

ArcelorMittal Construction



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Composite floor decking



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Our extensive range of floor systems meets all structural constraints for all types of buildings.

New constructions

The lightness of composite floors considerably reduces dimensions of the load bearing structure. Low in consumption of the materials used and fast to install, they offer construction sites the assurance of very economic solutions. Compatible with steel, concrete, masonry or timber structures, our floors are able to adapt to any constraints of your project.

Refurbishment

Easily handled, our floors avoid the use of lifting device. For renovation and extension project, additional loads frequently leads to rising stresses into the sub-structure and costly structural reinforcements. Lightness of the new slab structure is therefore an essential argument. With a minimum self-weight of less than 200kg/m² for the most sensitive cases, our composite floors solve this problem perfectly.

Our flooring solutions

The load tables in this guide are calculated in accordance with Eurocodes. The loads given in the tables are maximum unweighted live loads q .

Composite floors: thanks to the embossments and the geometry of the profiles, the related concrete is completely bonded to the steel fully contributing to the slab resistance .

The bonding between steel and concrete permits to achieves economic spans from 2,50 to 6 metres, significantly reducing the quantity of concrete poured, and thus its self-weight compared with a traditional reinforced concrete slab or prefabricated concrete solutions. The entire range of composite floor decks is regulated European Norms and national certifications like DTA in France or AbZ in Germany.

Integrated floors: The optimal combination of the materials used for these floor structure enables them to bridge spans from 5 to 8 m providing at the same time an excellent sound and fire insulation. Their finished soffit also offer the option of eliminating traditional suspended ceilings.

Long span additive floor systems: latest generation of our range, with 220m deep rolled ribs, these floors bridge spans from 5.50 m without propping, and up to 8 m with propping.

Composite beams: when the limit span for our floors is reached, then the composite beams can serve as intermediate support for floor decking and the final composite slabs. The offered solutions allow the HVAC ducts either to cross the beam through regular web openings (ACB beam), or to integrate the beam within the thickness of the floor (CoSFB beam).

Our engineering office remains at your disposal for all the solutions presented in this guide and for further individual optimisation of your projects.

Some key terms...

g': permanent loads in the final phase (excluding the self-weight of the floors)

q: live loads in the final phase

L span: means the distance between supports (can be calculated as clear distance between supports in the case of a concrete structure). If propping is necessary, the span differs between the pouring phase and the final composite slab

SLS: Service Limit States - states describing the service criteria of a floor system (deflection, cracking, vibration, etc.)

Deflection: maximum deformation of the floor under a combination of SLS loads. Limited to $L/180$ in the pouring phase

REI: resistance of the floor to fire for mechanical stability (R), flame proofing and tightness (E) and thermal insulation (I)

Composite floors decking with dovetail section

Cofrastra® 40



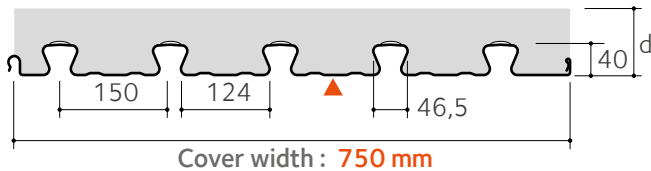
Cofrastra® 40 is a steel profile sheet with dovetail geometry intended to realise composite slabs

The longitudinal shear bond between the concrete and the profile realised by embossment and its dovetail section gives an additional reinforcement to the slab construction.

The profile serves as formwork while pouring the concrete and allows savings to be made on the lower reinforcement layer.

Cofrastra® 40 permits to build very slim and lightweight slabs, or quite massive structures, similar to standard reinforced concrete slabs using it more as lost shuttering.

Its dovetail geometry ensures a very good adhesion and the Cofrafix clip system allows to suspend building equipment, ducts or false ceilings ... without any dowels, pins or drilling.



▲ Coated face

CE - Marking

German technical approval: AbZ Z-16.1-22

French technical approval : DTA No. 3/15-801

Characteristics of the base material		Norms
Steel grade	S 350 GD	EN 10346
corrosion protection	Galvanised steel ZM 175	P 34-310 ETPM ZMevolution or AbZ Z-30.11-61 P 34-301 EN 10169+A1

Characteristics	Nominal thickness of the profile sheet [mm]		
	0,75	0,88	1,00
Weight [kg/m ²]	9,80	11,50	13,10
Cross section A_p : [mm ² /m]	1 183	1 400	1 600
Effective inertia I_{eff} [mm ⁴ /m]	175 800	222 300	254 100
Height of neutral axis [mm]	10,60	10,60	10,60
Modulus of inertia [mm ³ /m]	16 570	20 950	23 950

Nominal concrete consumption

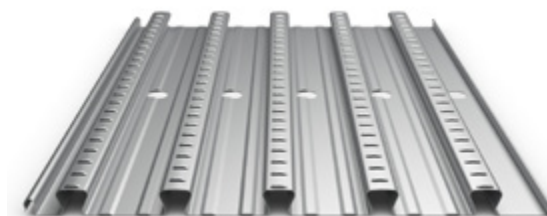
	Thickness of the slab [cm]									
	9	10	11	12	13	14	15	16	17	18
Concrete volume [l/m ²]	80	90	100	110	120	130	140	150	160	170
Theoretical weight of the composite slab [kg/m ²]	200	225	250	275	300	325	350	375	400	425

Concrete density 2500 kg/m³

Maximum recommended slab thickness d = 20 cm

Cofrastra® 40 P:

Pre-punched version, compatible with shear connectors, welded in advance or in shop to the composite beams.



The Cofra® 5 web based software application

will give detailed information about the required reinforcement according to the project specifications.



www.arcelormittal.com/cofra5

Fire resistance

	REI [min]			
	30	60	90	120
Thickness of the slab [cm]	9	9	11	13

REI: fire protection rating of the raw composite slab
The minimum thickness is required to comply with the temperature criterion (I) on the non- fire exposed side.

According to EN1994-1-2 4.3.2, Cofrastra® 40 composite floors are by default REI 30.

For higher fire resistance classes, reinforcement bars are required. These are positioned in the ribs of the profile. Their size is determined by calculation (see Cofra5).

Sound insulation

The acoustic behaviour of a raw composite slab is determined by its mass.

Given values are calculated by modelling – study report CSTB No. AC15-26054708

	Thickness of the slab [cm]									
	9	10	11	12	13	14	15	16	17	18
R _w [dB]	46	47	48	49	50	50	51	52	52	53
(C;Ctr) [dB]	(-1;-6)	(-2;-6)	(-2;-6)	(-2;-6)	(-1;-6)	(-1;-6)	(-1;-6)	(-2;-7)	(-1;-6)	(-2;-7)

Acoustic performance of the Cofrastra® 40 Décibel floor system			
Complex	R _w (C;Ctr)	L _{n,w}	CSTB Report
Cofrastra® Décibel: Cofrastra® 40 + slab thickness 140 mm + plénum space 70 mm + plasterboard BA13	56 (-6;-11) dB	66 dB	23268
Cofrastra® Décibel: Cofrastra® 40 + slab thickness 140 mm + plénum space 70 mm + IBR 60 mm + plasterboard BA13	65 (-4;-10) dB	61 dB	23268

Structural performance

Acceptable unweighted q values with g' = 0 in kg/m²

A calculation using Cofra 5 optimises these values according to the project requirements

Single span 

Thickness of the slab [cm]	Span [m]																					
	2,00	2,10	2,20	2,30	2,40	2,50	2,60	2,70	2,80	2,90	3,00	3,10	3,20	3,30	3,40	3,50	3,60	3,70	3,80	3,90	4,00	
18	3000	3000	2839	2670	2518	2379	2252	2135	2028	1929	1837	1752	1672	1598	1529	1463	1402	1345	1290	1239	1191	
17	3000	2863	2685	2524	2379	2246	2125	2014	1912	1817	1730	1649	1573	1502	1436	1375	1316	1262	1210	1161	1115	
16	2890	2700	2531	2378	2239	2113	1998	1892	1795	1706	1623	1546	1474	1407	1344	1286	1231	1179	1130	1084	1040	
15	2718	2538	2377	2231	2100	1980	1871	1771	1679	1594	1515	1442	1375	1311	1252	1197	1145	1096	1050	1006	965	
14	2547	2376	2223	2085	1960	1847	1744	1649	1562	1482	1408	1339	1275	1216	1160	1108	1059	1013	969	929	890	
13	2375	2214	2069	1939	1821	1714	1617	1528	1446	1371	1301	1236	1176	1120	1068	1019	973	930	889	851	815	
12	2204	2051	1915	1792	1682	1581	1490	1406	1330	1259	1194	1133	1077	1025	976	930	887	847	809	773	-	
11	2032	1889	1761	1646	1542	1448	1363	1285	1213	1147	1086	1030	978	929	884	841	801	-	-	-	-	
10	2095	1727	1607	1500	1403	1315	1236	1163	1097	1036	979	927	878	833	-	-	-	-	-	-	-	
9	1782	1778	1453	1353	1264	1183	1109	1042	980	924	-	-	-	-	-	-	-	-	-	-	-	
	Without propping										With propping											

Multiple spans  with L1 = L2 and prop width 100 mm

Thickness of the slab [cm]	Span [m]																					
	2,00	2,10	2,20	2,30	2,40	2,50	2,60	2,70	2,80	2,90	3,00	3,10	3,20	3,30	3,40	3,50	3,60	3,70	3,80	3,90	4,00	
18	3000	3000	3000	3000	2872	2743	2623	2512	2409	2313	2224	2140	2062	1922	1789	1668	1556	1453	1359	1271	1190	
17	3000	3000	2972	2830	2698	2576	2464	2360	2263	2173	2089	2010	1926	1790	1666	1553	1449	1353	1265	1183	1107	
16	3000	2929	2781	2645	2524	2410	2304	2207	2117	2032	1954	1880	1784	1658	1543	1438	1341	1252	1170	1095	1024	
15	2880	2727	2589	2462	2349	2243	2145	2054	1970	1892	1818	1750	1643	1527	1421	1323	1234	1152	1076	1006	942	
14	2667	2526	2397	2281	2172	2077	1986	1902	1824	1751	1683	1619	1502	1395	1298	1209	1127	1052	982	918	859	
13	2454	2324	2205	2098	1998	1910	1827	1749	1677	1610	1548	1467	1360	1263	1175	1094	1020	951	888	830	776	
12	2240	2122	2015	1915	1825	1741	1667	1597	1531	1470	1413	1315	1219	1132	1052	979	912	851	794	741	693	
11	2027	1920	1822	1734	1651	1574	1508	1444	1385	1329	1256	1162	1077	1000	929	864	805	750	700	653	-	
10	1813	1717	1630	1551	1476	1409	1346	1291	1238	1183	1092	1010	936	868	806	750	698	-	-	-	-	
9	1600	1515	1438	1368	1304	1243	1188	1136	1092	1006	929	858	795	-	-	-	-	-	-	-	-	
	Without propping										With propping											

Assumptions

- Concrete C25/30 (Density 2500 kg/m³)
- Fire resistance REI30
- Deflection while pouring L / 180
- Deflection in service L [cm] / 350 if L < 3.5 m or (0.5 cm + L / 700) if L > 3.5 m

Key	Thickness [mm]
Installation without propping	0,75
	0,88
	1,00
With propping	0,75

Composite floor decking with trapezoidal section

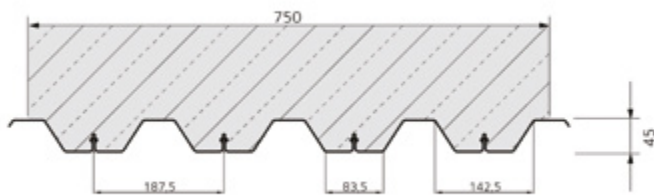
Cofraplus® 45



Cofraplus 45 is a trapezoidal profile sheet with additional, specially embossed webs intended to realise composite slabs. The embossments ensure the longitudinal shear bond between the concrete and the steel profile which acts than as additional reinforcement to the slab construction.

The profile serves as formwork in the temporary phase and allows savings to be made on the low reinforcement layer and due to its geometry on the self-weight of the slab construction.

A multi-use profile, Cofraplus® 45 is suitable for all types of construction.



▲ Coated face

CE - Marking

Characteristics of the base material		Norms
Steel grade	S 350 GD	EN 10346
Type of corrosion protection	Galvanised steel ZM 175	P 34-310 ETPM ZMevolution or AbZ Z-30.11-61
	Galvanised coated steel ZM 175	P 34-301 EN 10169+A1
Organic coating		Norms
Hairplus 25 µm	Category IIIa	P 34-310
	Category CPi3	EN 10169+A1
Other coatings	On demand	

Characteristics	Nominal thickness of the profile sheet [mm]
Weight [kg/m ²]	10,00
Cross section A_p : [mm ² /m]	1 088
Effective inertia I_{eff} [mm ⁴ /m]	-

Nominal concrete consumption

	Thickness of the slab [cm]															
	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38
Concrete volume [l/m ²]	62	82	102	122	142	162	182	202	222	242	262	282	302	322	342	362
Theoretical weight of the composite slab [kg/m ²]	155	205	255	305	355	405	455	505	555	605	655	705	755	805	855	905

Concrete density 2500 kg/m³

Fire resistance

Thickness of the slab [cm]	REI [min]			
	30	60	90	120
8	100	120	140	

REI: fire protection rating of the raw composite slab

The minimum thickness is required to comply with the temperature criterion (I) on the non-fire exposed side.

According to EN1994-1-2 4.3.2, Cofraplus® 45 composite floors are rated REI 30 even without specific reinforcement in the ribs. For higher fire resistance classes, additional reinforcement bars are required. These are positioned in the ribs of the profile. Their size is determined by calculation (see Cofra5).

