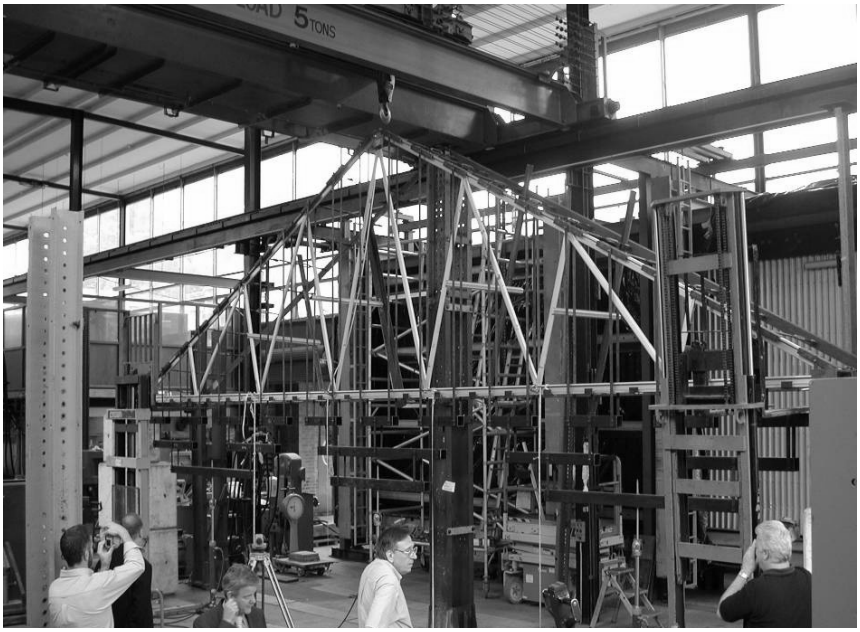


**Fig. 1.9 Roof truss under test**

(d) Frameless stressed-skin buildings

Typical components are sheeting profiles with stiffened edges, used to form such small structures as garden sheds.

(e) Domestic wall framing

Typical members are lipped and unlipped channel sections as wall studs, top and bottom plates and noggins as shown in Fig. 1.10(a). Flat steel straps or panel bracing are normally used as bracing. Detailed definitions of member types are given in the NASH Standard (Ref. 1.22).

(f) Floor bearers and joists

Usually C-sections are used but hat sections as shown in Fig. 1.10(b) can be used. LiteSteel Beams™ (LSB) as described in (k) below can also be used as floor joists and bearers. A two-storey steel frame is shown in Fig. 1.11.

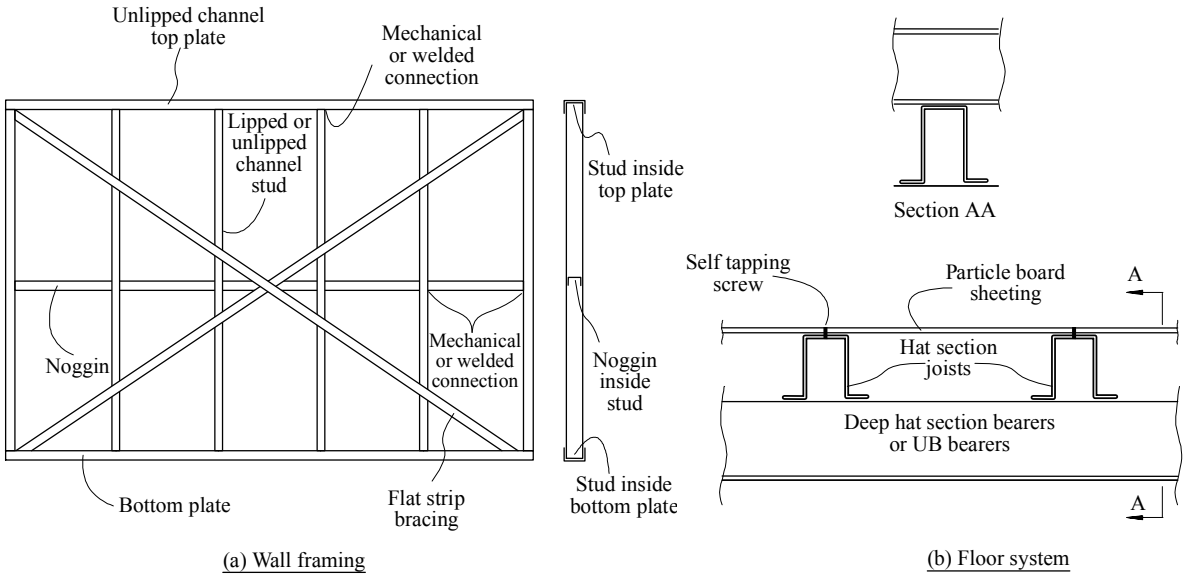



**Fig. 1.10 Domestic construction**

**Fig. 1.11 Two-storey steel framed house**

(g) Steel decking for composite construction

Deep and shallow profile sheeting is used often with intermittent indentations to effect bonding between the concrete and steel in order to achieve composite action. Typical sections are shown in Fig. 1.12.

