

KOMO Technical Approval with Product Certificate

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kiwa



Partner for progress



Accredited by RvA

RvC

LEWIS®-dovetailed sheeting

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STATEMENT BY KIWA

This Technical Approval with Product certificate for the LEWIS®-Dovetailed sheeting is issued by Kiwa on the basis of Evaluation Guideline 0206, "dovetailed sheeting floors", in accordance with the Kiwa Regulations for Product Certification: 1990.

Kiwa declares that Lewis®-dovetailed sheeting is suitable for construction of dovetailed sheeting floors on supporting joists in environmental category 1 which have the performance described in this Technical Approval with Product Certificate, provided that:

- the dovetailed sheeting floors comply with the technical specifications laid down in this Technical Approval with Product Certificate;
- the construction of the dovetailed sheeting floor takes place in accordance with the processing methods laid down in this Technical Approval with Product Certificate;
- the application conditions described in this Technical Approval with Product certificate.

In compliance with §3 of EN 45011 and in conjunction with ISO/IEC Guide 2 (see page 2), Kiwa declares that the dovetailed sheeting floors manufactured by the producer comply with the technical specifications laid down in this Technical Approval with Product Certificate, provided that they have been marked with the KOMO-mark reproduced below in the manner indicated in this Technical Approval with Product Certificate.

No control is exercised by Kiwa on the production of the other parts of the dovetailed sheeting floor, nor on the manufacture of the dovetailed sheeting floor within the scope of the issue of this Technical Approval with Product Certificate.

For the relationship between the statements contained in this Technical Approval with Product Certificate and the regulations of the "Bouwbesluit" (Dutch Building Decree), reference is made to the list of quality statements as published semi-annually by Stichting Bouwkwaliiteit (SBK) (Foundation for Building Quality) in Rijswijk.

ing. B. Meekma,
Director, Certification and Inspection, Kiwa N.V.

The users of this Technical Approval with Product Certificate are advised to contact Kiwa to ensure that this document is still valid.

Reproduction of the KOMO-mark



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This is a translation. Only the Dutch text shall be legally binding.

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The reference made in the "STATEMENT BY KIWA" to the prevailing EN 45011 standard means: action by a third party, demonstrating that adequate confidence is provided that a duly identified product is in conformity with a specific standard or other normative document.

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1 PRODUCT SPECIFICATION

Technical specification of the product

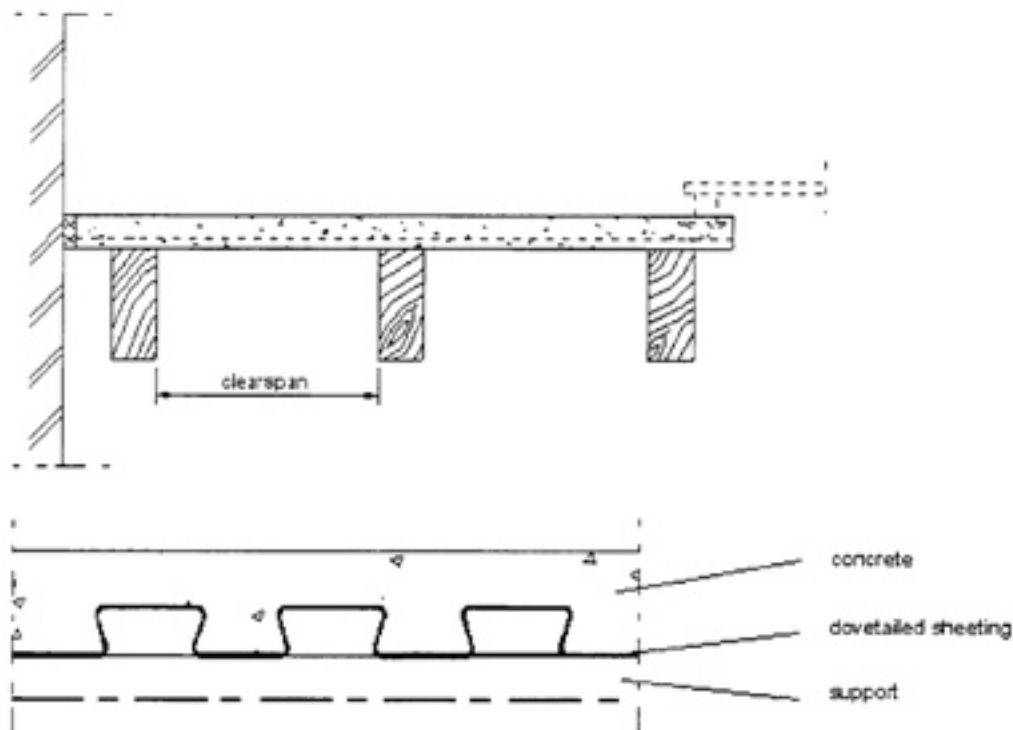


Figure 1. Diagrammatic representation of the application of dovetailed sheeting floor

1.1 Subject: shape and composition

The floor is built up from flexural rigid profiled steel sheets (LEWIS®-Dovetailed sheeting) as shuttering into which concrete is poured, whereby the Dovetailed sheeting has to be able to transmit the weight of the concrete mortar and the construction load, possibly with temporary struts, to the supports. When the concrete has set, the dovetailed sheeting with the concrete which has been poured on to it forms a whole, from the point of view of construction. See fig. 1. The Dovetailed sheeting functions as shrinkage reinforcement of the floor construction. The centre to centre distance between the dovetailed sheeting floor supports is limited to 1500 mm.

1.2 (Supplementary) Product requirements with respect to the LEWIS®-Dovetailed sheeting

- The LEWIS®-Dovetailed sheeting consists of a dovetail-shaped rolled steel sheet (see figure 2)
- The basic material is chromium plated on two sides, continuous immersion galvanized steel quality: S 320 GD + Z275 N-A-C in accordance with NEN-EN 10147.
- Material properties
 - yield point, minimum : 320 N/mm²
 - tensile strength, minimum : 380 N/mm²
 - elongation after fracture, minimum : 15 %

Figure 3 - Dimensions and dimensional deviations of the Dovetailed sheeting

	Nominal dimension	Deviation
Commercial lengths	1220 mm	± 3 mm
	1530 mm	± 4 mm
	1830 mm	± 4 mm
	2000 mm	± 4 mm
Length range	800 - 6000 mm	± 0.15 %
Nominal width	630 mm	± 3 mm
Effective width	610 mm	-
End flange width	27.5/30.5 mm	± 3 mm
Profile width	-	-
- Topside	38 mm	± 1 mm
- Underside	34 mm	± 1 mm
Profile height	16 mm	0 tot 2 mm
Plate thickness	0.5 mm exc. zinc	± 0.09 mm
Zinc layer	275 g/m ²	Minimum
(total 2 sides)	±19.5 µm per side	

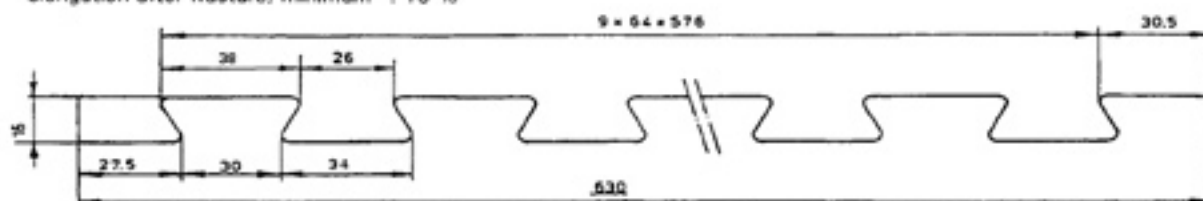


Figure 2 - Dimensions Dovetailed sheeting (dimensions in mm)

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1.3 Marking

The products are provided with the KOMO mark.
Position of the mark: on the upper side of each dovetailed sheet.