Structural performance

Acceptable unweighted q values with $g' = 0$ in kg/m^2

A calculation using Cofra 5 might optimise the design according to the project requirements

Single span 

Thickness of the slab [cm]	Span [m]																				
	1,50	1,60	1,70	1,80	1,90	2,00	2,10	2,20	2,30	2,40	2,50	2,60	2,70	2,80	2,90	3,00	3,10	3,20	3,30	3,40	3,50
18	1685	1513	1366	1239	1129	1032	946	870	801	740	684	634	587	545	506	470	436	404	374	347	321
17	1618	1452	1310	1187	1081	987	905	831	765	706	653	604	560	520	482	448	415	384	356	330	305
16	1551	1390	1253	1135	1033	943	863	793	730	673	622	575	533	494	458	426	394	365	338	312	289
15	1484	1329	1197	1083	985	898	822	754	694	639	590	546	505	468	435	403	373	345	319	295	273
14	1417	1268	1141	1031	937	854	780	716	658	606	559	517	478	443	411	381	352	325	301	278	257
13	1351	1207	1084	979	888	809	739	677	622	572	528	487	451	417	387	358	331	306	283	261	241
12	1284	1145	1028	927	840	764	698	639	586	539	497	458	423	392	363	336	310	286	264	244	225
11	1217	1084	972	875	792	720	656	600	550	505	465	429	396	366	339	314	289	267	246	227	209
10	1150	1023	915	823	744	675	615	562	514	472	434	400	369	341	315	291	268	247	228	-	-
9	1083	962	859	771	696	631	573	523	478	438	403	371	342	315	291	-	-	-	-	-	-

Without propping With propping

Multiple spans  with $L_1 = L_2$ and prop width 100 mm

Thickness of the slab [cm]	span [m]																				
	1,50	1,60	1,70	1,80	1,90	2,00	2,10	2,20	2,30	2,40	2,50	2,60	2,70	2,80	2,90	3,00	3,10	3,20	3,30	3,40	3,50
18	2200	1991	1812	1657	1522	1404	1299	1206	1123	1048	980	918	862	810	763	719	677	638	602	568	537
17	2110	1907	1734	1585	1455	1341	1240	1151	1071	998	933	874	820	771	725	683	643	606	571	539	509
16	2020	1824	1657	1513	1388	1278	1181	1095	1018	949	886	830	778	731	688	647	609	573	540	509	481
15	1930	1741	1580	1441	1321	1215	1122	1040	966	899	840	786	736	691	650	611	575	541	509	480	453
14	1840	1657	1502	1369	1253	1152	1063	984	913	850	793	741	694	651	612	576	540	508	478	450	425
13	1750	1574	1425	1297	1186	1089	1004	928	861	801	746	697	652	612	574	540	506	476	447	421	396
12	1660	1491	1348	1225	1119	1026	945	873	809	751	700	653	610	572	536	504	472	443	416	391	368
11	1569	1407	1270	1153	1051	963	886	817	756	702	653	609	568	532	499	468	438	411	385	362	340
10	1479	1324	1193	1081	984	900	826	761	704	652	606	564	527	492	461	432	404	378	354	332	312
9	1389	1241	1116	1009	917	837	767	706	651	603	559	520	485	452	423	396	370	346	-	-	-

Without propping With propping

Assumptions

- Concrete C25/30 (Density 2500 kg/m^3)
- Fire resistance REI30
- Deflection while pouring $L / 180$
- Deflection in service $L [\text{cm}] / 350$ if $L < 3.5$ m or $(0.5 \text{ cm} + L / 700)$ if $L > 3.5$ m

Key	Thickness [mm]
Installation without propping	0,80
With propping	0,80

Composite floors decking with dovetail section

Cofrastra® 56S



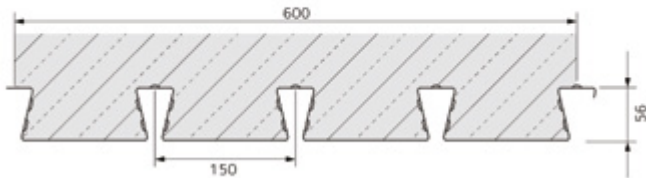
Cofrastra® 56S is a classical 600 mm width metal floor decking with re-entrant profile geometry to build a composite floor system.

The longitudinal shear bond between the concrete and the profile realised by embossment and its dovetail section gives an additional reinforcement to the slab construction.

The profile serves as formwork in the pouring phase of the concrete and allows savings to be made on the low reinforcement layer.

Cofrastra® 56S permits to build very slim and lightweight slabs or quite massive structures similar to standard reinforced concrete slabs.

Its dovetail geometry ensures a very good adhesion and, with its *Cofrafix clip system*, it allows to suspend building equipment, ducts or false ceilings without any dowels or pins., allows loads to be suspended on its underside without pinning.



▲ Coated face

CE - Marking

German technical approval: AbZ Z-16.1-22

Characteristics of the base material		Norms
Steel grade	S 350 GD	EN 10346
corrosion protection	Galvanised steel ZM 175	P 34-310 ETPM ZMevolution or AbZ Z-30.11-61
	Galvanised coated steel ZM 175	P 34-301 EN 10169+A1
Organic coating		Norms
Hairplus 25 µ	Catégorie IIIa	P 34-310
	Catégorie CPI3	EN 10169+A1
Other coatings	On demand	

Characteristics	Nominal thickness of the profile sheet [mm]					
	0,75	0,88	1,00	1,13	1,25	1,50
Weight [kg/m ²]	11,60	13,60	15,50	17,50	19,40	23,30
Cross section A _p : [mm ² /m]	1 402	1 659	1 896	2 153	2 390	2 884
Effective inertia I _{eff} [mm ⁴ /m]	471 000	613 000	744 000	844 000	936 000	112 900

Nominal concrete consumption

	Thickness of the slab [cm]												
	11	12	13	14	15	16	17	18	19	20	22	25	30
Concrete volume [l/m ²]	100	110	120	130	140	150	160	170	180	190	210	240	290
Theoretical weight of the composite slab [kg/m ²]	250	275	300	325	350	375	400	425	450	475	525	600	725

Concrete density 2500 kg/m³

Maximum recommended slab thickness d = 30 cm

Cofrastra® 56:

Pre-punched version, compatible with shear connectors, welded in advance or in shop to the composite beams.



The Cofra® 5 web based software application

will give detailed information about the required reinforcement according to the project specifications.



www.arcelormittal.com/cofra5

Fire resistance

	REI [min]				
	30	60	90	120	180
Thickness of the slab [cm]	11	11	12	14	18

REI: fire protection rating of the raw composite slab
The minimum thickness is required to comply with the temperature criterion (I) on the non- fire exposed side.

According EN1994-1-2 4.3.2, Cofrastra® 56S composite floors are by default REI 30.

For higher fire resistance classes, reinforcement bars are required. These are positioned in the ribs of the profile. Their size is determined by calculation (see Cofra5).

Sound insulation

The acoustic behaviour of a raw composite slab is determined by its mass.

Given values are estimated performances based on the mass of the slab and similar modellings.

	Thickness of the slab [cm]									
	11	12	13	14	15	16	17	18	17	18
R _w [dB]	48	49	50	50	51	52	52	53	52	53
(C;Ctr) [dB]	(-2;-6)	(-2;-6)	(-1;-6)	(-1;-6)	(-1;-6)	(-2;-7)	(-1;-6)	(-2;-7)	(-1;-6)	(-2;-7)

Structural performance

Acceptable unweighted q values with g' = 0 in kg/m²

A calculation using Cofra 5 optimises these values according to the project requirements

Single span 

Thickness of the slab [cm]	Span [m]																				
	2,00	2,10	2,20	2,30	2,40	2,50	2,60	2,70	2,80	2,90	3,00	3,10	3,20	3,30	3,40	3,50	3,60	3,70	3,80	3,90	4,00
18	2280	2834	2566	3000	3000	3000	3000	3000	1360	1287	1219	1156	1097	1043	992	944	900	858	819	782	747
17	2182	2707	2449	2229	3000	3000	3000	3000	2941	1226	1161	1100	1044	992	943	898	855	815	778	743	709
16	2084	1934	2332	2120	3000	2941	2960	2957	2796	1165	1103	1045	991	941	895	851	811	773	737	703	671
15	1986	1842	2215	2012	1836	2776	2620	2806	2651	2510	1045	990	938	891	846	805	766	730	696	664	634
14	1888	1750	1627	1903	1735	1590	2462	2327	2507	2371	2246	934	885	840	798	758	722	687	655	624	596
13	1790	1657	1540	1795	1634	1495	2305	2176	2214	2232	2113	879	832	789	749	712	677	644	614	585	558
12	1692	1565	1453	1352	1533	1401	1285	2025	1913	1955	1979	1875	779	739	701	665	632	602	573	545	-
11	1594	1473	1366	1270	1432	1307	1197	1874	1769	1816	1846	1746	1654	688	652	619	588	-	-	-	-
10	2792	1381	1279	1187	1106	1213	1109	1018	1624	1533	1584	1618	1531	1450	-	-	-	-	-	-	-
9	1910	2383	1191	1105	1028	1987	1021	-	-	1394	0	-	-	-	-	-	-	-	-	-	-
Without propping															With propping						

Multiple spans  with L1 = L2 and prop width 100 mm

Thickness of the slab [cm]	Span [m]																				
	2,00	2,10	2,20	2,30	2,40	2,50	2,60	2,70	2,80	2,90	3,00	3,10	3,20	3,30	3,40	3,50	3,60	3,70	3,80	3,90	4,00
18	2924	2728	2552	2395	2253	2125	2008	1901	2048	1893	2452	2272	2110	1961	1826	1703	1589	1191	1143	1098	1056
17	2796	2607	2438	2286	2150	2026	1914	1811	1944	1767	1589	2121	1969	1831	1704	1589	1483	1130	1084	1041	1001
16	2668	2486	2323	2177	2046	1927	1819	1721	1631	1640	1475	1970	1829	1700	1583	1475	1376	1285	1026	985	946
15	2540	2365	2208	2068	1942	1829	1725	1631	1545	1514	1362	1228	1688	1569	1461	1361	1270	1186	1108	928	891
14	2412	2243	2093	1959	1839	1730	1631	1541	1458	1383	1248	1125	1016	1439	1339	1247	1163	1086	1015	871	836
13	2284	2122	1979	1850	1735	1631	1537	1451	1372	1300	1234	1022	923	834	1217	1134	1057	987	922	862	781
12	2156	2001	1864	1741	1631	1532	1442	1361	1286	1218	1155	919	829	750	679	1020	951	887	829	775	725
11	2028	1880	1749	1632	1528	1433	1348	1271	1200	1135	1076	1021	736	665	-	-	845	788	736	687	-
10	1900	1759	1635	1523	1424	1335	1254	1180	1114	1052	996	945	897	-	-	-	-	-	-	-	-
9	1772	1638	1520	1415	1320	1236	1160	1090	1027	970	917	868	824	-	-	-	-	-	-	-	-
Without propping																					

Assumptions

- Concrete C25/30 (Density 2500 kg/m³)
- Fire resistance REI30
- Deflection while pouring L / 180
- Deflection in service L [cm] / 350 if L < 3.5 m or (0.5 cm + L / 700) if L > 3.5 m

Key	Thickness [mm]
Installation without propping	0,75
	0,88
	1,00
	1,13
	1,25
With propping	0,75

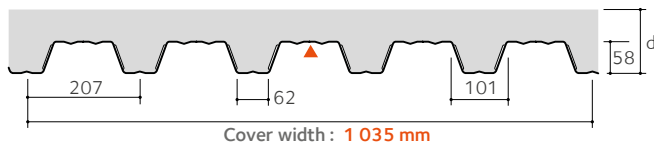
Composite floor decking

Cofraplus® 60



Cofraplus® 60 is a trapezoidal profile sheet with lateral embossments at its web intended to realise composite slabs.

The embossments ensure the longitudinal shear bond between the concrete and the steel profile which acts than as additional reinforcement to the slab construction. The profile serves as formwork in the pouring phase of the concrete and allows savings to be made on the low reinforcement layer and to its self-weight due to the trapezoidal geometry. A multi-use profile, Cofraplus® 60 is suitable for all types of construction. Upon request, the standard 5 ribs profile with a cover width of 1035mm can be delivered only with 4 ribs and a smaller cover width of 828mm to reduce scrap by offcuts and site operations.



▲ Coated face

CE - Marking

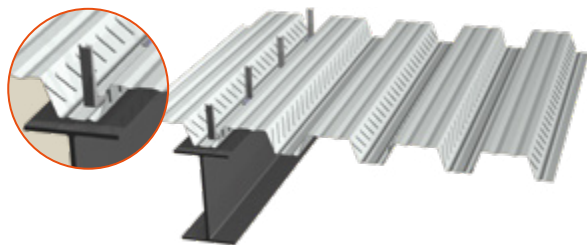
French technical approval : DTA No. 3/15-800

Characteristics of the base material		Norms
Steel grade	S 350 GD	EN 10346
Type of corrosion protection	Galvanised steel ZM 175	P 34-310 ETPM ZMevolution or AbZ Z-30.11-61
	Galvanised coated steel ZM 175	P 34-301 EN 10169+A1
Organic coating		Norms
Hairplus 25 µm	Category IIIa	P 34-310
	Category CPi3	EN 10169+A1
Other coatings	On demand	

Characteristics	Nominal thickness of the profile sheet [mm]			
	0,75	0,88	1,00	1,25
Weight [kg/m ²]	8,53	10,00	11,37	14,22
Cross section A_p [mm ² /m]	1 029	1 217	1 391	1 797
Effective inertia I_{eff} [mm ⁴ /m]	443 700	526 400	600 800	751 000
Height of neutral axis [mm]	33,70	33,70	33,70	33,70
Modulus of inertia [mm ³ /m]	13 160	15 620	17 830	22 280

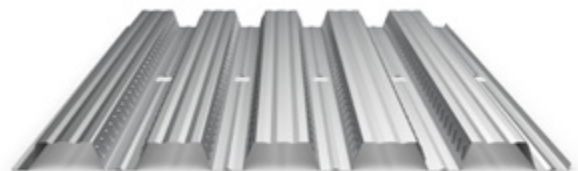
Cofraplus® 60 C:

If shear connectors are welded or nailed to the across the profile sheet to the beam, the Cofraplus® 60 C version brings advantages. The spacing between the 2 stiffeners in the lower flange permits to well position the connector.



Cofraplus® 60 P:

Pre-punched version, compatible with shear connectors welded in advance or in shop to composite beams.



Nominal concrete consumption

	Thickness of the slab [cm]									
	11	12	13	14	15	16	17	18	19	20
Concrete volume [l/m ²]	75	85	95	105	115	125	135	145	155	165
Theoretical weight of the composite slab kg/m ²	188	213	238	263	288	313	338	363	388	413

Concrete density 2500 kg/m³

Maximum recommended slab thickness d = 28 cm

The Cofra® 5 web based software application

will give detailed information about the required reinforcement according to the project specifications



www.arcelormittal.com/cofra5

Fire resistance

Thickness of the slab [cm]	REI [min]			
	30	60	90	120
11	11	12	14	16

REI: fire protection rating of the raw composite slab
The minimum thickness is required to comply with the temperature criterion (I) on the non-fire exposed side.

