

LEWIS®

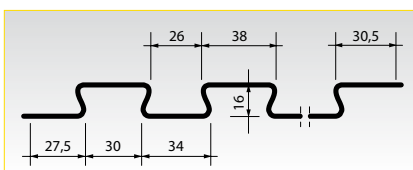
CONSTRUCTIONAL COVERING FLOORS

LEWIS®

dovetailed sheeting is often used for the shuttering and reinforcement of thin concrete floors on (existing) wooden joisting with a centre-to-centre distance of 400 – 900 mm. The enormous loadbearing capacity which is realised with these LEWIS® constructional covering floors was the starting point for additional investigation into the loadbearing capacity of the LEWIS® concrete floor with monolith finish for use on joisting with centre-to-centre distances or spans up to 2500 mm. This investigation was carried out by the University of Kaiserslautern in Germany. It was done in close co-operation with TNO-Bouw Rijswijk, the Netherlands [TNO Building & Construction Research]. Lengthy tests with varying loads, point loads and line loads, both in the floor surface and along the outer edges, were passed with flying colours. In addition to this, tests were carried out with a LEWIS® concrete floor in which cracks were made artificially. Also for these relatively large spans the LEWIS® dovetailed sheeting provides durable constructional stability and security.

The profile Interconnection

The profile has a certain experimentally determined optimised geometry, by which the LEWIS® dovetailed sheeting, together with the fine grade concrete, ensures the greatest possible loadbearing capacity of the floor.



The system

The LEWIS® constructional covering floors can be realised up to and including a span of 1500 mm without supplementary reinforcement. If there are fire-resistance requirements and/or extra high point loads, extra reinforcement is (sometimes also) necessary.

$L_t < 1500$ mm: up to a span of 1500 mm the total floor thickness is 50 mm.

$L_t > 1500$ mm: from 1500 – 2500 mm span, the floor thickness is 75 mm.

Either wooden joists or steel or concrete beams can be used as load-bearing structure. Naturally, other types of sub-structures are possible.

During application, the LEWIS® sheeting must be underpinned centre-to-centre max. 900 mm until the fine grade concrete has hardened sufficiently.



Characteristic features and applications

- Durability through the use of high quality steel.
- Reuse of existing materials and economical use of new material.
- Applicable on slender steel beams, (existing) wooden joisting, on laminated wooden beams, concrete beams, etc.
- Applicable for reinforcement of existing (too) light concrete floors.
- Fine grade concrete B25 can be given a level monolithic finish and a screed is not necessary.
- Through the construction of the LEWIS® profile with the concrete, only a thin layer of concrete is required.
- Low dead load of 0.9 – 1.40 kN/m² at high allowable loads.
- Fire grading of 60 minutes for the constructional covering floor with or without extra reinforcement can be achieved without any problems.
- System solutions available for floating sound-insulating constructions.
- Waterproof and liquid-tight finishes possible.
- Tested in conformance with state-of-the-art constructional insights and on basis of the Dutch norm NEN 6702 (Eurocode 1/4).

Technical data

Nominal width	630 mm
Effective width	610 mm
Standard lengths	1220 mm 1530 mm 1830 mm 2000 mm
Length range	800 - 7000 mm
Length tolerance	1 - 4 mm
Width tolerance	1 - 3 mm
Section modulus W_{ef}	3.0 cm ³ /m ¹
Moment of inertia I_{exp}	3.6 cm ⁴ /m ¹

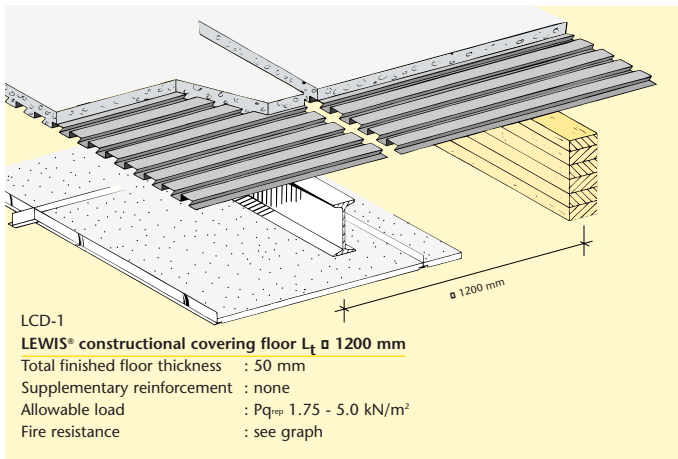
Thickness of steel	0.5 mm
Height of profile	16 mm
Width of flange	38/34 mm
Weight	0.058 kN/m ² (5.8 kgf/m ²)

Minimum thickness of finished fine grade concrete: 16 mm height of profile + 34 mm resp. 59 mm depending on the field of application.
Composition and quality of concrete: Fine grade concrete B 25.

