

Composite Floors

The invention relates to composite floors for buildings.

- 5 The invention provides a composite floor comprising a number of spaced I-section beams, a number of corrugated metal sheets resting with an end on each of two beams so that a portion of beam is exposed between the ends of adjacent sheets, each sheet having crest, valley and
- 10 intermediate web portions, and the crest portions sloping down to close its ends, a number of studs welded at intervals along the exposed portions of the beams, and concrete covering the sheets and exposed portions surrounding the studs.
- 15 In this arrangement, the beams, sheets and concrete act as a single composite structure. The position of the studs, generally in line with the web of the I-beam, allows the studs to be surrounded by a considerable depth of concrete, raises the bending moment of the
- 20 beam, and makes it functionally equivalent to a much larger beam.

The crest ends preferably slope downwards at forty-five degrees, but generally speaking an angle of from thirty to sixty degrees to the top of the crest will work. This

25 tends to produce a closed cell, the sheet not extending

far beyond where the cells are closed, but terminating there or thereabouts. Preferably, the sheet has rigid ends so that it may be supported on a relatively small portion of the top of the beams, leaving the major portion of the beam exposed to receive concrete and surround the studs. Additional, shallow corrugations in the crest portions of the sheet are preferably provided to increase the rigidity of the sheet. Embossments on the corrugated sheet may be provided to secure it to the overlying concrete.

DRAWINGS:

Figure 1 is a isometric view of a composite according to the invention;

Figure 2 is a side elevation of a portion of the floor shown in Figure 1 showing also the concrete;

Figure 3 is an end elevation of a portion of the floor shown in Figure 1;

Figure 4 is a top plan of a portion of the floor shown in Figure 1; and

Figure 5 is a cross-section on A-A of Figure 1 showing also the concrete.

Referring specifically to Figure 1, a corrugated metal sheet 10 is supported at each end 12 on two spaced supporting I-section beams 50. Each beam 50 has a top member 52, a base 54 and web 56. The sheets 10 are supported by a narrow edge portion 51 of the top member 52

of beam 50. A substantial portion of the top member 52 of beam 50 remains exposed, and studs 60 are welded directly to the beam 50, rather than indirectly through sheet 10. Direct welding of the studs to the beam
5 provides a more secure connection.

The studs 60 are welded to the top member 52 at intervals directly above the web 56. This location on the beam not only provides a maximum shear transfer, but also allows for an ample volume of concrete 80 (Figure 2) to
10 surround each stud 60. A concrete haunch 81 adds to the overall strength of the floor.

Each sheet 10 has a plurality of longitudinally extended crests 14, valley 20 and intermediate web portions 22 oriented transversely with respect to I-beams 50. In
15 order to provide an effective composite action between the corrugated sheet 10 and a concrete 80 (shown in Figure 5) embossments 24 on the web portions 22 of the sheet 10 secure the sheet to the concrete.

Ends 16 of the crests 14 are covered to prevent unwanted
20 loss of concrete on pouring, and slope downwards at forty-five degrees, closing the crests 14 into cells. By providing sheets 10 having crests 14 with sloping end portions 16, the volume of concrete 80 surrounding the studs 60 is increased (best shown in Figure 2), and
25 increases the effectiveness of the studs 60.

Additional, shallow corrugations 18 are provided in the crests 14 and crest ends 16 of the sheets 10 to increase the overall rigidity of the sheet.

In use, the composite floor of the invention has high performance by allowing inter action between corrugated metal sheet and overlying concrete, between the concrete and the I-section beams. By providing a solid concrete haunch secured directly over each supporting I-beam, the load carrying capacity of each beam is increased as if a deeper I-beam had been used in the first instance. By also providing corrugated metal sheets secured under the concrete, flexibility and strength are likewise increased. Therefore, the entire floor acts as a single composite unit having superior strength. Because of the efficient design, each stud is completely effective. To save on construction costs the studs may be welded to the beams at the factory rather than at the construction site. Finally, no ends need be attached to the crests to close the cells prior to the pouring of the concrete.

CLAIMS:

1. A composite floor comprising a number of spaced I-section beams, a number of corrugated metal sheets resting with an end on each of two beams so that a
5 portion of beam is exposed between the ends of adjacent sheets, each sheet having crest, valley and intermediate web portions, and the crest portions sloping down to close its ends, a number of studs welded at intervals along the exposed portions of the beams, and concrete
10 covering the sheets and exposed portions and surrounding the studs.
2. A composite floor according to claim 1 wherein the web of the sheets have embossments thereon to secure the sheets to the concrete.
- 15 3. A composite floor structure according to claim 1 or claim 2 wherein the ends of the crests of the sheets slope downwards at forty-five degrees with respect to the top of the crest.
4. A composite floor according to any preceding claim
20 wherein the crests of the sheets have additional corrugations therein to increase the stiffness of the sheets.
5. A composite floor as herein described with reference to the drawings.