According EN1994-1-2 4.3.2, Cofraplus® 60 composite floors are rated REI 30 even without specific reinforcement in the rib. For higher fire resistance classes, reinforcement bars are required. These are positioned in the ribs of the profile. Their size is determined by calculation (see Cofra5).

Sound insulation

The acoustic behaviour of a raw composite slab is determined by its mass. Values calculated by modelling – study report CSTB No. AC15-26054708

	Thickness of the slab [cm]								
	11	12	13	14	15	16	17	18	20
R _w [dB]	46	47	48	48	49	50	51	52	53
(C;Ctr) [dB]	(-2;-6)	(-2;-6)	(-2;-6)	(-1;-6)	(-1;-6)	(-2;-6)	(-2;-7)	(-2;-7)	(-2;-7)

Structural performance

Acceptable unweighted q values with g' = 0 in kg/m²

A calculation using Cofra 5 might optimise the given values according to the project requirements

Single span 

Thickness of the slab [cm]	span [m]																				
	2,00	2,10	2,20	2,30	2,40	2,50	2,60	2,70	2,80	2,90	3,00	3,10	3,20	3,30	3,40	3,50	3,60	3,70	3,80	3,90	4,00
20	1622	1615	1611	1257	1155	1063	980	906	838	777	721	670	623	580	540	503	469	437	407	380	354
19	1577	1572	1572	1220	1120	1031	950	878	812	752	698	648	603	561	522	486	453	422	394	367	342
18	1531	1400	1403	1409	1086	998	920	849	786	728	675	627	582	542	504	469	437	407	380	354	329
17	1486	1358	1364	1254	1265	966	890	821	759	703	652	605	562	522	486	453	421	393	366	341	317
16	1440	1316	1206	1217	1230	934	860	793	733	678	628	583	541	503	468	436	406	378	352	328	305
15	1395	1273	1167	1073	1088	1105	830	765	706	653	605	561	521	484	450	419	390	363	338	315	293
14	1349	1231	1128	1036	1053	973	993	737	680	628	582	539	500	465	432	402	374	348	324	302	281
13	1304	1189	1088	999	914	941	963	708	653	604	559	517	480	446	414	385	358	333	310	289	269
12	1258	1147	1049	963	880	806	840	864	627	579	535	496	459	426	396	368	342	318	296	276	-
11	1213	1104	1009	926	845	773	709	751	777	554	512	474	439	407	378	351	326	-	-	-	-
	Without propping										With propping										

Multiple spans  with L1 = L2 and prop width 100 mm

Thickness of the slab [cm]	span [m]																				
	2,00	2,10	2,20	2,30	2,40	2,50	2,60	2,70	2,80	2,90	3,00	3,10	3,20	3,30	3,40	3,50	3,60	3,70	3,80	3,90	4,00
20	2117	1950	1947	1803	1676	1683	1571	1469	1162	1087	1019	956	899	846	798	753	711	672	636	602	570
19	2053	1890	1890	1750	1625	1636	1526	1427	1121	1048	982	922	866	815	768	724	683	646	611	578	547
18	1990	1830	1690	1697	1575	1466	1481	1384	1296	1010	945	887	833	783	737	695	656	619	585	554	524
17	1926	1770	1634	1512	1525	1419	1323	1341	1256	1178	909	852	799	751	707	666	628	593	560	530	501
16	1830	1711	1577	1459	1475	1371	1278	1283	1215	1139	872	817	766	720	677	637	601	567	535	506	478
15	1686	1593	1510	1406	1296	1297	1233	1152	1130	1082	1034	782	733	688	647	608	573	540	510	482	455
14	1541	1457	1380	1310	1246	1150	1131	1081	1033	989	948	910	700	656	616	579	545	514	485	457	432
13	1396	1320	1250	1187	1129	1075	1025	979	936	896	859	824	792	625	586	551	518	488	459	433	409
12	1251	1183	1121	1064	1012	964	919	877	839	804	769	738	709	682	556	522	490	461	434	409	386
11	1107	1046	991	941	895	852	813	777	742	710	681	653	627	603	580	493	463	435	409	385	-
	Without propping										With propping										

Assumptions

- Concrete C25/30 (Density 2500 kg/m³)
- Fire resistance REI30
- Deflection while pouring L / 180
- Deflection in service L [cm] / 350 if L < 3.5 m or (0.5 cm + L / 700) if L > 3.5 m

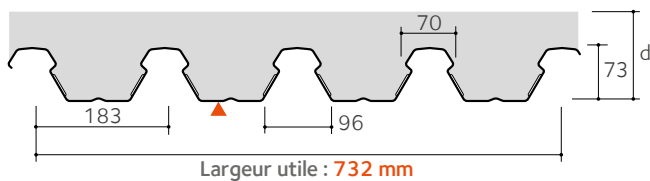
Key	Thickness [mm]
Installation without propping	0,75
	0,88
	1,00
With propping	0,75

Composite floor decking with dovetail section

Cofrastra® 70



Cofrastra® 70 is a steel profile used to realise composite slabs. The longitudinal shear bond between the concrete and the profile realised by embossment and its dovetail section gives an additional reinforcement to the slab construction. The profile serves as formwork in the pouring phase of the concrete and allows savings to be made on the lower reinforcement layer and to its self-weight due to its geometry. Due to its high inertia Cofrastra® 70 allows to bridge larger spans without propping in the construction stage. Further, its strong shears resistance makes it suitable for heavy loads. Its dovetail geometry ensures a very good adhesion and, with its *Cofrafix* clip system, allows to suspend building equipment, ducts or false ceilings without any dowels or pins.



▲ Coated face

CE - Marking

German technical approval: AbZ Z-16.1-22

French technical approval : DTA No. 3/15-802

Characteristics of the base material		Norms
Steel grade	S 350 GD	EN 10346
Type of corrosion protection	Galvanised steel ZM 175	P 34-310 ETPM ZMevolution or AbZ Z-30.11-61
	Galvanised coated steel ZM 175	P 34-301 EN 10169+A1
Organic coating		Norms
Hairplus 25 µm	Category IIIa	P 34-310
	Category CPI3	EN 10169+A1
Other coatings	On demand	

Characteristics	Nominal thickness of the profile sheet [mm]		
	0,75	0,88	1,00
Weight [kg/m ²]	10,05	11,80	13,40
Cross section A_p [mm ² /m]	1 219	1 442	1 648
Effective inertia I_{eff} [mm ⁴ /m]	657 600	774 900	883 200
Height of neutral axis [mm]	29,80	29,80	29,80
Modulus of inertia [mm ³ /m]	22 050	25 990	29 620

Nominal concrete consumption

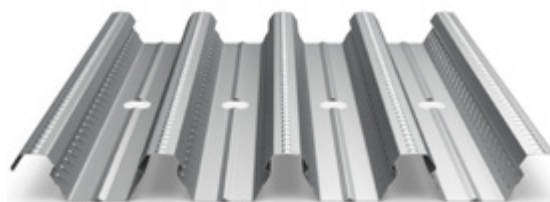
	Thickness of the slab [cm]											
	12	13	14	15	16	17	18	19	20	22	25	30
Concrete volume [l/m ²]	94	104	114	124	134	144	154	164	174	194	224	274
Theoretical weight of the composite slab [kg/m ²]	235	260	285	310	335	360	385	410	435	485	560	685

Concrete density 2500 kg/m³

Maximum recommended slab thickness d = 30 cm

Cofrastra 70 P:

Pre-punched version, compatible with shear connectors, welded in advance or in shop to the composite beams.



The Cofra® 5 web based software application

will give detailed information about the required reinforcement according to the project specifications.



www.arcelormittal.com/cofra5

Fire resistance

Thickness of the slab [cm]	REI [min]			
	30	60	90	120
12	12	12	13	15

REI: fire protection rating of the raw composite slab

The minimum thickness is required to comply with the temperature criterion (I) on the non-fire exposed side.

According EN1994-1-2 4.3.2, Cofrastra® 70 floors are by default REI 30, even without specific reinforcement in the ribs. For higher fire resistance classes, reinforcement bars are required. These are positioned in the ribs of the profile. Their size is determined by calculation (see Cofra5).

Sound insulation

The acoustic behaviour of a raw composite slab is determined by its mass. Values calculated by modelling – study report CSTB No. AC15-26054708

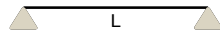
R _w [dB]	Thickness of the slab [cm]									
	12	13	14	15	16	17	18	19	20	21
(C;Ctr) [dB]	(-2;-6)	(-2;-7)	(-1;-6)	(-2;-6)	(-2;-7)	(-2;-7)	(-2;-6)	(-2;-7)	(-2;-6)	(-1;-6)

Structural performance

Acceptable unweighted q values with g' = 0 in kg/m²

A calculation using Cofra 5 might optimise the design according to the project requirements

Single span



Thickness of the slab [cm]	Span [m]																				
	2,00	2,10	2,20	2,30	2,40	2,50	2,60	2,70	2,80	2,90	3,00	3,10	3,20	3,30	3,40	3,50	3,60	3,70	3,80	3,90	4,00
21	2336	2137	1961	1806	2367	2349	1433	1333	1242	1159	1084	1014	950	892	837	787	740	697	656	618	583
20	2271	2076	1904	1752	2281	2124	2115	1290	1201	1121	1047	979	917	860	808	759	713	671	632	595	561
19	2205	2014	1846	1698	1566	2042	2037	1247	1161	1082	1010	945	885	829	778	730	686	645	607	572	538
18	2140	1953	1789	1644	1515	1959	1826	1829	1120	1043	974	910	852	798	748	702	659	620	583	548	516
17	2074	1891	1731	1590	1464	1352	1748	1631	1640	1005	937	875	819	766	718	674	633	594	559	525	494
16	2009	1830	1673	1535	1413	1304	1206	1557	1569	966	901	841	786	735	688	645	606	569	534	502	472
15	1943	1769	1616	1481	1362	1256	1160	1482	1384	1401	864	806	753	704	659	617	579	543	510	479	450
14	1879	1708	1559	1428	1312	1208	1116	1033	1313	1227	1248	772	721	673	630	590	553	518	486	456	429
13	1813	1646	1501	1373	1260	1159	1070	989	916	1158	1082	1107	687	641	599	560	525	492	461	432	406
12	1747	1585	1443	1319	1209	1111	1024	946	876	812	1017	951	978	610	569	532	498	466	436	409	-
	Without propping													With propping							

Multiple spans



with L1 = L2 and prop width 100 mm

Thickness of the slab [cm]	span [m]																				
	2,00	2,10	2,20	2,30	2,40	2,50	2,60	2,70	2,80	2,90	3,00	3,10	3,20	3,30	3,40	3,50	3,60	3,70	3,80	3,90	4,00
21	3000	2762	2548	2359	2190	2039	1904	1781	2277	2185	2099	1999	1897	1870	1177	1116	1059	1006	956	910	866
20	2917	2679	2469	2284	2120	1972	1840	1721	1613	2061	1980	1904	1816	1764	1701	1073	1018	966	918	873	831
19	2829	2596	2391	2210	2049	1905	1776	1660	1555	1459	1861	1790	1723	1646	1599	1030	976	926	880	837	796
18	2741	2512	2312	2136	1979	1838	1713	1599	1497	1404	1319	1675	1613	1553	1489	1444	935	887	842	800	761
17	2595	2429	2234	2061	1908	1771	1649	1539	1439	1348	1266	1190	1503	1447	1396	1345	1299	847	804	763	725
16	2407	2278	2155	1987	1838	1704	1585	1478	1381	1293	1213	1140	1073	1341	1293	1248	1204	808	766	727	690
15	2218	2099	1991	1893	1767	1637	1521	1417	1323	1238	1160	1089	1024	964	1191	1149	1110	1071	728	690	655
14	2030	1921	1823	1733	1650	1571	1458	1357	1266	1183	1108	1039	976	919	866	1051	1015	979	947	654	620
13	1840	1742	1652	1570	1495	1426	1363	1296	1207	1127	1054	988	927	871	820	773	730	981	858	817	584
12	1652	1563	1482	1409	1342	1280	1222	1169	1120	1072	1001	937	879	825	776	730	688	650	769	730	682
	Without propping																				

Assumptions

- Concrete C25/30 (Density 2500 kg/m³)
- Fire resistance REI30
- Deflection while pouring L / 180
- Deflection in service L [cm] / 350 if L < 3.5 m or (0.5 cm + L / 700) if L > 3.5 m

Key	Thickness [mm]
Installation without propping	0,75
	0,88
	1,00
With propping	0,75

Composite floor decking with trapezoidal section

Cofraplus® 77

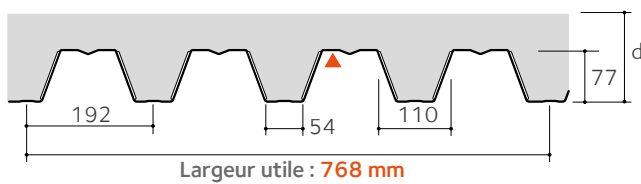


Cofrastra® 77 is a trapezoidal profile sheet with lateral embossments at its web intended to realise composite slabs.

The embossments ensure the longitudinal shear bond between the concrete and the steel profile which acts than as additional reinforcement to the slab construction.

The profile serves as formwork in the temporary phase and allows savings to be made on the low reinforcement layer and on the self-weight of the slab construction.

A multi-use profile, Cofraplus® 77 is suitable for all types of construction.



▲ Coated face

CE - Marking

French technical approval : DTA No. 3/15-823

Characteristics of the base material		Norms
Steel grade	S 350 GD	EN 10346
Type of corrosion protection	Galvanised steel ZM 175	P 34-310 ETPM ZMevolution or AbZ Z-30.11-61
	Galvanised coated steel ZM 175	P 34-301 EN 10169+A1
Organic coating		Norms
Hairplus 25 µm	Category IIIa	P 34-310
	Category CPi3	EN 10169+A1
Other coatings	On demand	

Characteristics	Nominal thickness of the profile sheet [mm]		
	0,75	0,88	1,00
Weight [kg/m ²]	9,20	10,80	12,30
Cross section A_p : [mm ² /m]	1 146	1 356	1 550
Effective inertia I_{eff} [mm ⁴ /m]	78 300	94 700	109 800
Height of neutral axis [mm]	42,70	42,70	42,70
Modulus of inertia [mm ³ /m]	18 340	22 180	25 710

Nominal concrete consumption

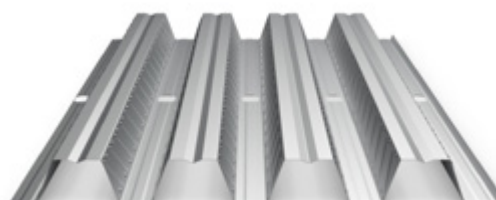
	Thickness of the slab [cm]												
	13	14	15	16	17	18	19	20	21	22	24	26	28
Concrete volume [l/m ²]	86	96	106	116	126	136	146	156	166	176	196	216	236
Theoretical weight of the composite slab [kg/m ²]	215	240	265	290	315	340	365	390	415	440	490	540	590

Concrete density 2500 kg/m³

Maximum recommended slab thickness d = 28 cm

Cofraplus® 77 P:

Pre-punched version, compatible with shear connectors, welded in advance or in shop to the composite beams.