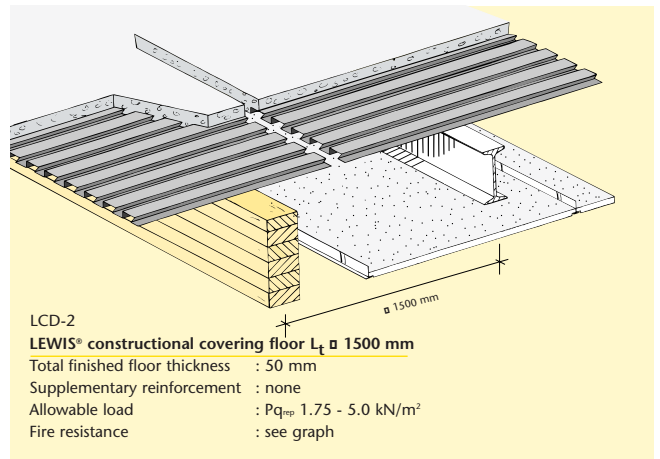


KOMO assessment with certificate number K7470/04 dated 01-01-2001.

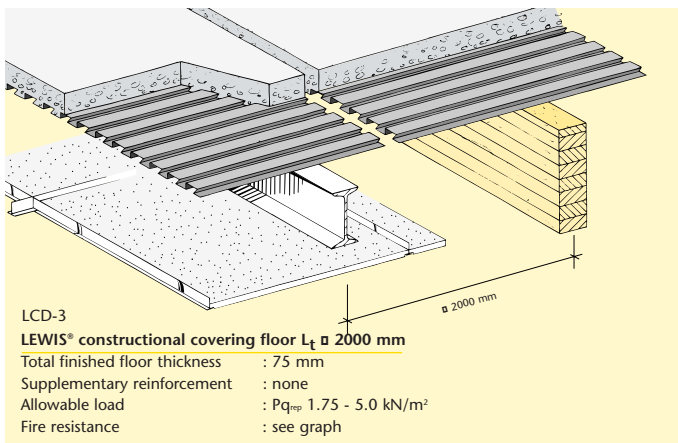
Steel quality: FeE 320-3 GZ 275 NA-C in accordance with NEN-EN 10147
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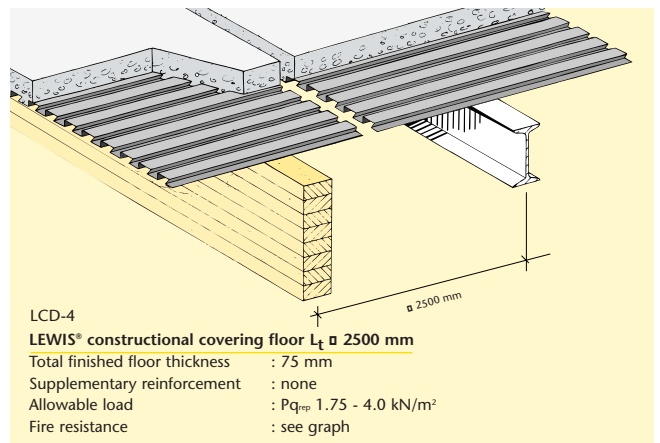
LCD-1
LEWIS® constructional covering floor $L_t \square 1200$ mm
 Total finished floor thickness : 50 mm
 Supplementary reinforcement : none
 Allowable load : $P_{q,rep}$ 1.75 - 5.0 kN/m²
 Fire resistance : see graph



LCD-2
LEWIS® constructional covering floor $L_t \square 1500$ mm
 Total finished floor thickness : 50 mm
 Supplementary reinforcement : none
 Allowable load : $P_{q,rep}$ 1.75 - 5.0 kN/m²
 Fire resistance : see graph



LCD-3
LEWIS® constructional covering floor $L_t \square 2000$ mm
 Total finished floor thickness : 75 mm
 Supplementary reinforcement : none
 Allowable load : $P_{q,rep}$ 1.75 - 5.0 kN/m²
 Fire resistance : see graph