The execution of the mark is as follows: a weatherproof ink stamp with the following mandatory indications:

Mandatory indications:

- product name LEWIS®;
- length of sheet in mm;
- logo KOMO;
- assessment with certificate number: K7470;
- coil number;
- date.

2 PROCESSING

2.1 General

The processing regulations, as drawn up by the manufacturer and certified by Kiwa, are a part of this assessment with certificate as they are stated here. The products must be processed and assembled in accordance with these processing regulations.

2.2 Calculations

The timber or steel bearing constructions that are to be used, must be calculated and checked for strength and rigidity in accordance with the applicable standards.

If, for a timber bearing construction this strength and/or rigidity proves to be insufficient, a choice can be made for an interconnected construction between the dovetailed sheeting floor and the timber bearing construction. In figures 6 and 7 the results of the calculations and tests are shown.

2.3 Overlap

Widthwise, the bottom or top side flanges of the LEWIS®-Dovetailed sheeting must overlap completely. Lengthwise, LEWIS®-Dovetailed sheeting must have a minimum overlap of 50 mm.

2.4 Supporting length

The supporting length on the load-bearing structure must be a minimum of 50 mm on both sheet sides.

2.5 Concrete

The concrete mixture applied consists of fine grade concrete (see processing regulations), for which the following applies:

- concrete mortar must comply with NEN 5950;
- aggregate for the concrete must comply with NEN 5905;
- largest particle size of the gravel (D): 8 mm;
- grade: span smaller than 1200 mm $\geq$ B15
- grade: span larger than 1200 mm $\geq$ B25.

If the dovetailed sheeting floors are installed in outside conditions, it must be proven that the concrete mortar complies with the Building Materials Decree.

2.6 Concrete cover

If the floor thicknesses indicated in figure 5 are adhered to, the concrete cover complies with NEN 6720 article 9.2 with clarification. (The concrete cover is minimum 20 mm. It must be remarked hereby where the structural height is greater.)

2.7 Dovetailed sheeting in outside conditions

If the Dovetailed sheeting comes into contact with outside conditions, this must be coated or at least be anti-corrosion treated.

2.8 Execution of the interconnected construction

If an interconnected construction between the LEWIS®-dovetailed sheeting floor and the timber load-bearing structure is chosen (see fig. 28) the following processing regulations must be observed.

The timber load-bearing structure must be temporarily underpinned in order to prevent initial deflection as a result of the weight of the concrete mortar. In each bottom flange of the LEWIS®-Dovetailed sheeting a hardened steel screw nail must be fitted with the following specification:

- hardened steel screw nail type no. 10
- flat head
- length 63.5 mm (2.5")
- diameter 3.4 mm.

The head of the screw nail must be flush with the top of the LEWIS®-Dovetailed sheeting after fixing.

2.9 Drying capacity

To avoid the risk of suffocating the timber counterfloor and the possibility of not drying after a mishap, it is not permitted to apply vapor-barrier foil between the (existing) timber floor construction and the dovetailed sheeting floor.

If there is a ventilation cavity between the dovetailed sheeting floor and the original floor, ventilation from the underlying cavity must be ensured by, for example, drilling 10 mm holes in the existing floorboards. In which case, the floor construction will dry out within six months after a mishap.

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3 PERFORMANCE

3.1 Safety

3.1.1 The structural strength: Dovetailed sheeting in the construction phase

If the centre-to-centre distances shown in figure 4 are maintained, the loads from this table are allowed for the LEWIS®-Dovetailed sheeting during the construction phase.

Figure 4 –Load-bearing capacity in multi-field span of LEWIS®-Dovetailed sheeting in the construction phase without concrete at maximum deflection $< l/150$

Span l (mm)	P_{poor} (kN/m ²)
600	8.5
900	5.7
*1200	3.8
*1500	2.5

* underpin temporarily until the concrete has set.

3.1.2 The structural strength: the dovetailed sheeting floor in the service phase

It has been shown that the dovetailed sheeting floor complies with articles 2.1., 2.2., 174.1 and 174.2 of the Dutch Building Decree.

The strength of the total floor construction is dependent on the load-bearing structure of the LEWIS®-dovetailed sheeting floor and on the possible interconnection between bearing structure and the LEWIS®-dovetailed sheeting floor.

F_{rep}	concentrated load (in conformance with NEN 6702)
h_t	floor thickness mm (height of profile plus concrete covering)
l	span mm
P_{poor}	allowable imposed load during execution kN/m ²
P_{extra}	extra allowable imposed load kN/m ²
P_{rep}	assumed imposed load kN/m ²

Figure 5 –Load-bearing capacity P_{rep} and P_{extra} of the LEWIS®-dovetailed sheeting floors in the service phase

h_t in mm	l in mm	Allowable imposed load kN/m ²	P_{rep} kN/m ² (assumed imposed floor load)				
			1.5	2.0	3.0	4.0	5.0
			P_{extra} kN/m ² (extra load-bearing capacity)				
50	600	30.2	28.6	28.2	27.2	26.2	25.2
50	900	19.5	17.9	17.5	16.5	15.5	14.5
50	1200	13.8	12.2	11.8	10.8	9.8	8.8
50	1500	9.7	8.1	7.7	6.7	5.7	4.7

3.1.2.1 Non-interconnected constructions

If the centre-to-centre distances shown in figure 5 are maintained, the values from the shaded area can be maintained for the extra allowable imposed load kN/m² (P_{extra}). (The main load-bearing structure must still be checked.)

3.1.2.2 Concentrated load-bearing capacity F_{rep}

With a floor thickness of 50 mm (height of profile plus concrete covering) and up to a span of maximum centre-to-centre distance of 1000 mm, the unreinforced dovetailed sheeting floor can bear a concentrated load F_{rep} of 7 kN on a surface area 100 mm x 100 mm. If a reinforcement (mesh $\varnothing$ 5 – 150 mm) is used, the concentrated load F_{rep} of 7 kN is allowable up to a span of 1500 mm.

For an unreinforced dovetailed sheeting floor, a concentrated load F_{rep} of 3 kN on a surface area of 100 mm x 100 mm is allowable up to a clear span of 1500 mm.