The Cofra® 5 web based software application

will give detailed information about the required reinforcement according to the project specifications.



www.arcelormittal.com/cofra5

Fire resistance

Thickness of the slab [cm]	REI [min]			
	30	60	90	120
13	13	13	15	17

REI: fire protection rating of the raw composite slab

The minimum thickness is required to comply with the temperature criterion (I) on the non-fire exposed side.

According EN1994-1-2 4.3.2, Cofraplus® 77 composite floors are rated REI 30 even without specific reinforcement in the ribs. For higher fire resistance classes, additional reinforcement bars are required. These are positioned in the ribs of the profile. Their size is determined by calculation (see Cofra5).

Sound insulation

The acoustic behaviour of a raw composite slab is determined by its mass. Values calculated by modelling – study report CSTB No. AC15-26054708

	Thickness of the slab [cm]									
	13	14	15	16	17	18	19	20	21	22
R _w [dB]	47	48	49	50	51	52	52	53	53	54
(C;Ctr) [dB]	(-1;-5)	(-1;-6)	(-1;-6)	(-2;-6)	(-2;-6)	(-1;-6)	(-1;-7)	(-2;-7)	(-1;-6)	(-2;-6)

Structural performance

Acceptable unweighted q values with g' = 0 in kg/m²

A calculation using Cofra 5 might optimise the design according to the project requirements

Single span 

Thickness of the slab [cm]	Span [m]																					
	2,00	2,10	2,20	2,30	2,40	2,50	2,60	2,70	2,80	2,90	3,00	3,10	3,20	3,30	3,40	3,50	3,60	3,70	3,80	3,90	4,00	
22	1435	1293	1169	1060	963	1019	1048	960	666	609	557	509	466	426	389	355	323	294	266	241	217	
21	1419	1279	1156	1048	953	1011	923	953	660	604	553	506	463	424	388	354	323	295	268	243	220	
20	1404	1266	1145	1038	944	860	917	947	870	600	550	504	462	424	388	355	325	297	270	246	223	
19	1388	1251	1132	1027	934	851	909	833	865	596	546	501	460	422	387	355	325	298	272	248	226	
18	1372	1238	1120	1016	925	843	770	827	760	792	544	499	459	422	387	356	327	300	274	251	229	
17	1356	1223	1107	1005	915	834	763	698	754	787	726	496	457	420	387	356	327	301	276	253	232	
16	1341	1210	1095	995	906	827	756	693	749	690	723	494	455	420	387	356	328	302	278	256	235	
15	1325	1196	1083	983	896	818	749	686	630	685	632	666	453	418	386	356	329	303	280	258	238	
14	1310	1182	1071	973	887	810	742	681	626	576	630	582	615	418	386	357	330	305	282	261	241	
13	1294	1168	1058	962	877	802	734	674	620	571	527	579	537	569	385	357	331	306	284	263	244	
	Without propping													With propping								

Multiple spans  with L1 = L2 and prop width 100 mm

Thickness of the slab [cm]	span [m]																				
	2,00	2,10	2,20	2,30	2,40	2,50	2,60	2,70	2,80	2,90	3,00	3,10	3,20	3,30	3,40	3,50	3,60	3,70	3,80	3,90	4,00
22	1906	1733	1582	1448	1330	1224	1130	1045	1107	1028	956	890	824	763	705	650	599	551	505	461	419
21	1878	1707	1558	1426	1309	1205	1112	1029	953	1014	943	878	819	765	707	651	600	551	507	474	444
21	1851	1682	1535	1405	1290	1187	1096	1013	939	1001	931	867	809	755	700	645	593	541	501	469	439
19	1823	1657	1511	1383	1269	1168	1078	997	924	857	798	745	697	645	593	541	493	451	422	393	366
18	1796	1632	1488	1362	1250	1150	1061	982	910	844	785	736	688	645	593	541	493	451	422	393	366
17	1768	1606	1464	1340	1229	1131	1044	965	895	830	772	719	677	626	576	526	476	436	406	377	350
16	1741	1581	1441	1318	1210	1113	1027	950	880	817	760	708	661	617	571	526	476	436	406	377	350
15	1713	1555	1417	1296	1189	1095	1010	934	865	804	747	696	650	607	568	520	476	436	406	377	350
14	1677	1530	1394	1275	1170	1076	993	918	851	790	735	685	640	598	559	524	476	436	406	377	350
13	1503	1422	1348	1253	1149	1058	976	902	836	777	723	673	629	588	550	515	476	436	406	377	350
	Without propping																				

Assumptions

- Concrete C25/30 (Density 2500 kg/m³)
- Fire resistance REI30
- Deflection while pouring L / 180
- Deflection in service L [cm] / 350 if L < 3.5 m or (0.5 cm + L / 700) if L > 3.5 m

Key	Thickness [mm]
Installation without propping	0,75
	0,88
	1,00
With propping	0,75

Long span floor decking

Cofraplus® 220

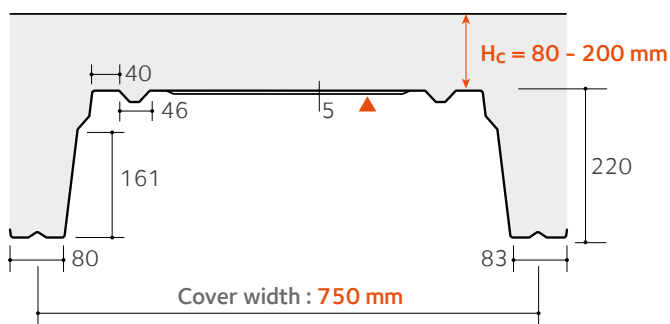
Cofraplus® 220 is a long span floor system with an additive design approach, which means that the structural resistance of the steel profile on one hand and the resistance of the ribbed reinforced concrete slab on the other hand are combined to give the slab its full resistance.

The unique performance of this versatile floor system makes it suitable for any type of construction, particularly for light weight structures with long spans (car parks, service sector, industrial use, etc.) associated to any kind of main structures (steel, concrete or even timber)

The Cofraplus® 220 profile can be produced based on galvanised steel (ZMevolution) or based on any other organic coated steel.



▲ Coated face



CE - Marking

DTA No. 3.1/17-927_V1 or AbZ Z-26.1-55

Characteristics of the base material		Norms
Steel grade	S 350 GD	EN 10346
Type of corrosion protection	galvanised steel ZM 175 galvanised steel ZM 175 with organic coating	EN 10346 P 34-310 ETPM ZMevolution or AbZ Z-30.11-61 EN 10169+A1 P 34-301
Organic coating		Norms
Hairplus 25 µm	Category IIIa	P 34-310
	Category CPI3	EN 10169+A1
Other coatings	on demand	

Characteristics	Nominal thickness of the profile sheet [mm]	
	1,13	1,25
Weight [kg/m ²]	15,14	16,75
Cross section A_p [mm ² /m]	1 817	2 017
Effective inertia I_{eff} [mm ⁴ /m]	92 600	106 300
Height of neutral axis [mm]	159,90	159,90
Modulus of inertia [mm ³ /m]	57 910	66 480

Nominal concrete consumption

	Thickness h_c [cm]							
	80	90	100	110	120	130	140	150
Concrete volume [l/m ²]	117	127	137	147	157	167	177	187
Theoretical weight of the composite slab [kg/m ²]	308	333	358	383	408	433	458	483

Density of the concrete 2500 kg/m³

Possibility of bridging large spans

- Up to 5,5 m without props
- Up to 8,5 m with props

Considerable flexibility in use: the profile's lightness (12,5 kg/ml) makes it easy to handle, thus reducing the costs of lifting devices for installation.

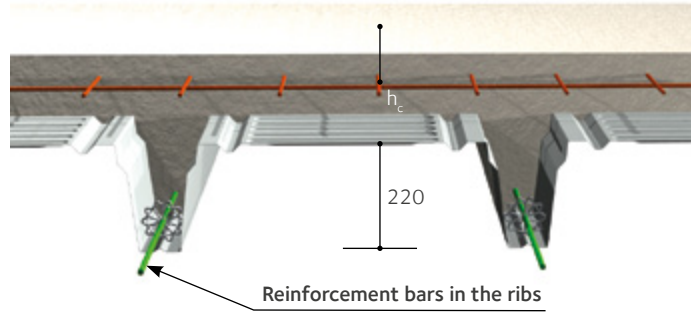
Compatibility with steel, concrete or timber frame for new builds, extensions and renovations

Fire resistance 60 to 120 minutes, thanks to the incorporation of reinforcement in the ribs.

Fire resistance

h_c mini [mm]	REI [min]			
	30	60	90	120
	80	80	100	120

The size and amount of reinforcement get calculated according to the project specifications.
A specific calculation note for a pre-design will be communicated by our consultant engineers.



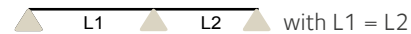
Structural performance

Acceptable unweighted q values with $g' = 0$ in kg/m^2

Our engineering design office will be able to refine these indications based on the detailed specifications of your project

Single span 

Thickness of the slab [cm]	span [m]																				
	5,00	5,10	5,20	5,30	5,40	5,50	5,60	5,70	5,80	5,90	6,00	6,20	6,40	6,60	6,80	7,00	7,20	7,40	7,60	7,80	8,00
15	614	575	540	500	470	725	685	650	610	575	545	610	575	545	490	490	465	440	420	405	380
14	625	585	545	510	480	725	690	650	615	580	550	600	570	540	460	460	460	440	415	395	355
13	630	591	555	520	490	715	690	655	625	585	555	590	560	535	435	435	455	435	415	395	330
12	720	600	565	530	495	700	685	655	625	590	555	585	555	525	414	415	455	430	410	390	310
11	730	690	570	540	480	690	670	655	625	590	560	575	545	520	395	395	450	430	410	390	295
10	735	695	630	550	470	675	660	640	625	595	565	565	540	515	380	380	445	425	405	385	285
9	745	700	614	530	460	665	650	630	615	600	565	555	530	505	375	375	440	420	400	380	280
8	670	685	600	525	455	650	635	620	605	590	555	550	525	500	365	365	435	415	400	370	275
Steel reinforcement per rib	Ø 12 mm					Ø 16 mm					Ø 20 mm					Ø 25 mm					
	stirrups Ø6 mm, spaced 200 mm																				
	Without propping										With propping										

Multiple spans  with $L_1 = L_2$

Thickness of the slab [cm]	span [m]																				
	5,00	5,10	5,20	5,30	5,40	5,50	5,60	5,70	5,80	5,90	6,00	6,20	6,40	6,60	6,80	7,00	7,20	7,40	7,60	7,80	8,00
15	665	645	625	605	585	565	550	530	515	500	485	455	430	405	380	355	335	315	295	275	260
14	655	635	615	595	575	560	540	525	510	495	480	450	425	400	35	355	335	315	295	280	260
13	645	325	605	585	570	550	535	520	505	490	475	445	420	400	375	355	335	315	295	280	265
12	635	615	595	580	560	545	530	515	500	485	470	445	420	395	35	350	335	315	295	280	265
11	625	605	585	570	555	535	520	505	490	480	465	440	415	395	370	350	330	315	295	280	265
10	610	595	575	560	545	530	515	500	485	475	460	435	410	390	370	350	330	315	300	285	270
9	600	585	570	550	535	520	510	495	480	475	455	430	410	390	370	350	330	315	300	285	270
8	595	575	560	545	530	515	500	490	475	460	450	425	405	385	365	350	330	315	300	285	270
Steel reinforcement per rib	Ø 12mm					Ø 16mm					Ø 20mm					Ø 25mm					
	Stirrups Ø 6 mm, spaced 200 mm + welded mesh Ø 8/100mm on mid-supports																				
	Without propping										With propping										

Assumptions

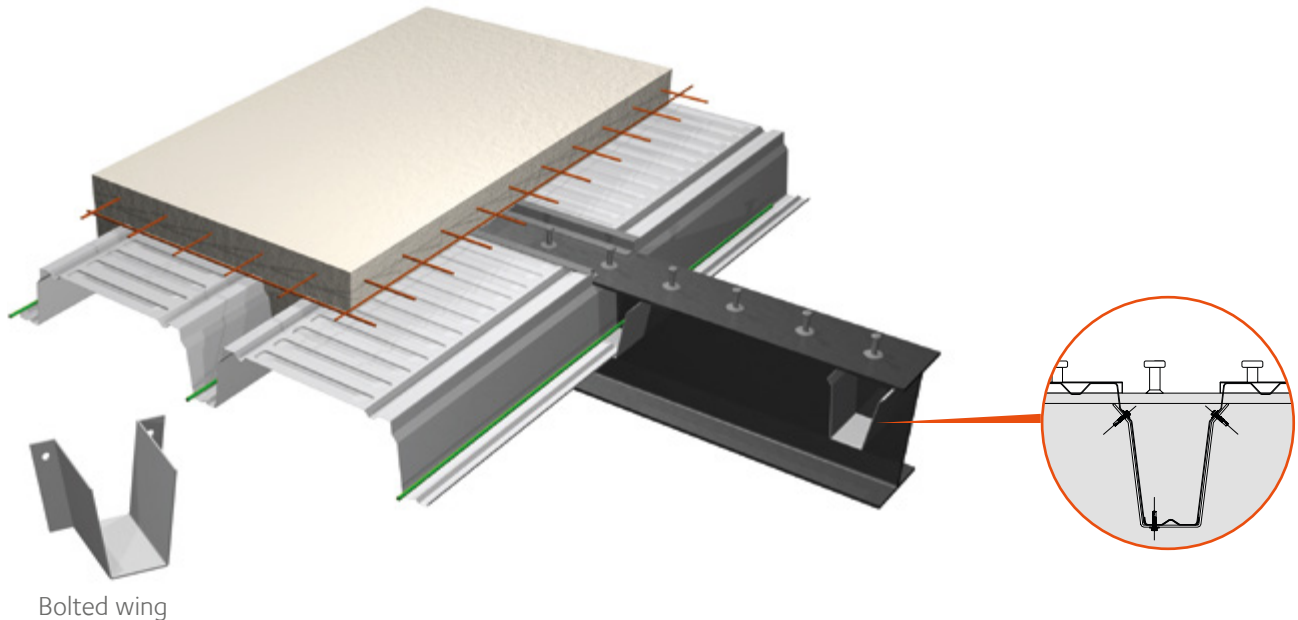
- Concrete C25/30 (density 2500 kg/m^3)
- Fire resistance REI30
- Deflection while pouring $L / 180$
- Deflection in service L [cm] / 350 if $L < 3,5$ m or $(0.5 \text{ cm} + L / 700)$ if $L > 3,5$ m

