Supporting Beam for Ceiling Systems, Ceiling System and Method for the Production Thereof

Technical Field

The invention relates to a supporting beam for ceiling systems according to the preamble of claim 1. Such supporting beams are frequently used in steel-reinforced concrete construction and composite construction, particularly when building ceiling systems and storey ceilings.

Prior Art

For example, EP 1 611 295 B1 discloses a supporting beam of the same category. It comprises a hollow box cross-section and serves as a bearing for plate-shaped semi-finished parts or finished parts. After laying the semi-finished parts or finished parts, a local or large-scale in-situ concrete layer is applied which also penetrates into the inner of the hollow box cross-section of the supporting beam in order to produce the ceiling composite system. With this supporting beam consisting as such only of steel, such as with supporting beams consisting only of steel, in-situ concrete is introduced into the space of the supporting beam the ceiling plates are connected at the construction site, which space is defined by the webs, a base plate, and an upper plate (upper chord) opposite to the base plate (lower chord).

Such supporting beams known from the prior art have been proven successful. However, when connecting such supporting beams with the finished part or semi-finished part, bubbles in the concrete often occur below the upper plate and the concrete as a whole has to be introduced to the construction site using a relatively large amount of effort. Also, the full carrying capacity of the supporting beam is only given after the introduction of the in-situ concrete. Moreover, steel is under stress in the upper chord area, which causes technical disadvantages.

Summary

According to a first aspect, there is provided a supporting beam for composite ceiling systems which consist at least partially of concrete, having a support, in particular a steel support, which comprises a base plate and at least one web, preferably two webs which are

arranged at an angle thereto, preferably perpendicular, characterized in that a space limited by the web or webs and the base plate is filled at least partially with concrete which is not in-situ concrete, the supporting beam has through-passages which extend transversely to the longitudinal axis of the supporting beam through the web or webs, the supporting beam comprises a stirrup basket, the base plate comprises at least one projection which protrudes transversely to the longitudinal axis of the supporting beam across at least one web, and the space filled with concrete is at least in some areas, preferably entirely, open on the side facing away from the base plate.

According to a second aspect, there is provided use of a semi-finished part as the supporting beam for composite ceiling systems which at least partially consist of concrete which is not in-situ concrete, wherein the semi-finished part comprises a support, in particular a steel support, which comprises a base plate and at least one web, preferably two webs, which are arranged at an angle thereto, preferably perpendicular, the inner surface of the web or webs and/or the base plate comprise form-fit connecting means, in particular depressions and/or projections, furthermore in particular headed bolts, recesses and/or wave-shaped, folded and/or bent connecting means, and a space limited by the web or webs and the base plate is filled at least partially with concrete such that the form-fit connecting means are connected with the concrete in a form-fit, wherein supporting beam has through-passages which extend transversely to the longitudinal axis of the supporting beam through the web or webs, the supporting beam comprises a stirrup basket, the base plate comprises at least one projection which protrudes transversely to the longitudinal axis of the supporting beam across at least one web, and the space filled with concrete is at least in some areas, preferably entirely, open on the side facing away from the base plate.

Description of the Invention

It is therefore the object of the present invention, with simple construction, to provide a supporting beam which enables a simple and reliable use in ceiling systems. At the same time, the weight of the supporting beam should be kept low.

Claims

1. Supporting beam (1) for composite ceiling systems (100) which consist at least partially of concrete, having

a support (10), in particular a steel support, which comprises a base plate (12) and at least one web, preferably two webs (14, 16) which are arranged at an angle thereto, preferably perpendicular,

characterized in that

a space limited by the web or webs (14, 16) and the base plate is filled at least partially with concrete (2) which is not in-situ concrete,

the supporting beam has through-passages (20) which extend transversely to the longitudinal axis of the supporting beam (1) through the web or webs (14, 16),

the supporting beam comprises a stirrup basket (25),

the base plate comprises at least one projection which protrudes transversely to the longitudinal axis of the supporting beam across at least one web, and
the space filled with concrete (2) is at least in some areas, preferably entirely, open on the side facing away from the base plate (12).

2. Supporting beam according to claim 1, characterized in that the concrete (2) over at least one web (14, 16) protrudes by a protrusion (4), namely preferably in a direction perpendicular to the base plate (12).

3. Supporting beam according to claim 2, characterized in that the protrusion (4) comprises a toothing (6), in particular at least one longitudinal groove.