3.1.2.3 Interconnected floor construction

If the floor construction is executed as an interconnected floor construction ($h_t = 50$ mm) (see also figure 28), the theoretical maximum spans of the floor in figures 6 and 7 can be allowed.

3.1.2.4 Limitation of the buckling length of columns

In determining the buckling length of columns protruding through the floor (also those forming part of the main load-bearing structure), the lateral support which occurs through the disc action of the floor, can be included. This disc action can be included if the connection between column and floor has been executed as such and if the floor is fire-resistant for at least 90 minutes. See figures 14, 15, 19 and 21.

Timber-concrete constructions: interconnected floor construction

Figure 6

Joist dimension in mm	Allowable theoretical span l_k in mm in the case of timber joisting centre-to-centre distance of 600 mm		
	P_{imp} imposed floor load		
	$\leq 2 \text{ kN/m}^2$	2.5 kN/m^2	4 kN/m^2
160x63	2988	2916	2404
175x63	3359	3177	2625
200x63	3860	3604	2976
175x75	3572	3343	2831
200x75	4064	3810	3222
225x75	4545	4263	3611
150x95	3214	3087	2676
150x100	3286	3142	2716
200x100	4407	4137	3598
230x120	5313	4999	4362

Figure 7

Joist dimension in mm	Allowable theoretical span l_k in mm in the case of timber joisting centre-to-centre distance of 750 mm		
	P_{imp} imposed floor load		
	$\leq 2 \text{ kN/m}^2$	2.5 kN/m^2	4 kN/m^2
160x63	2809	2579	2134
175x63	3060	2814	2323
200x63	3474	3198	2650
175x75	3277	3042	2520
200x75	3723	3456	2870
225x75	4180	3869	3211
150x95	3025	2835	2417
150x100	3067	2884	2479
200x100	4057	3812	3273
230x120	4895	4610	4023

3.1.3 Strength during a fire

For the dovetailed sheeting floor it has been shown that this complies with articles 2.1., 2.2., 174.1 and 174.2 of the Dutch Building Decree.

The fire resistance (also known as fire spread) of the construction is indicated with the number of minutes that the construction complies with the criteria with respect to collapse, flame density and thermal insulation. The constructions according to figures 9, 11, 14, 16 and 19 have been tested and the results are reproduced in figures 10, 12, 15, 17, 20 and 21.

The method of working is as follows. The assumed momentary imposed floor load has to be chosen in figure 8 and has to be compared with the figures for the construction strength as shown in figures 10 and 12. (Or figure 13 compared with figure 15 and 17, or figure 18 compared with figure 20 or 21.)

The fire penetration rate of the timber bearing construction should be determined in conformance with NEN 6073.

3.1.4 Limitation of the occurrence of a situation constituting a fire hazard

The occurrence of a situation constituting a fire hazard is determined by the non-flammability of the materials present and the circumstances locally. The LEWIS® dovetailed sheeting floor is non-flammable. The designer must assess the situation on materials and the possible occurrence of rises in temperature.

3.1.5 Limitation of the development of a fire

The limitation of the development of a fire is expressed in the number of minutes that no fire penetration occurs. The constructions according to figures 9, 11, 14, 16 and 19 have been tested and the results are reproduced in figures 10, 12, 15, 17, 20 and 21.

3.1.6 Limitation of the spread of a fire

The limitation of the spread of a fire is expressed in the number of minutes that the fire resistance is satisfactory. The results of the tests on the constructions as in figures 9, 11, 14, 16 and 19 are shown in figures 10, 12, 15, 17, 20 and 21 and comply with fire resistance ratings of 30, 60 or 90 minutes resp. as shown in the figure.

3.1.7 Fleeing from a dwelling

The extent to which fleeing from a dwelling is possible, is expressed in the number of minutes that the fire resistance of a division construction is satisfactory. If a dovetailed sheeting floor has this function in a certain situation and has been executed in accordance with figures 9, 11, 14, 16 and 19, the results in figures 10, 12, 15, 17, 20 and 21 can be adhered to. The designer must assess the situation on the function that the dovetailed sheeting floor has.

3.1.8 Limitation of the occurrence of smoke

The smoke production of the floor is, in principle, nil.

3.1.9 Limitation of the spread of smoke

For the use of the LEWIS®-dovetailed sheeting floor as a structural division for dwellings, requirements have been laid down regarding the spread of smoke. In principle, the floor is smoke-tight. The connection details determine the smoke permeability. In figures 9, 11, 14, 16 and 19, connection details are given by which the floor is smoke-tight.

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3.2 Health

3.2.1 Protection from extraneous sound

The LEWIS® dovetailed sheeting floor as a protective construction against extraneous sound is outside the scope of this assessment with product certificate. The use of the sheeting floor as a roof construction is outside the scope of this assessment with product certificate. It is assumed that, if the use of the sheeting floor is as a structural division of a crawl space, this requirement does not apply.

3.2.2 Sound-damping between areas

When using the LEWIS®-dovetailed sheeting floor as a structural division for dwellings, requirements are laid down regarding the sound insulation between areas. The requirements laid down apply for separation of a living area of a dwelling from another area not belonging to the dwelling. The end result depends not only on the main structural division but also on the structural members (flanking sound transmission) and connections (sound leaks). Sound leaks can be prevented by executing the construction according to figures 22, 23, 24 or 25. (Flanking transmission will be minimal with whole brick walls.)

The D_{nflw} and the L_{nflw} are, in the constructions shown in the details, at least 52 and 57 dB. Mineral wool edging strips should be installed at the connection between the sheeting floor and the wall. See figures 22, 23, 24 and 25. These show the performance which can be achieved, expressed in D_{nflw} and the L_{nflw} .

3.2.3 Exclusion of damp from outside

When using the LEWIS® dovetailed sheeting floor as a ground floor which adjoins a crawl space, the connection details are normative for the exclusion of damp from outside. Thermal linkage between the outside construction and the LEWIS®-dovetailed sheeting floor must be prevented. See figure 26.

3.2.4 Exclusion of damp from inside

The requirement of NEN 2778 with respect to the water absorption should be complied with by providing the LEWIS®-dovetailed sheeting floor with a coating finish. The LEWIS® dovetailed sheeting floor should be used in situations in accordance with environmental category 1

NEN 6702. It is, however, possible to apply the sheeting floor for wet areas (for example showers and toilets) provided that a number of supplementary measures are taken so that the sheeting floor again complies with environment category 1. See figure 27.

3.3 Deformation

3.3.1 Deformation: deflection of a floor

The effect of the extra flexural rigidity of a floating (not nailed down) dovetailed sheeting floor on the flexural rigidity of the timber load-bearing construction is 5 %.

3.3.2 Deformation: stability of a building

If a building derives its strength with respect to windload from the floor, this should be examined on its contribution to the structure. If a floating (not nailed down) floor delivers insufficient contribution to the structure, or no contribution at all with respect to this load, windbracing should be fitted. One possibility is the application of steel strips in the form of one or more crosses.