Key	Thickness [mm]
Installation without propping	1,13
With propping	1,13

Long span floor decking Cofraplus® 220

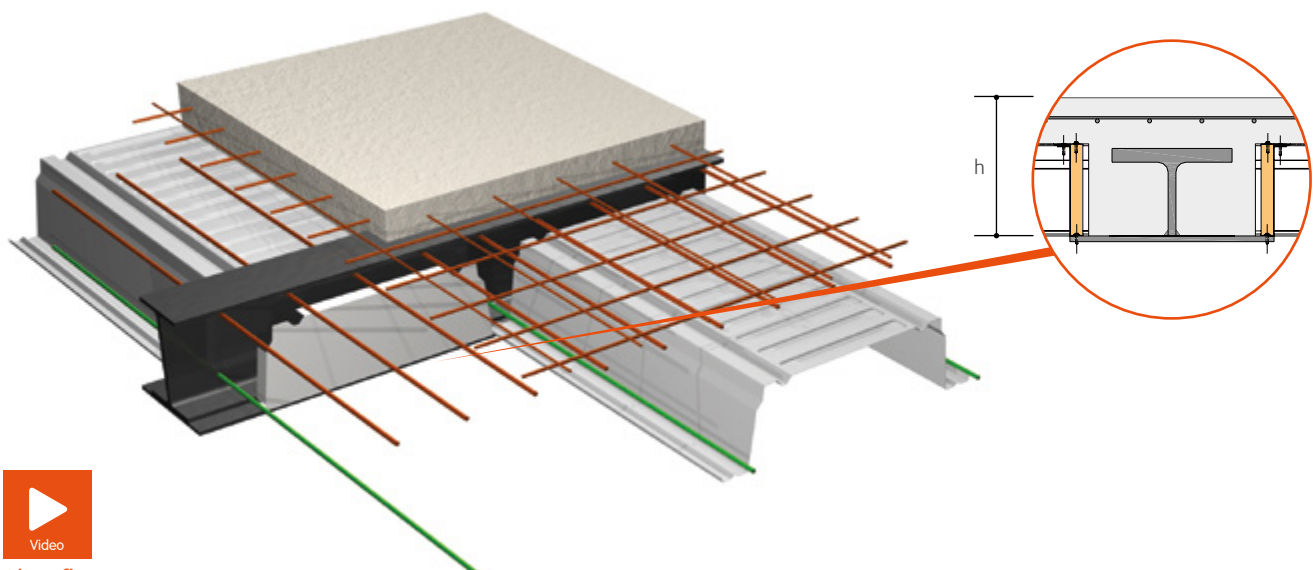
Wing system

Wings are consoles which can be welded to the web of the beam in shop or bolted on site.



Slim Floor system

The combination of Cofraplus® 220 with a CoSFB beam avoids the beam dropping and protects it in case of fire.



Slim floor

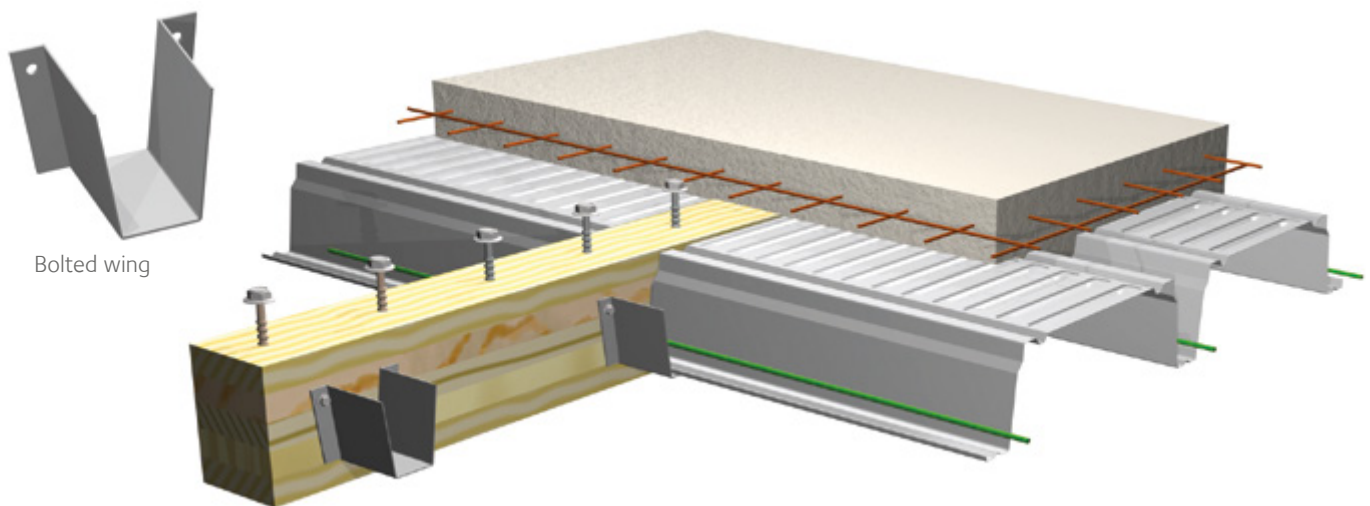


Installation - Cofraplus® 220

Supports

On timber or steel beam

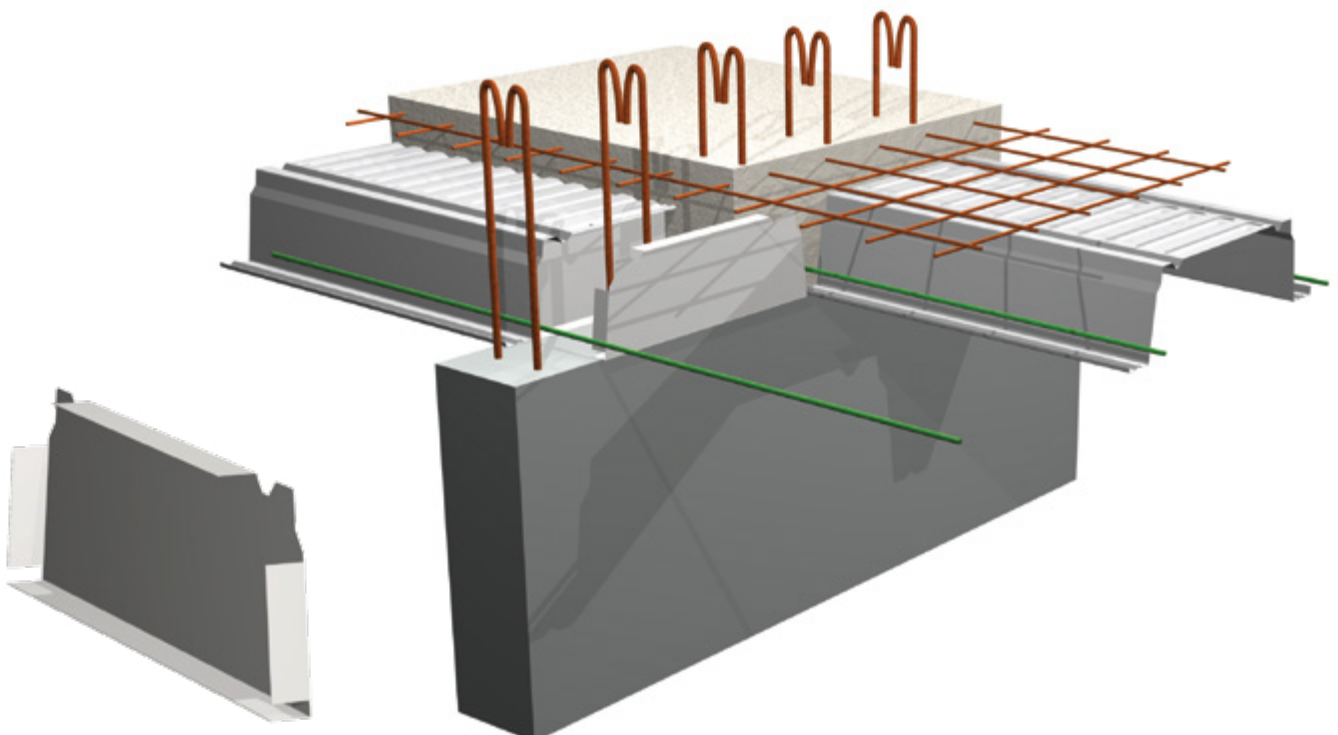
Wings can be either welded in shop to the web of the steel beam or bolted on site requiring holes in the web of the steel beam.



On concrete beams

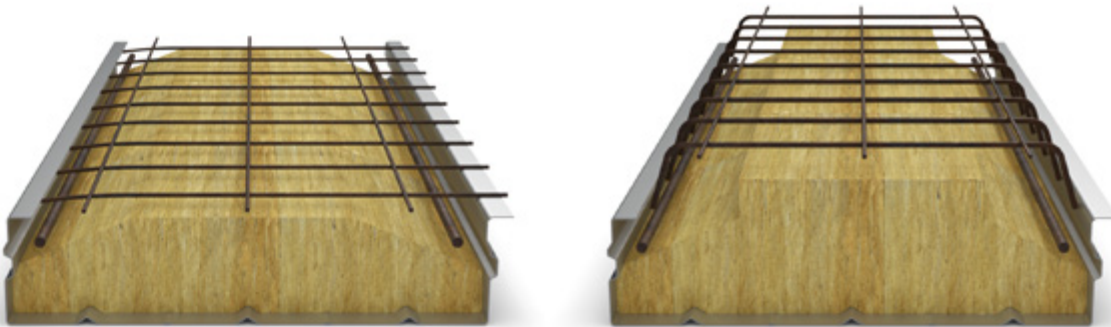
The end diaphragm can either be fixed to the profile in advance, before it is installed on the supporting structure, or it can be fixed on the support by nailing in order to house the profile.

The brochure "Cofraplus 220 - installation guidelines" gives more details on the different installation procedures.



Integrated composite floor systems

Cofradal® 200 & 260



Cofradal® is a integrated, composite floor system intended for all types of construction. Its lightness and its performance enable it to bridge large spans while providing a very low self-weight, high fire resistance and a narrow construction height.

Cofradal® in its Decibel version has a perforated soffit in coated steel providing acoustic functionalities.

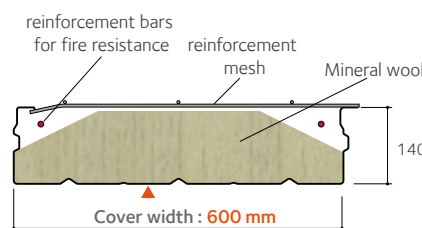


▲ Coated face

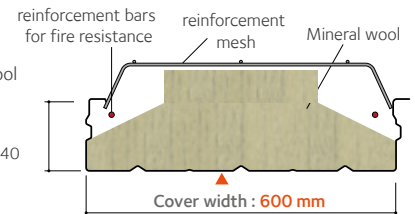
French Avis technique: DTA

Characteristics of the base material		Norms
Steel grade	S 320 GD	EN 10346
Type of corrosion protection	ZMevolution galvanised steel and ZM galvanised steel coated evolution	EN 10346 P 34-310 ETPM ZMevolution or AbZ Z-30.11-61 EN 10169+A1 P 34-301
Coating		
Hairplus 25 µm	Category IIIa Category CPI3	P 34-310 EN 10169+A1
Other coatings	On demand	

Cofradal® 200

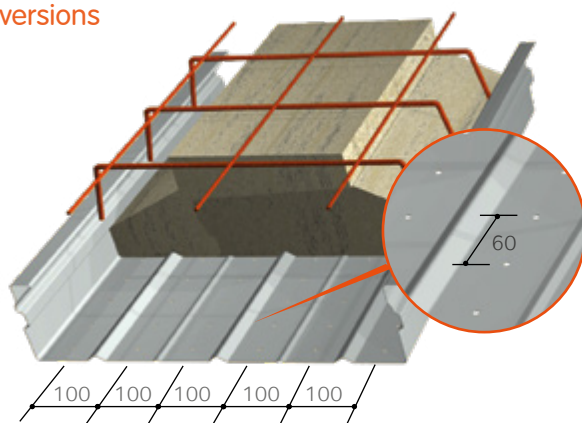


Cofradal® 260

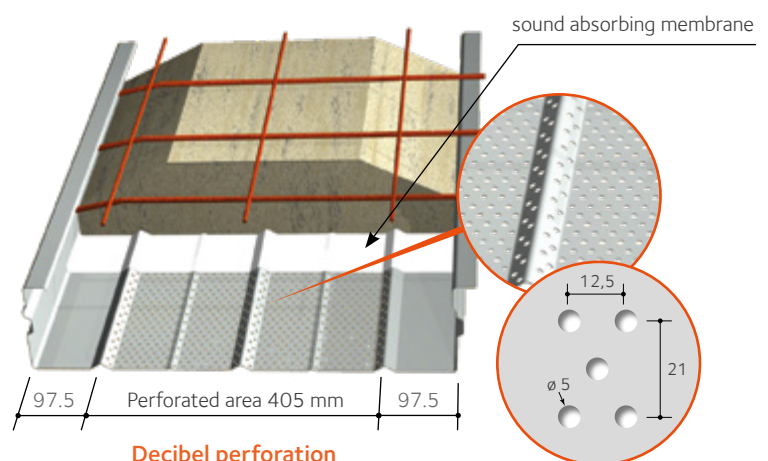


Cofradal®	200	260
Thickness of the complex [mm]	200	260
Weight of the finished floor [kg/m²] Excluding support zones and BN	240	280

Two versions



Standard perforation



Decibel perforation

Fire resistance

Cofradal®		200			260		
Span [m]		5,00	6,00	7,00	6,00	7,50	8,00
REI [min]		120			120		
G' [kg/m²]	Q [kg/m²]						
100	250	Ø 12 mm	Ø 16 mm	Ø 16 mm	Ø 16 mm	Ø 16 mm	Ø 16 mm
70	350	Ø 12 mm	Ø 16 mm		Ø 16 mm	Ø 16 mm	
100	500	Ø 12 mm			Ø 16 mm		

REI: fire protection rating of the net composite slab

The incorporation of a mineral wool insulation and the reinforcement bars permit to obtain a fire resistance rating of REI 120 even for the maximum span.

