

# A new building system: spiked steel sheet: composite slab

Autor(en): **Home, Matti**

Objekttyp: **Article**

Zeitschrift: **IABSE congress report = Rapport du congrès AIPC = IVBH Kongressbericht**

Band (Jahr): **13 (1988)**

PDF erstellt am: **13.05.2024**

Persistenter Link: <https://doi.org/10.5169/seals-13167>

## Nutzungsbedingungen

Die ETH-Bibliothek ist Anbieterin der digitalisierten Zeitschriften. Sie besitzt keine Urheberrechte an den Inhalten der Zeitschriften. Die Rechte liegen in der Regel bei den Herausgebern.

Die auf der Plattform e-periodica veröffentlichten Dokumente stehen für nicht-kommerzielle Zwecke in Lehre und Forschung sowie für die private Nutzung frei zur Verfügung. Einzelne Dateien oder Ausdrucke aus diesem Angebot können zusammen mit diesen Nutzungsbedingungen und den korrekten Herkunftsbezeichnungen weitergegeben werden.

Das Veröffentlichen von Bildern in Print- und Online-Publikationen ist nur mit vorheriger Genehmigung der Rechteinhaber erlaubt. Die systematische Speicherung von Teilen des elektronischen Angebots auf anderen Servern bedarf ebenfalls des schriftlichen Einverständnisses der Rechteinhaber.

## Haftungsausschluss

Alle Angaben erfolgen ohne Gewähr für Vollständigkeit oder Richtigkeit. Es wird keine Haftung übernommen für Schäden durch die Verwendung von Informationen aus diesem Online-Angebot oder durch das Fehlen von Informationen. Dies gilt auch für Inhalte Dritter, die über dieses Angebot zugänglich sind.



## A New Building System – Spiked Steel Sheet – Composite Slab

Un nouveau système de construction: dalle mixte avec une tôle et des ancrages particuliers

Ein neues Bausystem: Verbunddecke mit Stahlblech mit Verbundhaken

**Matti HOME**  
D.Tech.  
HomeCon Oy  
Espoo, Finland

### Background

In many countries fluted steel sheets are used also as form and reinforcement of slabs in the concrete construction. In these solution the bond between concrete and thin sheet is achieved by shaping sheet and/or by making knobs, grooves or folds on the surface of the sheet. The drawback in these solutions is poor bond between concrete and fluted sheet. That is why the ends of the fluted sheet have to be welded to the structure below, which on its half limits the use of the structure especially in steel frame buildings.

The aim of this development work has been to find such bonding projections which would turn thin sheet into a usable reinforcement. As a result of the work is the spiked steel sheet. The developed "nailty" ensures the thin sheet and concrete working together so that the area of steel cross-section can be taken as effective reinforcement.

The fluted and spiked steel sheets are usable with steel structures, ordinary reinforced concrete structures, reinforced concrete and prestressed element structures and wooden structures in almost all house construction.

Simplifying of reinforcement in slab constructions is possible because the thin sheet reinforcement is so effective that ordinary slab can be designed as one-way reinforced slab.

Compared with traditional concrete structures, the spiked steel sheets are lightweight building elements with which the construction work can also be carried out successfully at sites where hoisting equipment cannot be used or is not available.

### Technical features

- surface anchorage by means of the "nails"
- no additional end anchorage required at support
- application: all floor constructions in multistorey buildings
- continuous manufacture of the anchorage "nails"
- use of dimensioning methods for reinforced concrete structures

### Patents

Patent granted in Finland, Sweden, Norway, BRD, Switzerland, USA and Canada. Registered designs granted in Finland, England, France and Benelux.

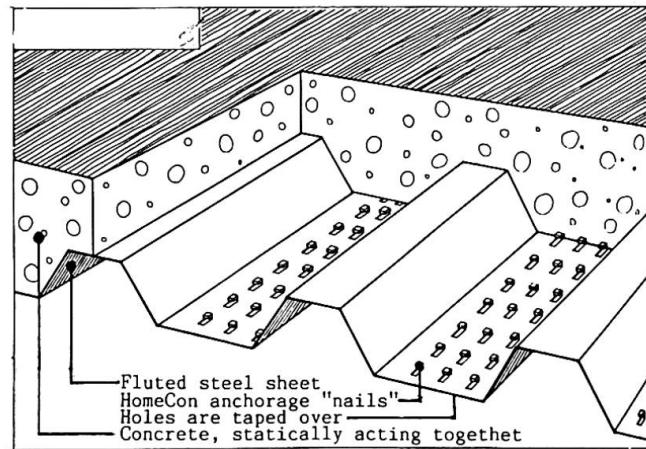


Fig. 1 Principle of HomeCon-fluted and spiked steel sheet.

### Ultimate shear between spiked steel sheet and concrete

Shear capacity of "nailty"  $R_{ud}$  in the composite slab structure is obtained from the formula:

$$R_{ud} = n r_{ud} b a$$

where

- $n$  is amount of "nails" ( $\text{pcs}/\text{m}^2$ )
- $r_{ud}$  is shear capacity of one "nail" ( $r_{ud} = b_n t_{cal} f_{yd}$ )
- $b$  is width of slab under consideration
- $a$  is calculated value of bond length
- $b_n$  is width of one "nail" ( $b_n = 4 \text{ mm}$ )
- $t_{cal}$  is calculated thickness of steel cross-section of thin sheet
- $f_{yd}$  is design strength of steel sheet

Tensile force  $Z$  in thin sheet reinforcement is received from the formula:

$$Z = A_s \varepsilon_s E_s \leq A_s f_{yd}$$

where

- $A_s$  is area of thin sheet reinforcement
- $\varepsilon_s$  is strain of steel ( $^{\circ}/\text{oo}$ )
- $E_s$  is modulus of elasticity of steel ( $E_s = 210 \text{ kN/mm}^2$ )

When  $Z = R_{ud}$ , it is possible to check the value of bond length  $a$ . When all capacities of steel sheet are used the following formula is received:

$$a = \frac{A_s f_{yd}}{n b r_{ud}}$$

Table 1 The value of bond length  $a$  and shear capacity  $R_{ud}$

Fluted steel sheet	$t_{cal}$ mm	$n$ $\text{pcs}/\text{m}^2$	$b$ m	$r_{ud}$ kN	$A_s$ $\text{mm}^2/\text{m}$	$f_{yd}$ $\text{N}/\text{mm}^2$	$a$ mm	$R_{ud} ^*)$ $\text{kN}/\text{m}^2$
HomeCon 45	0.63	588	1	0.73	820	291	556	429.2
	0.82	588	1	0.95	1070	291	556	558.6

\*) Holarib  $R_{ud} = 50 \text{ kN}/\text{m}^2$

### The HomeCon building system

- simplifies construction work
- reduces construction time
- enables widely the use of unskilled labour
- eliminates the need and transport of formwork materials
- improves order at the building site
- reduces the need for storage space because the sheets can be piled up in a small area without damage to the "nails"
- facilitates do-it-yourself construction
- is the important invention for on-site construction



Fig.2 The fluted and spiked steel sheet is lightweight building element