3.4 Energy saving

3.4.1 Thermal insulation

The total floor construction must meet the requirements of $R_e \geq 2.5 \text{ m}^2\text{K/W}$. The requirement with respect to thermal insulation can be met with an $R_e \geq 3.5 \text{ m}^2\text{K/W}$. For renovations, the local Building and Housing Inspectorate can grant exemption from this and decide on a lower value.

3.4.2 Limitation of air permeability

The floor is, in principle, airtight. The connection details determine the airtightness. In figures 9, 14, 19, 22, 23, 24 and 25 the connection details for making the floor airtight are shown.

3.5 Flatness

If requirements are laid down for the flatness of the LEWIS®-dovetailed sheeting floor, these must be included in the processing regulations.

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Fire-resistant floor constructions

Figure 8 – Load schedule for construction of LWS- fire 1 and 2

(ψ -values according Eurocode 1: NVN-ENV 1991-1:1995 basic of design and actions of constructions)

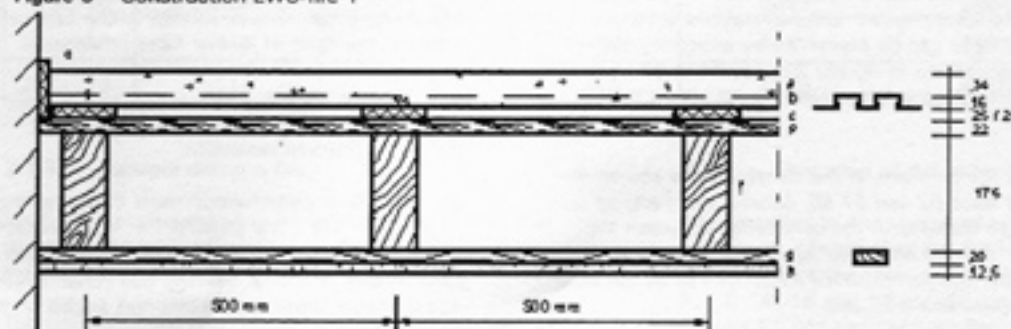
Category of building according Eurocode 1 Assumed imposed floor load P_{rep}	Momentary imposed floor load during fire $\psi_1 \times P_{rep}$ kN/m ²	Total load during fire	
		Excluding partition walls kN/m ² *)	Including partition walls kN/m ² **)
• domestic residential	$0.5 \times 2.0 = 1.0$	2.5	3.5
• offices	$0.5 \times 2.0 = 1.0$	2.5	3.5
• shopping	$0.7 \times 4.0 = 2.8$	4.3	5.3
• congregational areas	$0.7 \times 5.0 = 3.5$	5.0	6.0

*) Load from, for example, joists, floorboards and Dovetailed sheeting
Load from, fine grade concrete
Total without ceiling
Total with ceiling

**) Load from the partition walls
1,0 kN/m²

$0.20 + 0.15 + 0.058 = 0.408 \text{ kN/m}^2$
 $(3.4 + 1.6/2) = 4.2 \times 0.2 = 0.84 \text{ kN/m}^2$
 $0.408 + 0.84 = 1.248 \text{ kN/m}^2 = 1.25 \text{ kN/m}^2$
 $1.25 + 0.25 = 1.50 \text{ kN/m}^2$

Figure 9 – Construction LWS-fire 1

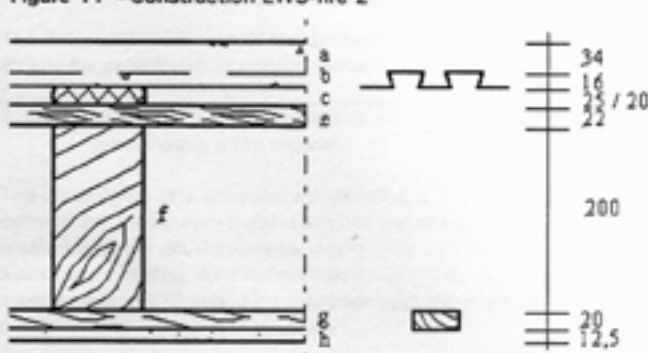


- a. Fine grade concrete
- b. Dovetailed sheeting
- c. Rockwool RT 25/20 mm
- d. Rockwool 501 20/15 mm edging strips
- e. Floorboards with tongue and groove, 20 mm thick
- f. Timber joisting 75 mm x 175 mm, centre-to-centre 500 mm
- g. Battens 20 mm x 50 mm, centre-to-centre 300 mm
- h. Fiberglass reinforced plasterboard 12.5 mm

Figure 10 – Fire resistance construction LWS-fire 1

Joist length in mm	Load during fire kN/m ²	Fire resistance in min
3250	3.15	60
3550	2.65	60
3750	2.50	60

Figure 11 – Construction LWS-fire 2



- a. Fine grade concrete
- b. Dovetailed sheeting
- c. Rockwool RT 25/20 mm
- e. Floorboards with tongue and groove, 20 mm thick
- f. Timber joisting 75 mm x 175 mm, centre-to-centre 500 mm
- g. Battens 20 mm x 50 mm, centre-to-centre 300 mm
- h. Fiberglass reinforced plasterboard 12.5 mm

Figure 12 – Fire resistance construction LWS-fire 2

Joist length in mm	Load during fire kN/m ²	Fire resistance in minutes
4400	3.15	60
4750	2.65	60
5000	2.50	60

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Fire-resistant floor constructions

Figure 13 - Load schedule for construction of LWS- fire 3 and 4

(γ -values according Eurocode 1: NVN-ENV 1991-1:1995 basic of design and actions of constructions)

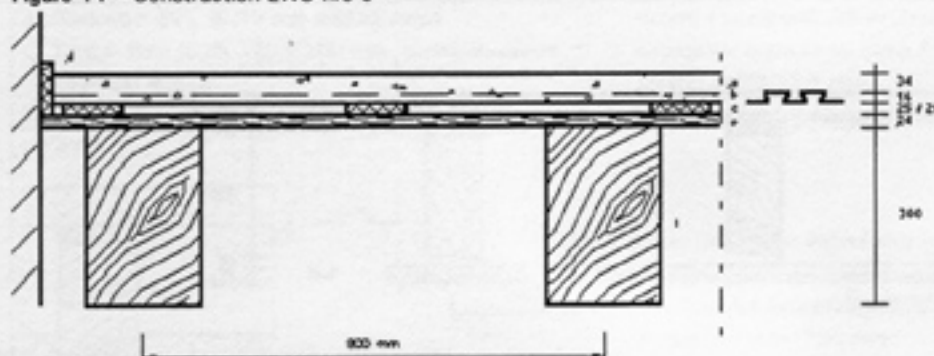
Category of building according Eurocode 1 Assumed imposed floor load P_{rep}	Momentary imposed floor load during fire $\gamma \times P_{rep}$ kN/m ²	Total load during fire	
		Excluding partition walls kN/m ² *)	Including partition walls kN/m ² **)
• domestic residential	$0.5 \times 2.0 = 1.0$	2.25	3.25
• offices	$0.5 \times 2.0 = 1.0$	2.25	3.25
• shopping	$0.7 \times 4.0 = 2.8$	4.05	5.05
• congregational areas	$0.7 \times 5.0 = 3.5$	4.75	5.75