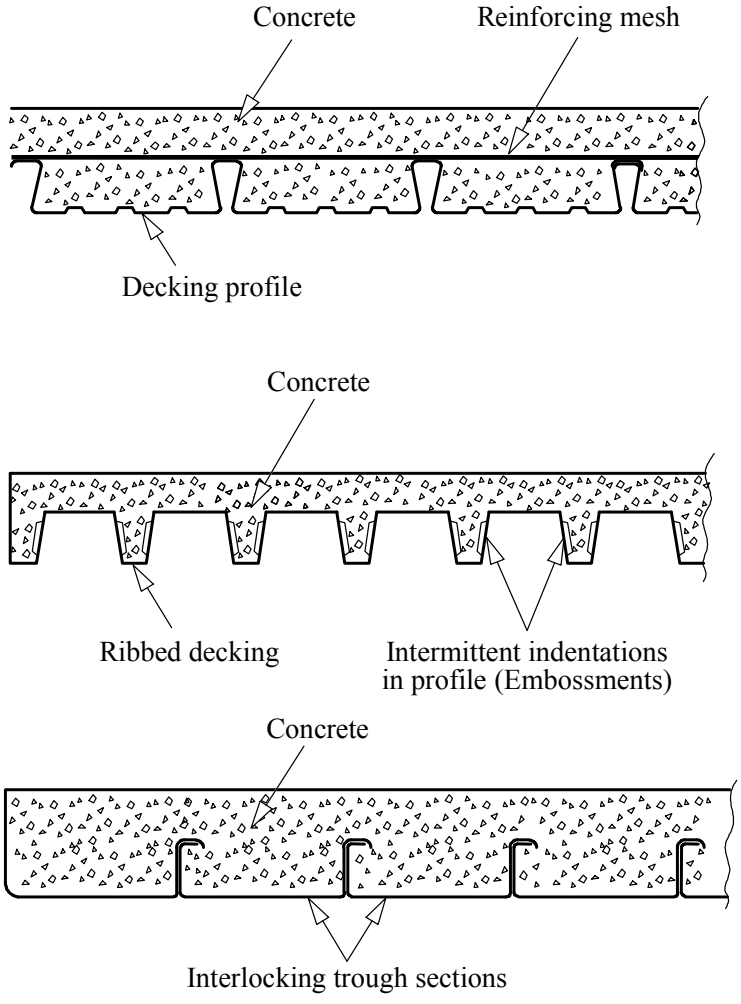



**Fig. 1.12 Typical deck profiles for composite slabs**

(h) Lighting towers

Typical sections are tubular members which may be fabricated by welding. Section shapes may be circular or polygonal and are usually tapered.

(i) Automotive applications

All major structural members can be used but normally hat sections or box sections are used.

(j) Rural grain storage silos

Silo walls usually consist of shallow profile sheeting stiffened by hat or channel sections.

(k) Cold-formed tubular members and hollow flange beams

All circular (CHS) and rectangular (RHS) hollow sections produced in Australia are manufactured by cold-forming with an electric resistance weld (ERW) used to close the section. Another section called the Hollow Flange Beam (HFB) and LiteSteel™ Beam (LSB) are produced by cold-forming with two ERW welds used to produce tubular flanges. Typical sections are shown in Fig. 1.13.

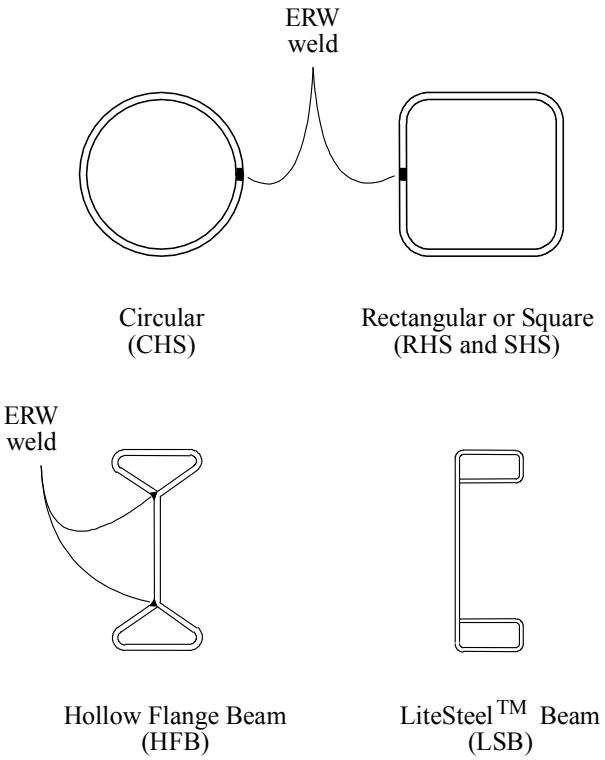



**Fig. 1.13 Typical tubular sections**

### 1.3 Manufacturing Processes

Cold-formed members are normally manufactured by one of two processes. These are:

- Roll Forming
- Brake Pressing

Roll forming consists of feeding a continuous steel strip through a series of opposing rolls to progressively deform the steel plastically to form the desired shape. Each pair of rolls produces a fixed amount of deformation in a sequence of the type shown in Fig. 1.14. In this example, a Z-section is formed by first developing the bends to form the lip stiffeners and then producing the bends to form the flanges. Each pair of opposing rolls is called a stage as shown in Fig. 1.15(a). In general, the more complex the cross-sectional shape, the greater the number of stages required. In the case of cold-formed rectangular hollow sections, the rolls initially form

# Design of Cold-Formed Steel Structures
# (To Australian/New Zealand Standard AS/NZS 4600:2005)

**by**

**Gregory J. Hancock** BSc BE PhD DEng

*Bluescope Steel Professor of Steel Structures*
Dean
Faculty of Engineering & Information Technologies
University of Sydney

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