4. Supporting beam according to one of the preceding claims, characterized in that the inner surface of the web or webs (14, 16) and/or the base plate (12) comprise connecting means (18, 19, 21, 27).

5. Supporting beam according to claim 4, characterized in that the connecting means comprise form-fit connecting means, in particular depressions and/or projections,

further in particular headed bolts (18), recesses (27), preferably on support plates (21), and/or wave-shaped, folded and/or bent connecting means (19).

6. Supporting beam according to one of the preceding claims 4 and 5, characterized in that the web or webs and/or the base plate are formed, in particular by projections, depressions and deformations (19) and/or recesses (27), such that they themselves function as connecting means.

7. Supporting beam according to one of the preceding claims, characterized in that the through-passages (20) also extend through the concrete (2) provided in the space.

8. Supporting beam according to claim 5, characterized in that the distance of the through-passages (20) to the base plate (12) and the distance of the form-fit connecting means (18) to the base plate (12) are substantially equal.

9. Supporting beam according to one of the preceding claims, characterized in that the base plate comprises at least one projection (12a, 12b) which protrudes transversely to the longitudinal axis of the supporting beam (1) across at least one web (14, 16), an elastic damping element (22) preferably being provided on the at least one projection (12a, 12b).

10. Supporting beam according to one of the preceding claims, characterized in that the support (10), preferably the base plate (12), comprises a fire-resistant layer (17a, 17b).

11. Supporting beam according to one of the preceding claims, characterized in that the supporting beam comprises a camber, which preferably corresponds to a later deflection.

12. Supporting beam according to one of the preceding claims, characterized in that the stirrup basket (25) comprises reinforcement steel, preferably in the form of longitudinal rods.

13. Supporting beam according to claim 12, characterized in that concrete (2) surrounds at least partially, preferably entirely, the stirrup basket (25) and the reinforcement steel (23, 24).

14. Supporting beam according to claim 5, characterized in that the connecting means (18) extend through the gaps in the stirrup basket (25) in the direction perpendicular to the longitudinal direction L.

15. Use of the supporting beam according to one of the preceding claims in a composite ceiling system, wherein

the supporting beam is used to support at least one semi-finished part (30) or finished part (40) and

an in-situ concrete layer (50) is at least provided in the connecting area between the at least one supporting beam (10) and the semi-finished part (30) or finished part (40).

16. Composite ceiling system (100), comprising:

at least one supporting beam (1) according to one of the preceding claims 1 to 14,

at least one semi-finished part (30) or finished part (40) which is supported on at least one supporting beam (1), and

an in-situ concrete layer (50) which is provided at least in the connecting area between the at least one supporting beam (1) and the semi-finished part (30) or finished part (40).

17. Method for producing a composite ceiling system (100), having the steps:

supporting at least one supporting beam (1) according to one of claims 1 to 16 on bearings,

supporting at least one semi-finished part (30) or finished part (40) on the at least one supporting beam (1),

providing composite elements (26) in the connecting area between the at least one supporting beam (1) and the semi-finished part (30) or finished part (40),

providing an in-situ concrete layer (50) at least in the connecting area between the at least one supporting beam (1) and the semi-finished part (30) or finished part (40).

18. Method according to claim 17, characterized in that at least several composite elements (26) are each guided through a through-passage (20) provided in the supporting beam.

19. Use of a semi-finished part as the supporting beam for composite ceiling systems (100) which at least partially consist of concrete which is not in-situ concrete, wherein

the semi-finished part comprises a support (10), in particular a steel support, which comprises a base plate (12) and at least one web, preferably two webs (14, 16), which are arranged at an angle thereto, preferably perpendicular,

the inner surface of the web or webs (14, 16) and/or the base plate (12) comprise form-fit connecting means (18,19), in particular depressions and/or projections, furthermore in particular headed bolts (18), recesses (27) and/or wave-shaped, folded and/or bent connecting means (19), and

a space limited by the web or webs (14, 16) and the base plate is filled at least partially with concrete (2) such that the form-fit connecting means (18, 19) are connected with the concrete (2) in a form-fit,

wherein supporting beam has through-passages (20) which extend transversely to the longitudinal axis of the supporting beam (1) through the web or webs (14, 16),

the supporting beam comprises a stirrup basket (25),

the base plate comprises at least one projection which protrudes transversely to the longitudinal axis of the supporting beam across at least one web, and

the space filled with concrete (2) is at least in some areas, preferably entirely, open on the side facing away from the base plate (12).