*) Load from, for example, joists, floorboards and Dovetailed sheeting
Load from fine grade concrete
Total without ceiling

**) Load from the partition walls
1.0 kN/m²

$0.20 + 0.15 + 0.058 = 0.408 \text{ kN/m}^2$
 $(3.4 + 1.6/2) \times 0.2 = 0.84 \text{ kN/m}^2$
 $0.408 + 0.84 = 1.248 \text{ kN/m}^2 = 1.25 \text{ kN/m}^2$

Figure 14 - Construction LWS-fire 3

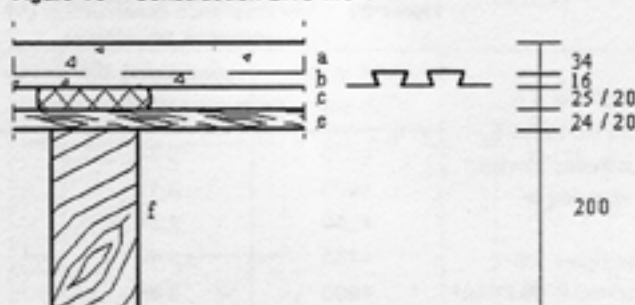


- b. Fine grade concrete
- c. Dovetailed sheeting
- d. Rockwool RT 25/20 mm
- e. Rockwool 501 20/15 mm edging strips
- f. Floorboards with tongue and groove, 24 mm thick
- g. Timber joisting 75 mm x 175 mm, centre-to-centre 500 mm

Figure 15 - Fire resistance construction LWS-fire 3

Joist length in mm	Load during fire kN/m ²	Fire resistance in min
4000	3.50	90
4100	3.35	90
4300	3.00	90
4500	2.85	90
4550	2.75	90
4750	2.50	90
4800	2.45	90
5000	2.25	90

Figure 16 - Construction LWS-fire 4



- a. Fine grade concrete
- h. Dovetailed sheeting
- i. Rockwool RT 25/20 mm
- j. Rockwool 501 20/15 mm edging strips
- k. floorboards with tongue and groove, 20/24 mm thick
- l. Timber joisting 100 mm x 200 mm, centre-to-centre 600 mm

Figure 17 - Fire resistance construction LWS-fire 4

Joist length in mm	Load during fire kN/m ²	Fire resistance in min
4100	2.45	30
4250	2.25	30

Fire-resistant floor constructions

Figure 18 - Load schedule for construction of LWS- fire 5

(γ_n -values according Eurocode 1: NVN-ENV 1991-1:1995 basic of design and actions of constructions)

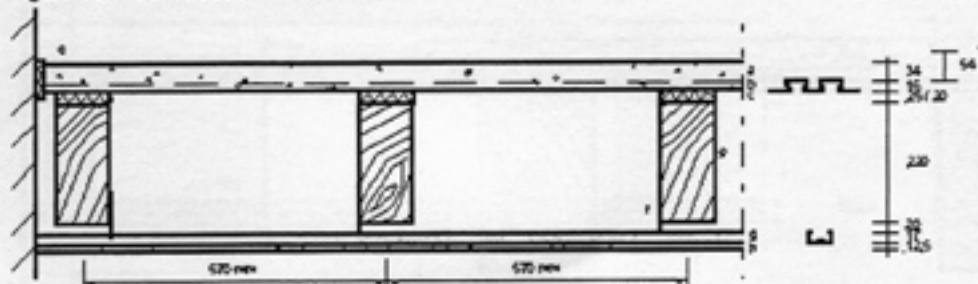
Category of building according Eurocode 1 Assumed imposed floor load P_{rep}	Momentary imposed floor load during fire $\gamma_n \times P_{rep}$ kN/m ²	Total load during fire	
		Excluding partition walls kN/m ² *)	Including partition walls kN/m ² **)
• domestic residential	$0.5 \times 2.0 = 1.0$	2.35	3.35
• offices	$0.5 \times 2.0 = 1.0$	2.35	3.35
• shopping	$0.7 \times 4.0 = 2.8$	4.15	5.15
• congregational areas	$0.7 \times 5.0 = 3.5$	4.85	5.85

*) Load from, for example, joists and Dovetailed sheeting
Load from fine grade concrete
Total without ceiling
Total with ceiling

**) Load from the partition walls
1.0 kN/m²

$0.20 + 0.058 = 0.258 \text{ kN/m}^2$
 $(3.4 + 1.6/2) = 4.2 \times 0.2 = 0.84 \text{ kN/m}^2$
 $0.258 + 0.84 = 1.098 \text{ kN/m}^2 = 1.10 \text{ kN/m}^2$
 $1.10 + 0.25 = 1.35 \text{ kN/m}^2$

Figure 19 - Construction LWS -fire 5



- a. Fine grade concrete
- b. Dovetailed sheeting
- c. Rockwool RT 25/20 mm
- d. Rockwool 501 20/15 mm edging strips
- e. Timber joisting 200 mm x 300 mm, centre-to-centre 570 mm
- f. Suspended ceiling
- g. Metal stud profiles
- h. Fiberglass reinforced plasterboard 12.5 mm

Remark

If the single layer of plasterboard in construction LWS- fire 5 is replaced by a double layer, the fire resistance can be increased by 10 minutes. The fire resistance requirement of 90 minutes can be met if the thickness of concrete on the dovetailed sheeting is increased from

$$h_b = 34 (+16) \text{ mm to } h_b = 54 (+16). \text{ See figure 19.}$$

The supplementary load (fine grade concrete) of approx. 0.40 kN/m² is deducted from the allowable load during fire as stated in figure 21.

Figure 20 - Fire resistance construction LWS-fire 5
Fire resistance 60 minutes

Joist length in mm	Load during fire kN/m ²	Fire resistance in min
4300	3,75	60
4400	3,50	60
4550	3,25	60
4750	3,00	60
4900	2,75	60
5150	2,50	60
5300	2,35	60

Figure 21 - Fire resistance construction LW - fire 5
Fire resistance 90 minutes

Joist length in mm	Load during fire kN/m ²	Fire resistance in min
4300	3,35	90
4400	3,10	90
4550	2,85	90
4750	2,60	90
4900	2,35	90