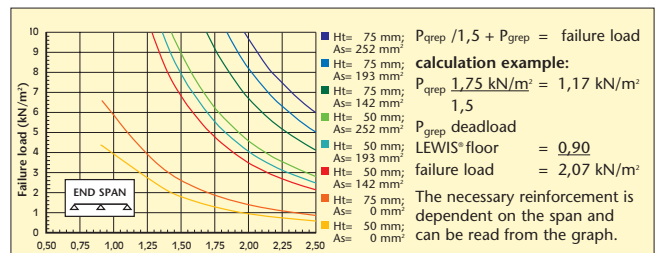


LCD-4
LEWIS® constructional covering floor $L_t \square 2500$ mm
 Total finished floor thickness : 75 mm
 Supplementary reinforcement : none
 Allowable load : $P_{q,rep}$ 1.75 - 4.0 kN/m²
 Fire resistance : see graph

Table Load-bearing capacity of the LEWIS® constructional covering floor with fine-grade concrete B25.

Total floor thickness in mm	Span L_t in mm	Dead load of LEWIS® floor	Allowable evenly distributed load in conformance with NEN 6702 $P_{q,rep}$ kN/m ²	*Allowable load non-bearing dividing walls kN/m ²	**Allowable point load in conformance with NEN 6702 F_{rep} kN
50	1200	0,90	13,8	\square 0,50/0,80/1,20	3 kN/0,5x0,5 m
50	1500	0,90	9,7	\square 0,50/0,80/1,20	3 kN/0,5x0,5 m
75	2000	1,40	6,1	\square 0,50/0,80/1,20	3 kN/0,5x0,5 m
75	2500	1,40	4,1	\square 0,50/0,80/1,20	3 kN/0,5x0,5 m

Graph 60 minutes fire grading of the LEWIS® constructional covering floor with fine-grade concrete B25 finish.



* N.B. Non-bearing interior walls up to 2.5 m+ in conformance with NEN 6702.

**N.B. From a span of 2000 mm a mesh reinforcement of $\varnothing 5 \times 150$ mm is necessary to meet the point-load requirement of 3 kN. For point-load requirements of 7 and 10 kN, which can often also be met, TNO report 1999-CON-Bis-R5006/2, 1 May 2000, should be referred to.

- Report 93-CON-B0340/HEB, May 2000 Loadbearing capacity of LEWIS® sheeting tested against the Dutch Building Decree.
- Report 1999-CON.BIS.R5006/2, May 2000 Loadbearing capacity of LEWIS® sheeting with spans of 1000 – 2500 mm.

University of Kaiserslautern :

- Gutachten über das Tragverhalten der LEWIS® Fußbodenkonstruktion® mit der Blechdicke von $t = 0,50$ mm, November 1995.
- Gutachten über das Tragverhalten der LEWIS® Fußbodenkonstruktion® bei konzentrierter Belastung (Punkt und Linienlasten), January 1997.
- Gutachten über das Tragverhalten der LEWIS® Fußbodenkonstruktion® bei konzentrierter Punktbelastung mit künstlichen Rissen, May 1997.
- Gutachten zum Tragverhalten von LEWIS® Fußbodenplatten® mit einer Blechdicke von $t = 0,50$ mm bei randnahen Einzellasten, December 1997.
- Gutachten zum Tragverhalten von bewehrten LEWIS®-Fußbodenplatten® mit einer Blechdicke von $t = 0,50$ mm bei Belastung durch randnahe Einzellasten und bei Ausbildung als Durchlaufplatten, July 1998.

Fire resistance

The Dutch Building Decree requirement is 60 minutes on failure and on thermal insulation, for fire compartments lying above each other and thus also the floor construction.

The requirement regarding failure can be met with LEWIS® constructional covering floors. Supplementary reinforcement is sometimes required (see graph).

Overview of reports on loadbearing capacity

TNO Building & Construction Research:

- Report B91-0281, May 1991 Experimental investigation into the loadbearing capacity of the LEWIS® dovetailed sheeting as a finished concrete floor.
- Report B91-0328, May 1991 Loadbearing capacity of the LEWIS® dovetailed sheeting in the construction phase and as a finished concrete floor.

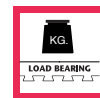
Overview of reports on fire resistance

TNO Building & Construction Research:

- Report no. B-81-484, October 1981
- Report no. B-83-534, October 1983
- Report no. B-94-CVB-R-0645, May 1994
- Report no. B-94-CVB-R-0646, May 1994
- Report no. B-99-CVB-R-0341, February 1999

University of Braunschweig:

- Gutachtliche Stellungnahme 3401/1875 -We/Ma August 1995 / June 1997.



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