Integrated composite floor systems

Cofradal® 200 & 260

Acoustic performances

Despite its low self-weight, Cofradal® meets the requirements of the acoustic regulations without an additional false ceiling. The "decibel" finish also provides remarkable sound absorption intended to improve comfort of the adjacent rooms below.

Installation	R _w (C, Ctr)	L _{n,w}
Cofradal® 200 alone ⁽¹⁾	58 (-1 ; -6) dB	78 dB
Cofradal® 200 with floating screed ⁽²⁾ Rocksol 501 20 mm + 50 mm screed	65 (-3 ; -10) dB	60 dB
Cofradal® 200 decibels - perforated profile ⁽³⁾	α _w = 0.85	

(1) Test report CSTB No. AC 04-060 - (2) Test report CSTB No. AC 08-260 13 227/2

(3) Test report CSTB No. AC 05-148

Thermal performance

125 mm of ineral wool give the Cofradal® good thermal insulation. Additional insulation material, fixed to the underside, will provide the targeted Up value.

e [mm]	0	40	60	80	100
Up (W/m²K)	0,78	0,37	0,29	0,24	0,20



Structural performance

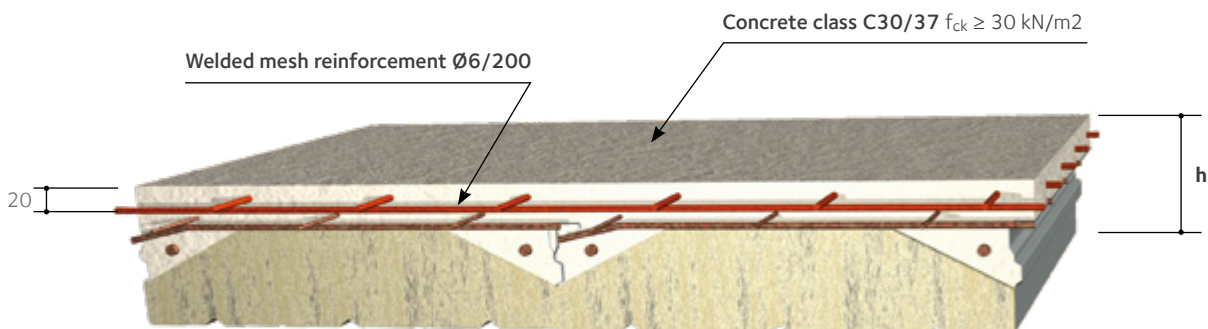
Acceptable unweighted q values with g' = 0 in kg/m²

Our engineering design office will be able to refine these values based on the detailed specification of your project

Cofradal®	Deflection	span [m]																						
		4,00	4,20	4,40	4,60	4,80	5,00	5,20	5,40	5,60	5,80	6,00	6,20	6,40	6,60	6,80	7,00	7,20	7,40	7,50	7,60	7,80	8,00	
200 standard	1/350	799	764	729	697	682	666	647	629	588	539	490	456	422	388	354	320							
	1/500	629	622	614	606	598	590	551	512	474	435	396	369	343	316	290	263							
200 decibels	1/350	714	699	685	657	643	627	602	567	523	479	435	406	377	347	318	289							
	1/500	573	565	557	549	541	533	497	461	426	390	354	331	308	286	263	240							
260 standard	1/350																					392	377	363
	1/500	726	715	705	681	669	657	642	628	613	599	585	555	525	496	466	437	421	407	399	386	344	324	
260 decibels	1/350																						323	313
	1/500	718	697	679	637	618	598	574	550	526	502	478	455	432	408	385	362	352	343	337	332	302	281	

Consumption of materials

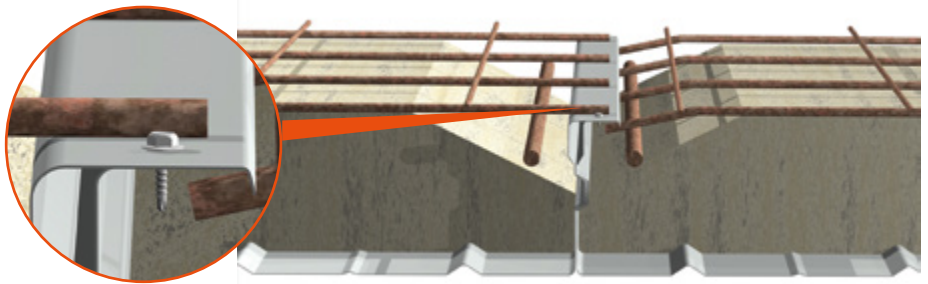
Cofradal®	Height h [mm]	Concrete volume (l/m²)
200	200	100
260	260	120



Installation - Cofradal® 200 & 260

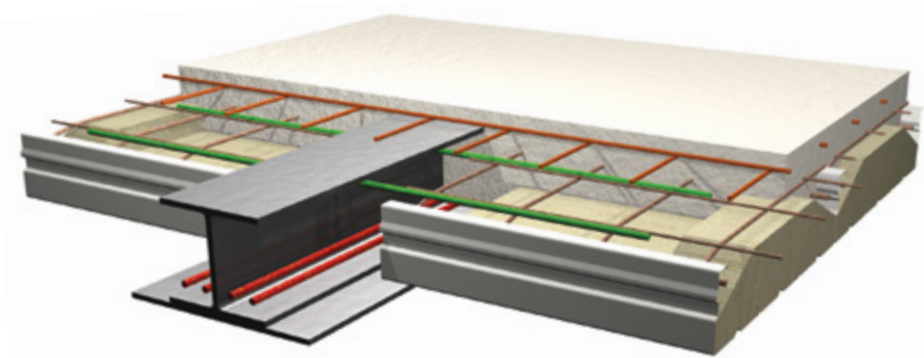
Stitching

The elements are stitched among each other using self-tapping screws 6.3 x 19 mm in a distance of 1,0 m supplied on site.

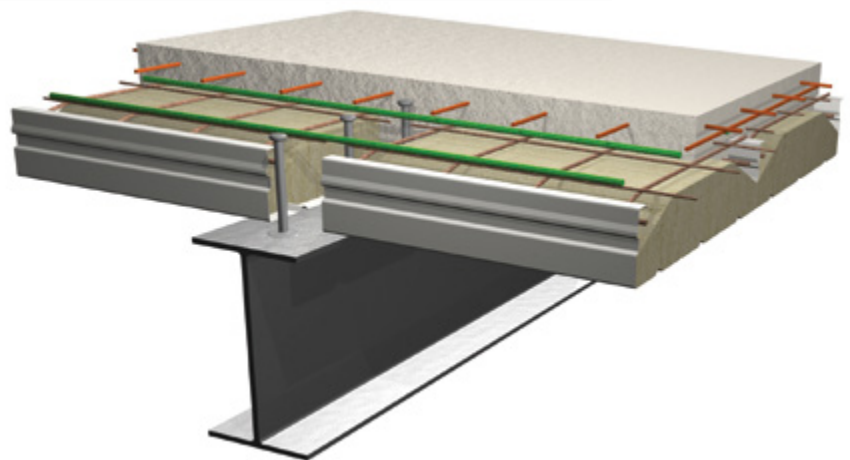
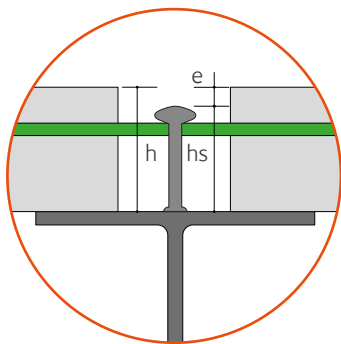


On SFB or CoSFB beam (composite slim floor beam)

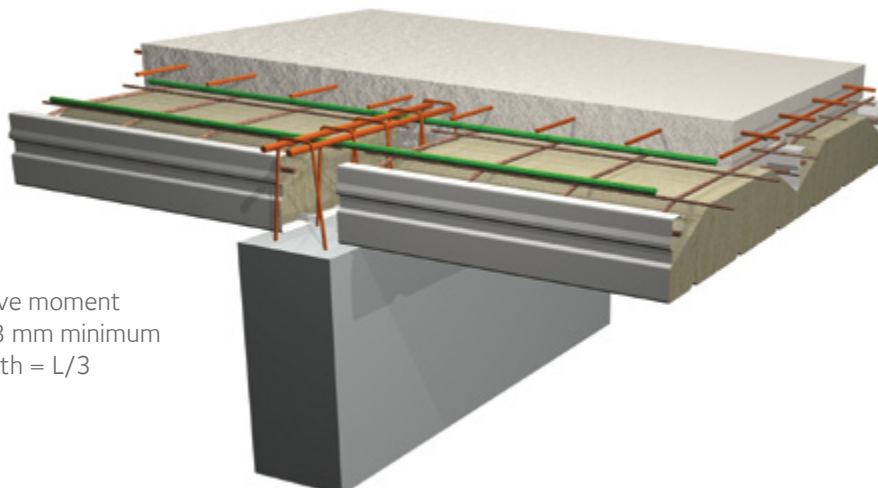
Incorporation of the CoSFB beam in the thickness of the Cofradal® system avoids any joist and gives a fire resistant rating of R60 without any additional protection measures.



the height of the shear connectors **hs** depends on the height of the Cofradal system ($h=200$ or 260 mm)



On reinforced concrete or pre-stressed concrete



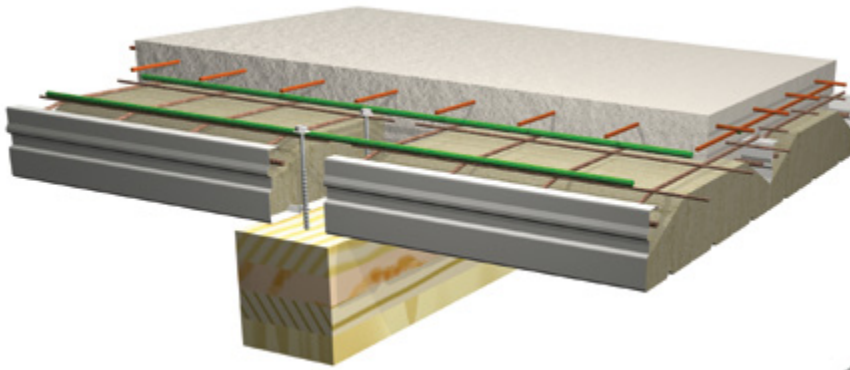
On support negative moment reinforcement: \varnothing 8 mm minimum ($e=300$ mm) length = $L/3$



Installation - Cofradal® 200 & 260

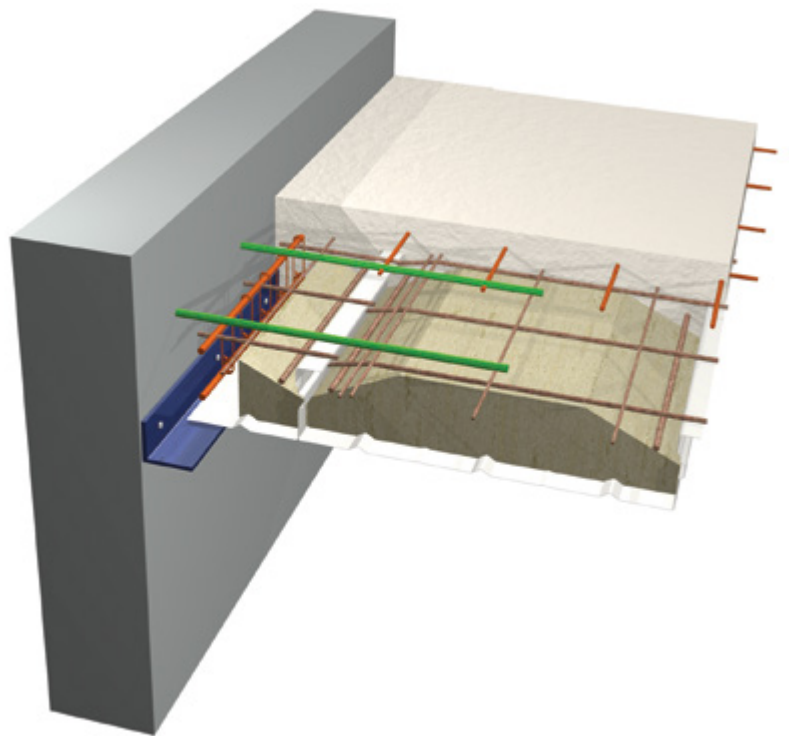
On composite timber beam

In order to transfer the horizontal forces of the floor to the load-bearing frame, it is recommended to fix connectors in the timber beam or timber wall. The connectors are designed inline with the bracing requirements.



Borders & edges

A layout plan provided for each site will give details of the slab edges. Fixing of edge trims is easy to implement and is adaptable to any type of support.

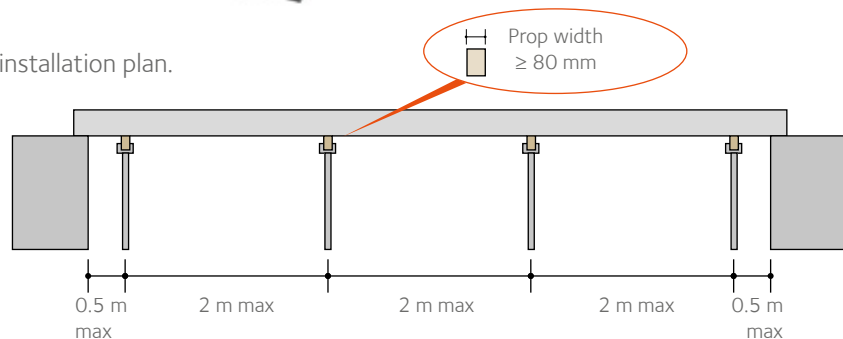


Propping

A shoring plan is provided, as well as an installation plan.