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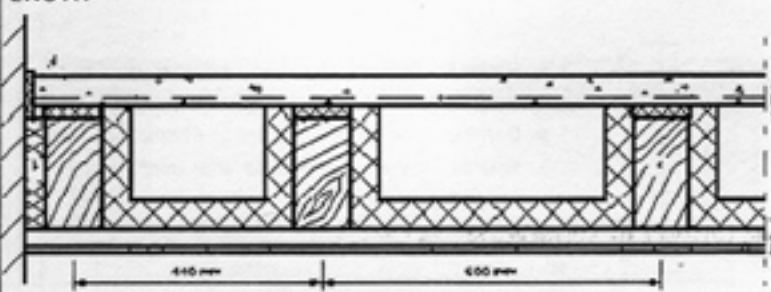
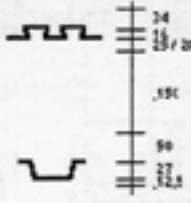
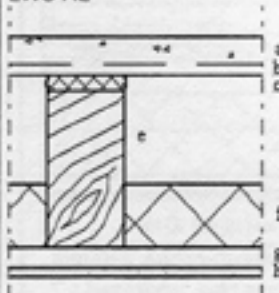
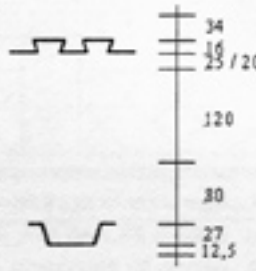
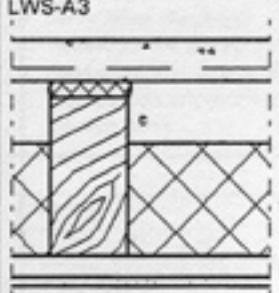
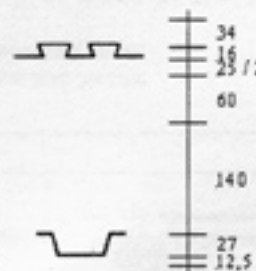
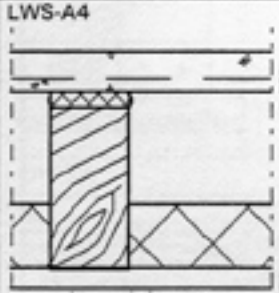
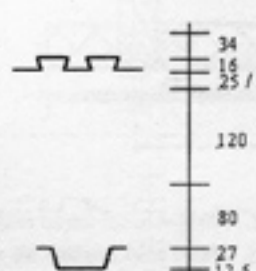
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Sound-insulating floor constructions

Figure 22 - Performance regarding airborne sound and impact sound in construction, in accordance with LWS-A1, A2, A3 and A4

Detail	Construction	$D_{nT,w}$ dB	$L_{nT,w}$ dB
LWS-A1  440 mm 600 mm a. Fine grade concrete b. Dovetailed sheeting c. Rockwool RT 25/20 mm d. Rockwool 501 20/15 mm edging strips e. Timber floor joists 100 x 200 mm, centre-to-centre 440/600 mm	f. Isover Unipan (or equivalent) mineral wool 50 mm g. Knauf (or equivalent) spring stirrups 27/60 mm, centre-to-centre 330 mm h. Gyproc (or equivalent) glass fiber reinforced plaster board 12.5 mm k. Isover Unipan (or equivalent) mineral wool 	61	51
LWS-A2  a b c d e f g h	f. Isover Unipan (or equivalent) mineral wool 80 mm g. Knauf (or equivalent) spring stirrups 27/60 mm, centre-to-centre 330 mm h. Gyproc (or equivalent) glass fiber reinforced plasterboard 12.5 mm 	61	52
LWS-A3  a b c d e f g h	f. Isover Unipan (or equivalent) mineral wool 140 mm g. Knauf (or equivalent) spring stirrups 27/60 mm, centre-to-centre 330 mm h. Gyproc (or equivalent) glass fiber reinforced plasterboard 12.5 mm 	62	50
LWS-A4  a b c d e f g h i	f. Isover Unipan (or equivalent) mineral wool 80 mm g. Knauf (or equivalent) spring stirrups 27/60 mm, centre-to-centre 330 mm h. Gyproc (or equivalent) glass fiber reinforced plasterboard 12.5 mm i. Gypsum plaster 10 mm 	62	50

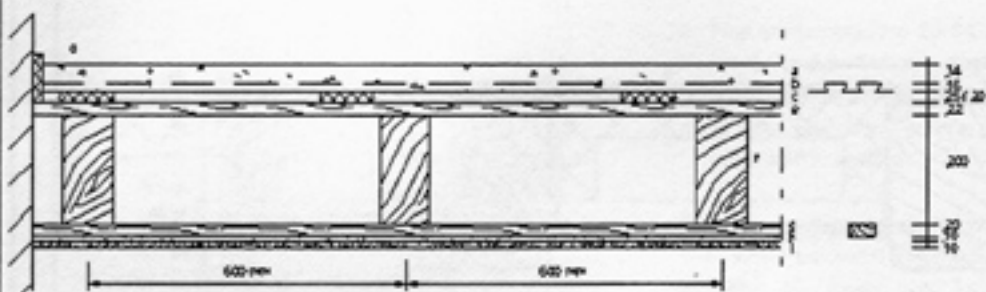
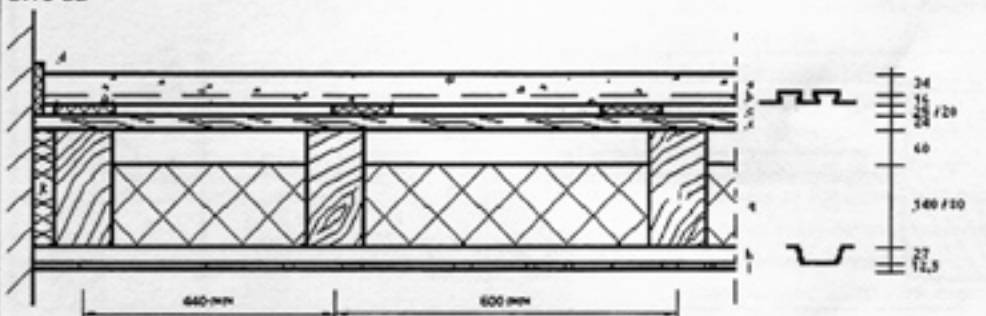
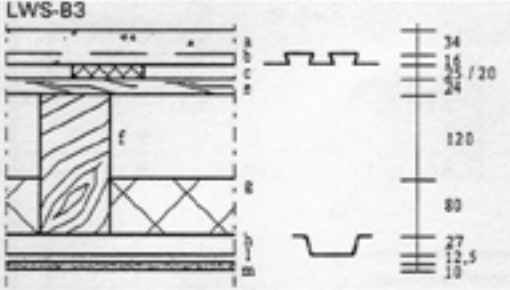
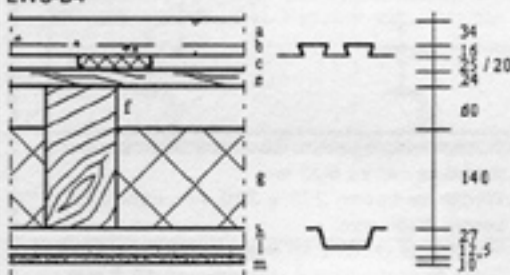
Sound-insulating floor constructions

Figure 23 – Performance regarding airborne sound and impact sound in construction, in accordance with LWS-A5, A6, A7 and A8

Detail	Construction	$D_{nT,w}$ dB	$L_{nT,w}$ dB
LWS-A5	f. Isover Unipan (or equivalent) mineral wool 80 mm g. Battens 24 x 48 mm, centre-to-centre 330 mm h. Gyproc (or equivalent) glass fiber reinforced plasterboard 12.5 mm	58	55
LWS-A6	f. Isover Unipan (or equivalent) mineral wool 140 mm g. Battens 24 x 48 mm, centre-to-centre 330 mm h. Gyproc (or equivalent) glass fiber reinforced plasterboard 12.5 mm	59	53
LWS-A7	f. Isover Unipan (or equivalent) mineral wool 140 mm g. Battens 24 x 48 mm, centre-to-centre 330 mm h. Gyproc (or equivalent) glass fiber reinforced plasterboard 12.5 mm i. Gypsum plaster 10 mm	61	51
LWS-A8	f. Mineral wool wired mat 80 mm g. Metal stud profiles 45 mm h. Glass fiber reinforced plaster board 12.5 mm k. Mineral wool	58	45

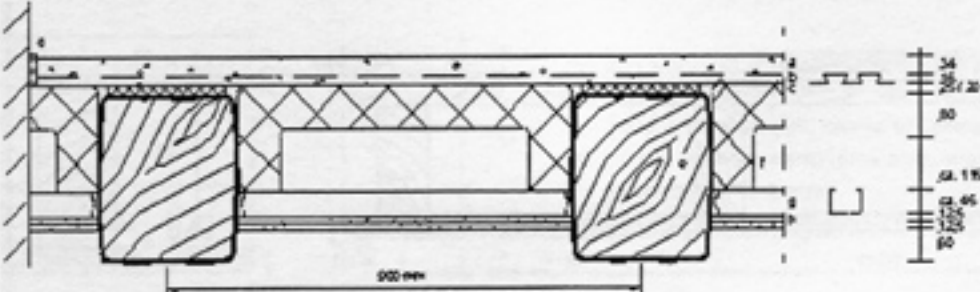
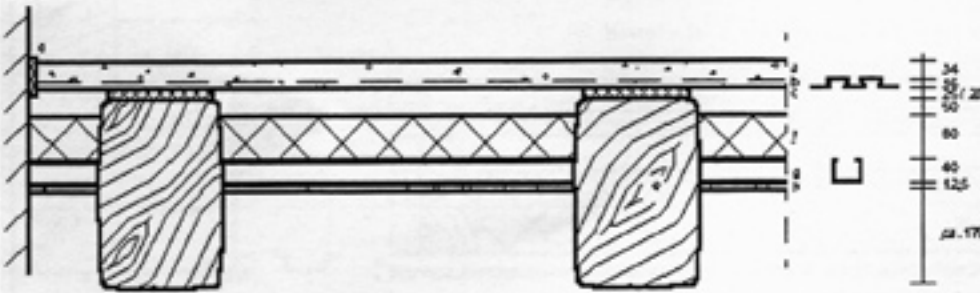
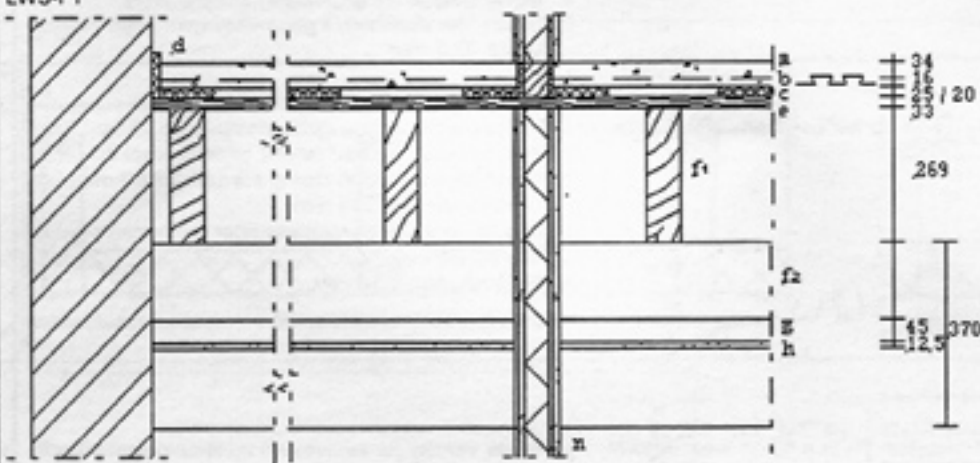
Sound-insulating floor constructions

Figure 24 – Performance regarding airborne sound and impact sound in construction, in accordance with LWS-B0, B2, B3 and B4

Detail	Construction	Detail dB	Detail dB
LWS-B0	 a. Fine grade concrete b. Dovetailed sheeting c. Rockwool RT 25/20 mm d. Rockwool 501 20/15 mm edging strips e. Floorboards with tongue and groove, 20/24 mm thick f. Timber joisting 110 mm x 200 mm, centre-to-centre 600 mm g. Battens 20 x 50 mm, centre-to-centre 300 mm h. Plaster board 10 mm i. Gypsum plaster	56	49
LWS-B2	 a. Fine grade concrete b. Dovetailed sheeting c. Rockwool RT 25/20 mm d. Rockwool 501 20/15 mm edging strips e. Floorboards without tongue and groove, 24 mm thick f. Timber joisting 100 mm x 200 mm, centre-to-centre 440/600 mm g. Isover Unipan (or equivalent) mineral wool 140*/80* mm h. Knauf (or equivalent) spring stirrups 27/60 mm, centre-to-centre 330 mm i. Isover Unipan (or equivalent) mineral wool 140*/80* mm l. Gyproc (or equivalent) glass fiber reinforced plaster board 12.5 mm * Mineral wool 140 mm * Mineral wool 80 mm	62 61	47 49
LWS-B3	 g. Isover Unipan (or equivalent) mineral wool 80 mm h. Knauf (or equivalent) spring stirrups 27/60 mm, centre-to-centre 330 mm i. Gyproc (or equivalent) glass fiber reinforced plaster board 12.5 mm m. Gypsum plaster 10 mm.	64	45
LWS-B4	 g. Isover Unipan (or equivalent) mineral wool 140 mm h. Knauf (or equivalent) spring stirrups 27/60 mm, centre-to-centre 330 mm i. Gyproc (or equivalent) glass fiber reinforced plaster board 12.5 mm m. Gypsum plaster 10 mm.	63	47

Sound-insulating floor constructions

Figure 25 - Performance regarding airborne sound and impact sound in construction, in accordance with LWS-E1, E2 and F1