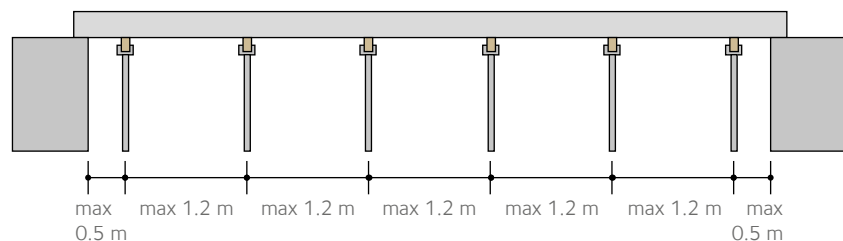
Cofradal® Standard

Without shoring for span ≤ 3 m according to a study by our engineering design office.



Cofradal® Decibel

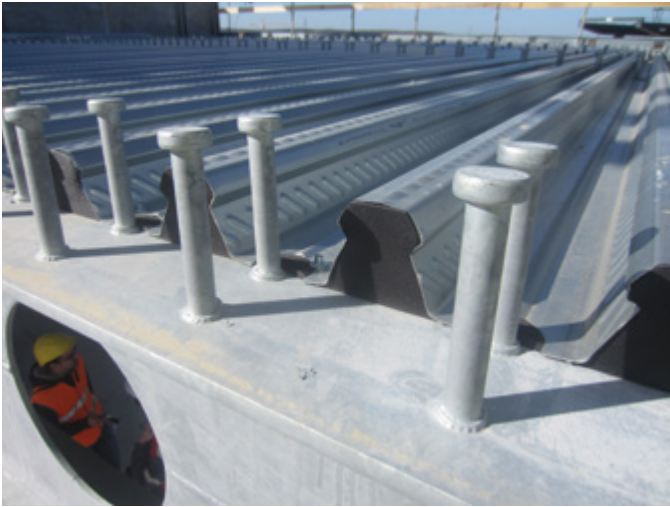
In the case of a Decibel finish, particular attention should be paid to the quality and nature of the shoring finishing. Protection against scratches is recommended.



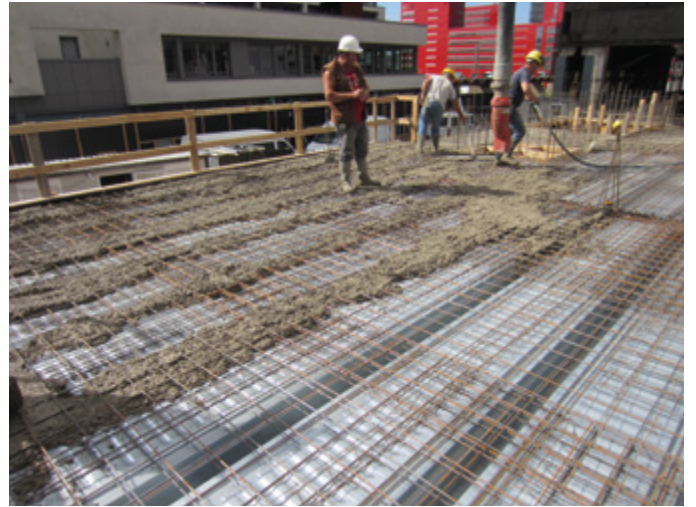
Installation



Installation - Composite floor decking



Cofrastra® 70 with profile filler installed on composite beam with double shear studs



Concrete pouring on Cofraplus® 220 filling first the ribs



Installation of Cofradal® 200



Edge trim with restraint strap and nailed shear studs



Soffit of Cofradal® Decibel



Installation within rehabilitation project - Cofraplus® 60



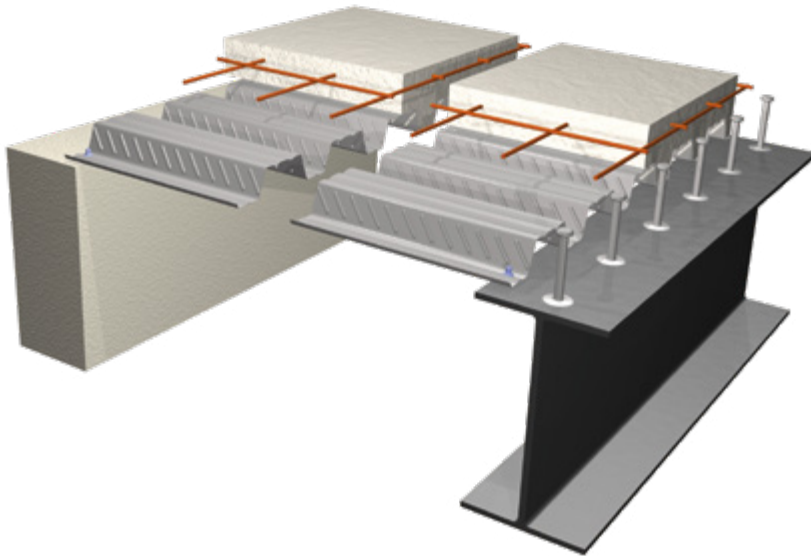
Installation - Composite floor decking

ArcelorMittal

Support conditions and fastening

Installation on concrete or metal beam

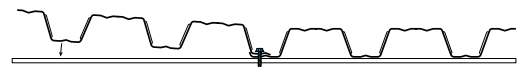
Support width ≥ 50 mm



Fastening and stitching

Each profile will be fixed at each end with 2 fasteners per support (except on intermediate supports in case the profile is continuous). The fasteners will be chosen in respect of the type of support.

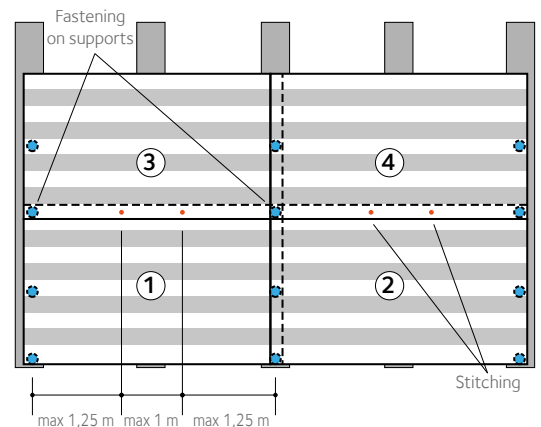
Fixing on supports



Stitching by rivets or self-taping screws

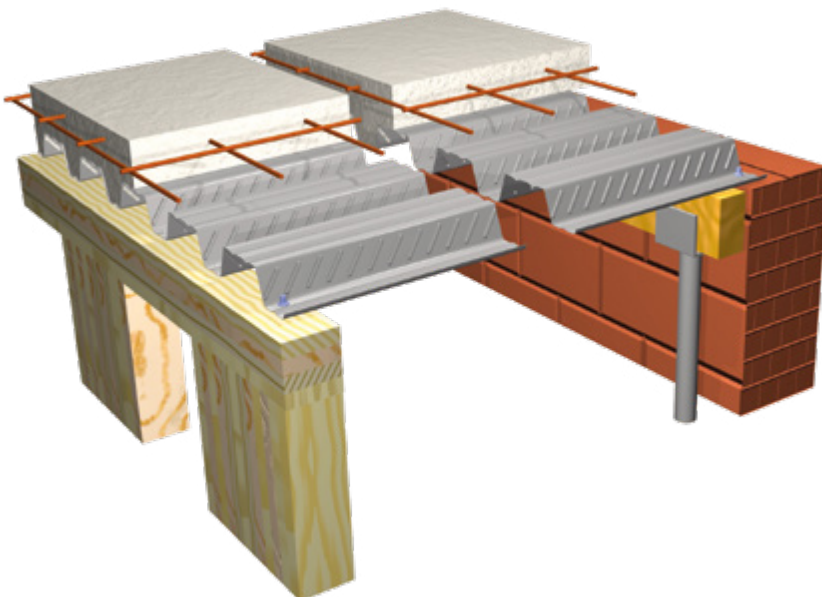


In the absence of fixing on a support, safety in the temporary phase can be ensured by a sliding rail.



Installation on brick wall or timber structure

Prop ≥ 70 mm

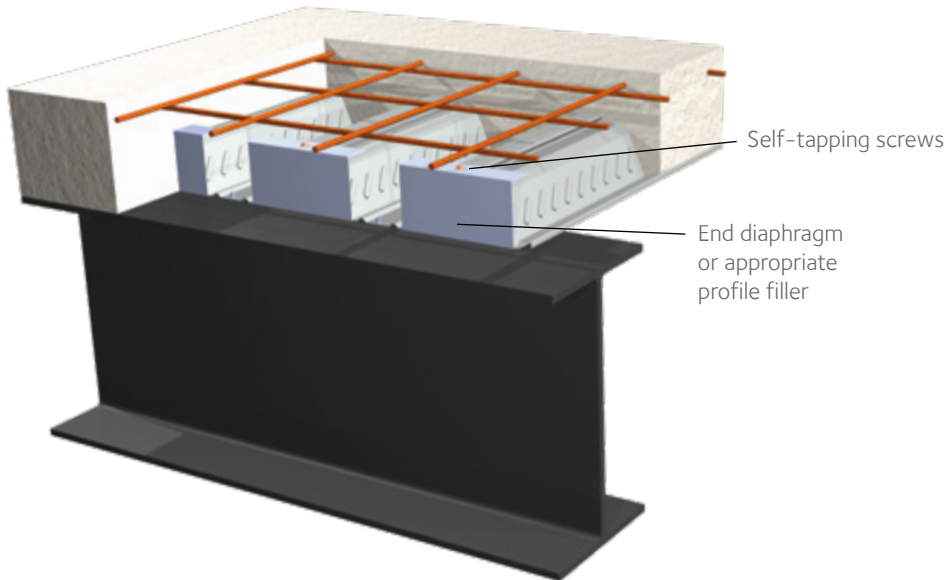


Installation - Composite floor decking

Overview

End diaphragm or appropriate profile filler

The ribs are getting closed at the end of the profile sheet either by appropriate profile filler or metallic diaphragm. The single elements or as running-band types get fixed by tape or by self-tapping screws.



Continuity between two profiles at their top end

In case the profiles can not be overlapped (re-entrant or dovetail shapes), adhesive tape might seal the joint between the top end of 2 profiles.



Concrete cover

Applied concrete cover has to follow the indications of the calculation note (according to the exposure and structural class of the structure and/or its fire resistance). The anti-cracking reinforcement mesh respect a concrete cover of at least 20 mm.

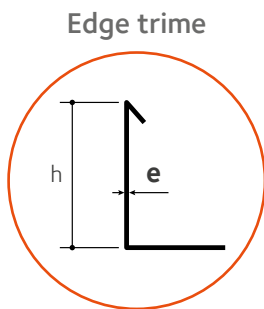
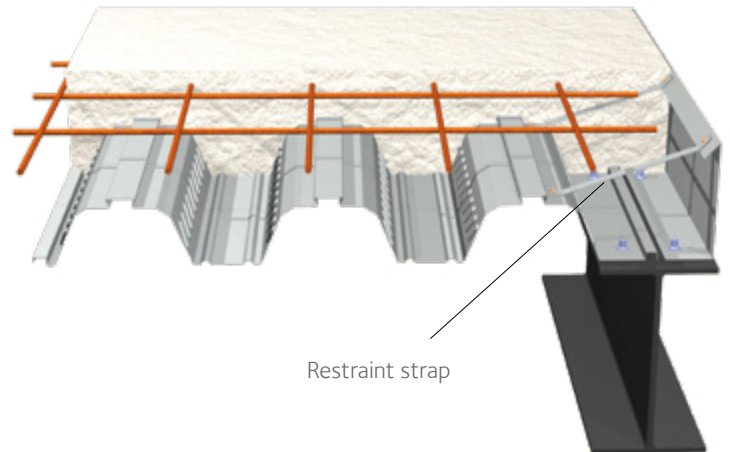
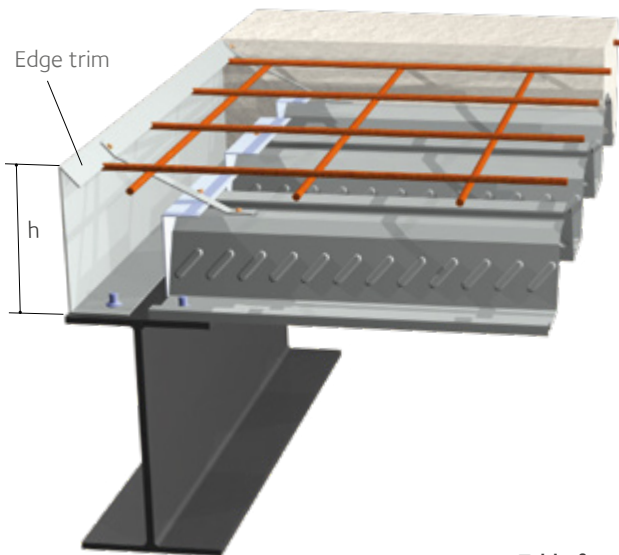


End supports

On steel beam

Edge trims serve as vertical formwork for the final slab. Its height is equal to the thickness of the final slab, and it gets fastened to the support.

Restraint straps are desirable for floor heights $h > 150$ mm in order to limit the deformation of the edge trim.