Detail	Construction	$D_{nT,w}$ dB	$L_{nT,w}$ dB
LWS-E1	 a. Fine grade concrete b. Dovetailed sheeting c. Rockwool RT 25/20 mm d. Rockwool 501 20/15 mm edging strips e. Timber joisting 250 mm x 300 mm, centre-to-centre 900 mm f. Mineral wool blanket 80 mm g. Metal stud profiles 45 mm h. Glass fiber reinforced plasterboard 2x 12.5 mm	53	55
LWS-E2	 a. Fine grade concrete b. Dovetailed sheeting c. Rockwool RT 25/20 mm d. Rockwool 501 20/15 mm edging strips e. Timber joisting 220 mm x 340 mm, centre-to-centre 900 mm f. Rockwool 428 (or equivalent) mineral wool 80 mm g. Metal stud profiles 40 mm h. Glass fiber reinforced plasterboard 12.5 mm	52	57
LWS-F1	 a. Fine grade concrete b. Dovetailed sheeting c. Rockwool RT 25/20 mm, centre-to-centre 500 mm d. Rockwool 501 20/15 mm edging strips e. Floorboards with tongue and groove, 33 mm thick f1. Timber tie beams 270 x 370 mm, centre-to-centre 4000 mm f2. Timber bridging joists 69 mm x 269 mm, centre-to-centre 600 mm g. Metal stud profiles 45 mm h. Glass fiber reinforced plasterboard 12.5 mm n. Partition wall	61	48

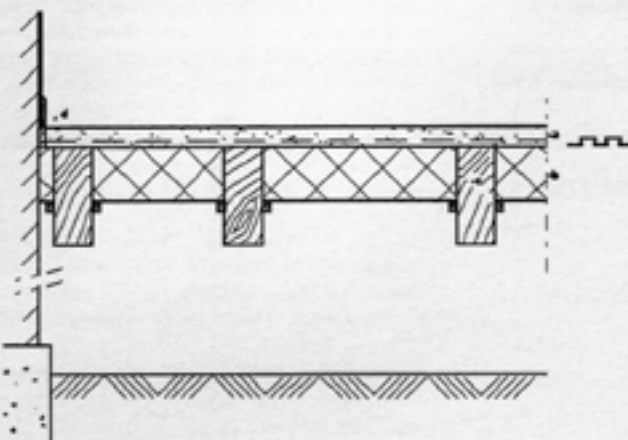
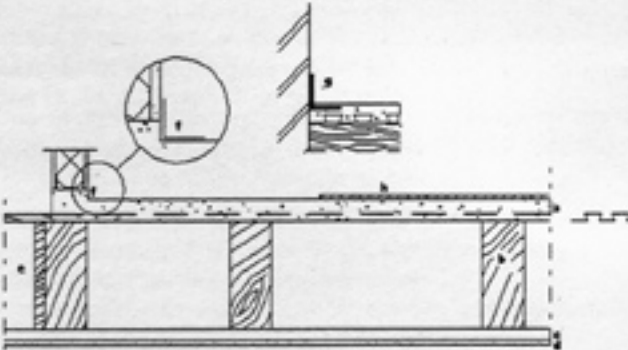
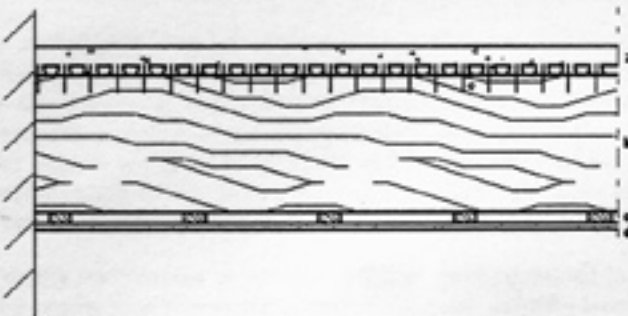
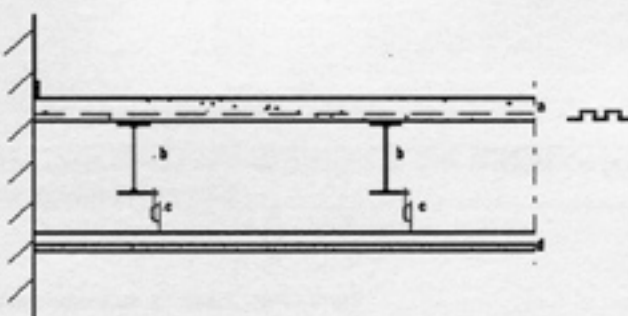
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Structural and inter-connected floors

Detail	Construction
Figure 26 - Floor construction for ground floor 	Natural stone / tiles on wood with or without underfloor heating - Fine grade concrete 20-34 mm on LEWIS® sheets - Isover Mupan 140 mm thick, (or equivalent) insulation sheets ($R_e > 3,5 \text{ m}^2 \text{ K/W}$) - EPS (or equivalent) edging strips 10 mm thick, finished with mastic sealant. Pipe sleeves must be sealed with mastic on back filling. The chinks around the manhole must be well sealed and insulated. No 'thumb hole' may be made in the hatch.
Figure 27 - Bathroom/shower unit floors 	- Fine grade concrete 20-34 mm on LEWIS® sheets - Floor joists - Battens or metal stud profiles - Plasterboard sheets - Joist reinforcement where connected to floorboards - Partition wall of metal stud profiles with plasterboard sheets or light brick and water-resistant flashing - Connection detail on existing brickwork with a strip of bituminous material - Watertight finish with tiles, terrazzo (or equivalent)
Figure 28 - Interconnected floors 	- Fine grade concrete 30 mm on LEWIS® sheets - Floor joists - Option - Battens or metal stud profiles - Plasterboard sheets - Screw nails type no. 10, 63.5 mm long, $\varnothing 3.4 \text{ mm}$
Figure 29 - Steel structure 	- Fine grade concrete 20-34 mm on LEWIS® sheets - Floor joists - Option - Mounting strips - Plasterboard sheets (or equivalent) on metal stud profiles

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4 RECOMMENDATIONS FOR USERS

1. The products are intended for application as floor constructions.
Please: observe the following application conditions: -
2. Check at the time of delivery whether:
 - 2.1 the manufacturer has delivered in compliance with the agreement;
 - 2.2 the mark and marking method are correct (in accordance with 1.3 above);
 - 2.3 the products do not show any visible defects due to transport etc..
3. If you should reject a product on the basis of the above, please contact:
 - 3.1 Reppel B.V., Dordrecht Holland
and, if necessary:
 - 3.2 Kiwa N.V. Rijswijk Holland

4. *Recommendations for the users of the English translation*

This KOMO Technical Approval with Product Certificate was originally written in the Dutch language. The Dutch version is based on an assessment of reports from a number of Dutch and German laboratories (including the accreditation, the testing procedures, the validation and the test results). A list of laboratories is available on request. The calculation reports were assessed basically on Dutch NEN and partly on European NEN-EN standards.

To produce this English version, this KOMO Technical Approval with Product Certificate has been translated from the Dutch language. In case of doubt the Dutch version is only version legally binding.

For the English version several paragraphs have been modified according the recommendations of the producer and their advisors from TNO, TU Delft to make this document more convenient to the English reader.

The two major modifications are

- *The load schedule for construction
LWS - fire 1 up to 5 figure 8, 13 and 18*
- *The Sound insulation values for the constructions
LWS A1 up to F1 figure 22, 23, 24 and 25*

These modifications are not officially assessed by Kiwa and are therefore written down in italic