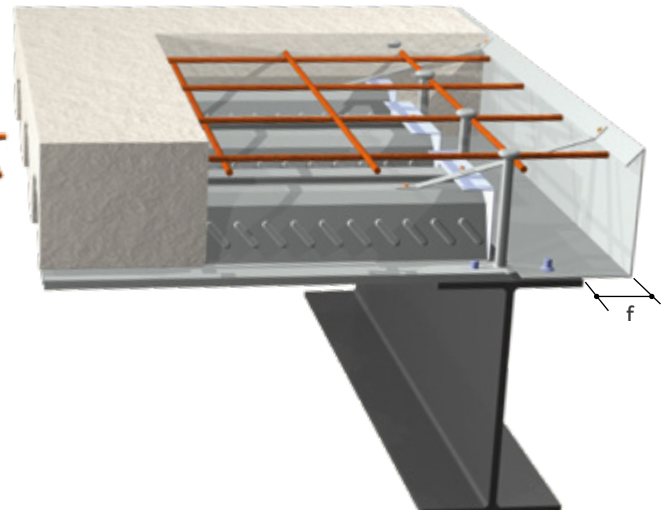
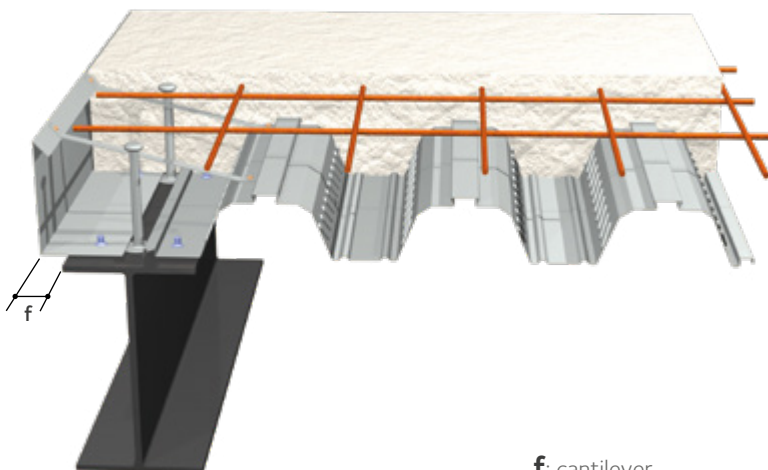


e: nominal thickness of galvanised metal for the edge trime [mm]

Table for the pre-design and definition of the steel thickness **e** of the edge trime[mm]

Thickness h of the slab [cm]	Cantilever f [mm]								
	0	25	50	75	100	125	150	175	200
9	0,88	0,88	1,00	1,00	1,20	1,20	1,50	2,00	2,50
10	0,88	0,88	1,00	1,00	1,20	1,20	1,50	2,00	2,50
11	0,88	0,88	1,00	1,20	1,20	1,50	1,50	2,00	2,50
12	0,88	0,88	1,00	1,20	1,50	1,50	2,00	2,00	2,50
13	0,88	1,00	1,20	1,50	1,50	2,00	2,00	2,50	2,50
14	1,00	1,20	1,20	1,50	1,50	2,00	2,00	2,50	2,50
15	1,20	1,20	1,50	1,50	2,00	2,00	2,50	2,50	2,50
16	1,20	1,50	1,50	2,00	2,00	2,50	2,50	2,50	2,50
17	1,20	1,50	1,50	2,00	2,00	2,50	2,50	2,50	2,50
18	1,50	1,50	2,00	2,00	2,50	2,50	2,50	2,50	3,00
19	1,50	1,50	2,00	2,00	2,50	2,50	2,50	2,50	3,00
20	2,00	2,00	2,50	2,50	2,50	3,00	3,00	3,00	3,00

On composite beams with shear studs



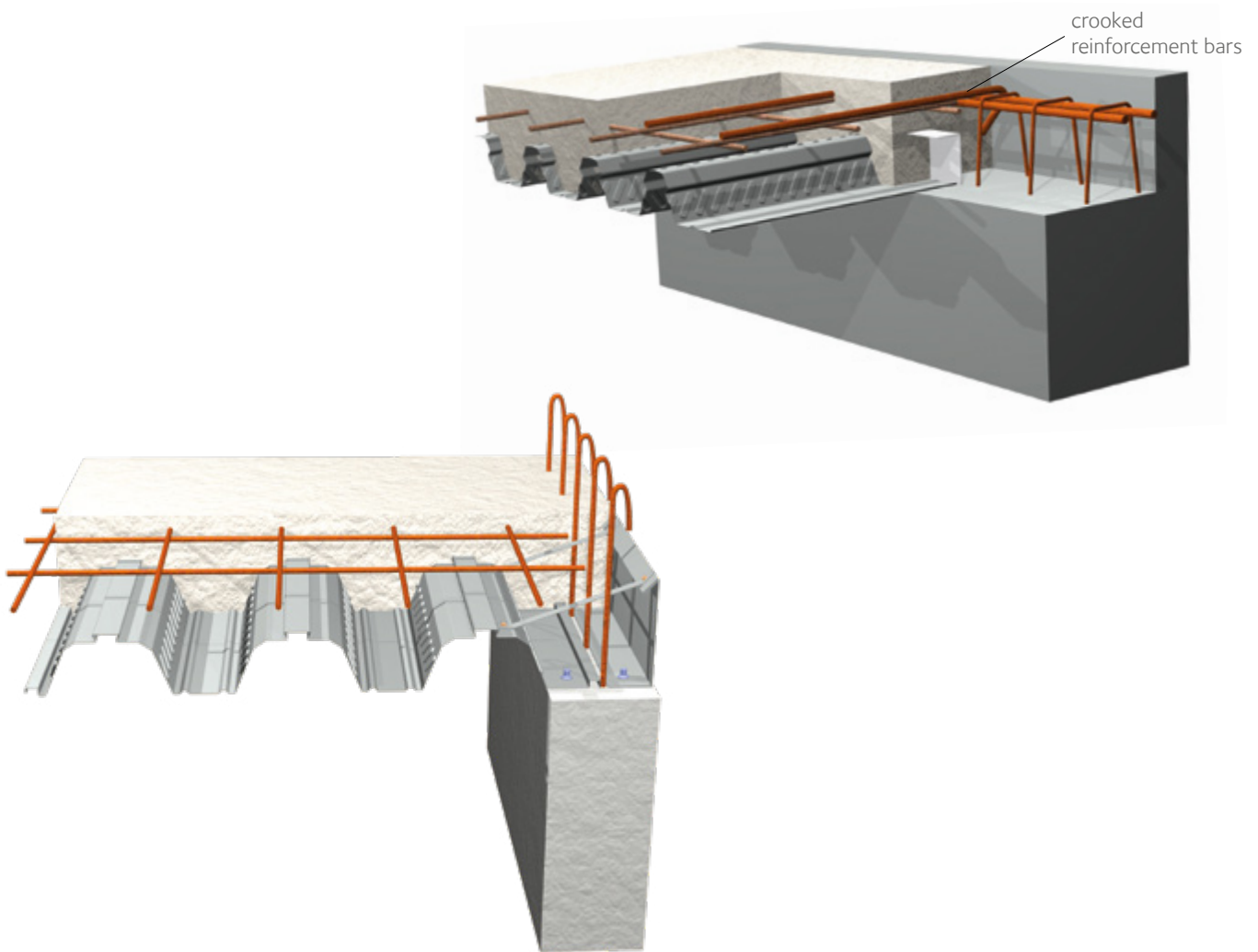
f: cantilever

Installation - Composite floor decking

End supports

On concrete

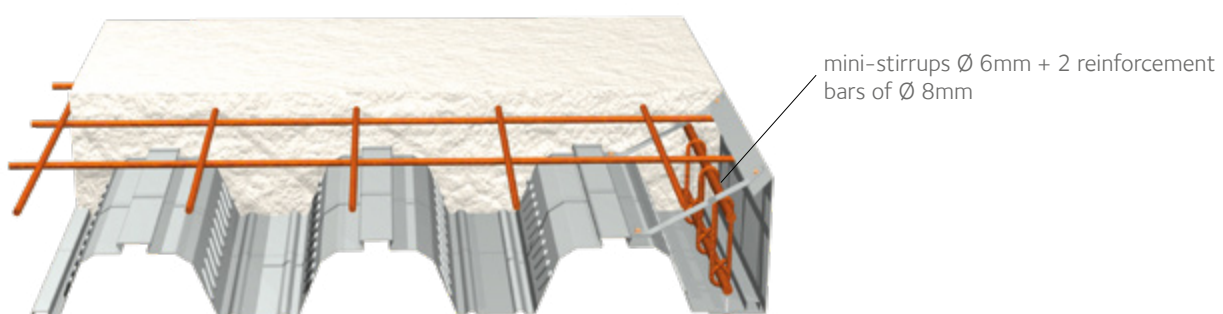
The slab can be anchored by additional reinforcement bars, as traditionally used in reinforced concrete structures .



A layout plan should optimise the situation at the end supports.

Free edge

The free sides of the slab should receive a longitudinal stiffener.

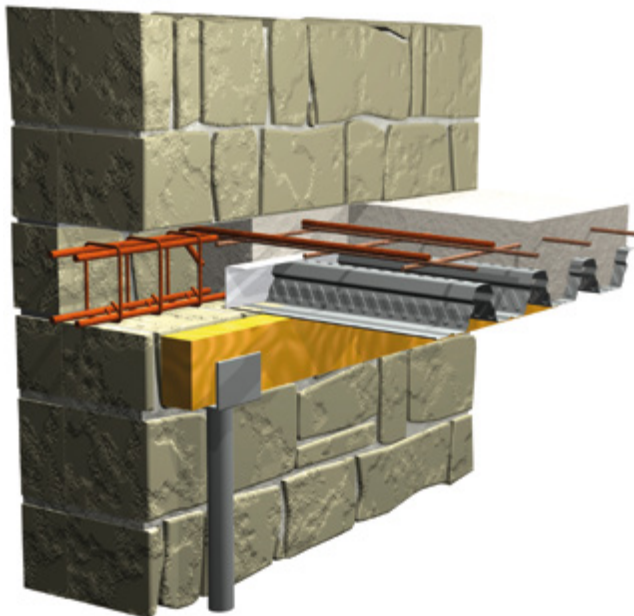


End supports

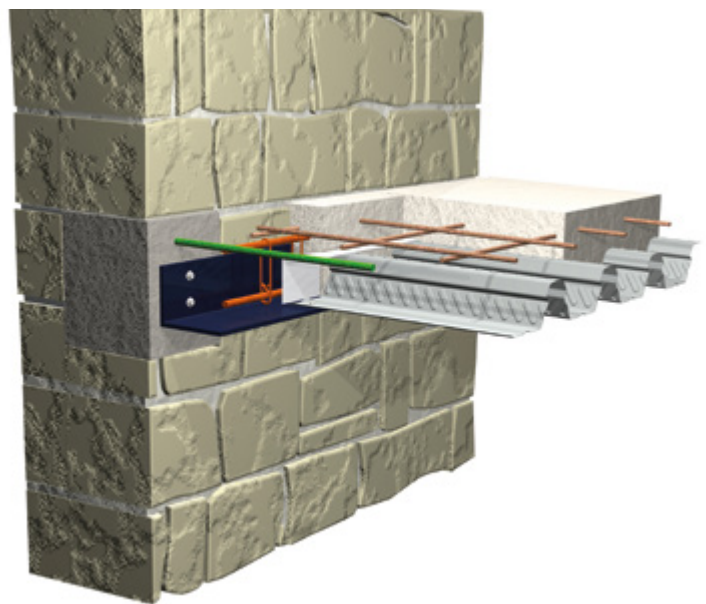
On existing masonry

The steel angle must be pinned into the reinforced concrete pockets made beforehand in the existing wall. The number of pins and their cross-section are to be defined by the supplier of the angle pieces.

Linear engraving

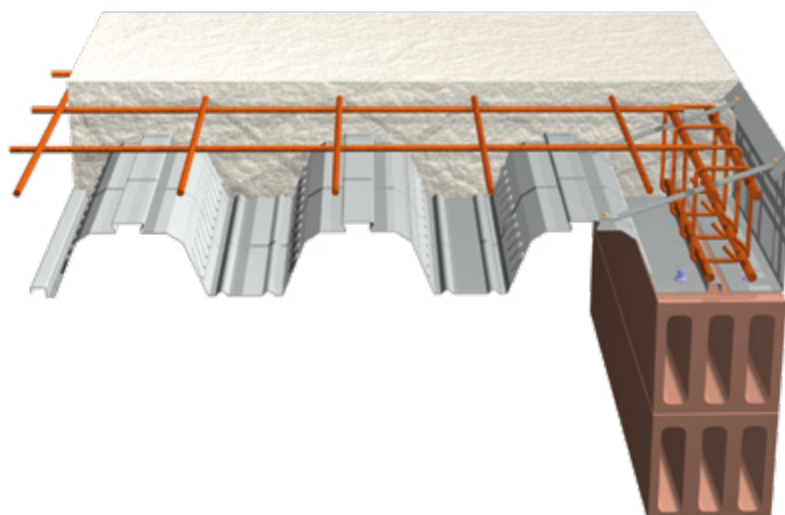


On running-band angle piece



On masonry

Side wall chaining will be produced in accordance with the CPT floor 3730_V2 rules, in line with the situation of the structure in an earthquake zone.

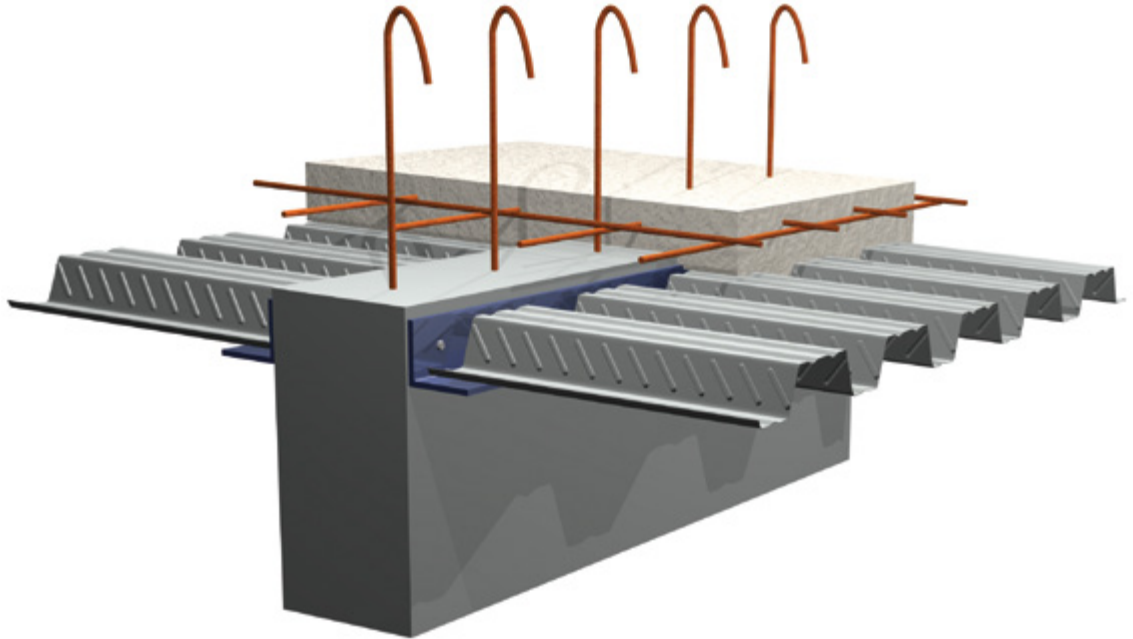


Installation - Composite floor decking

Mid-supports

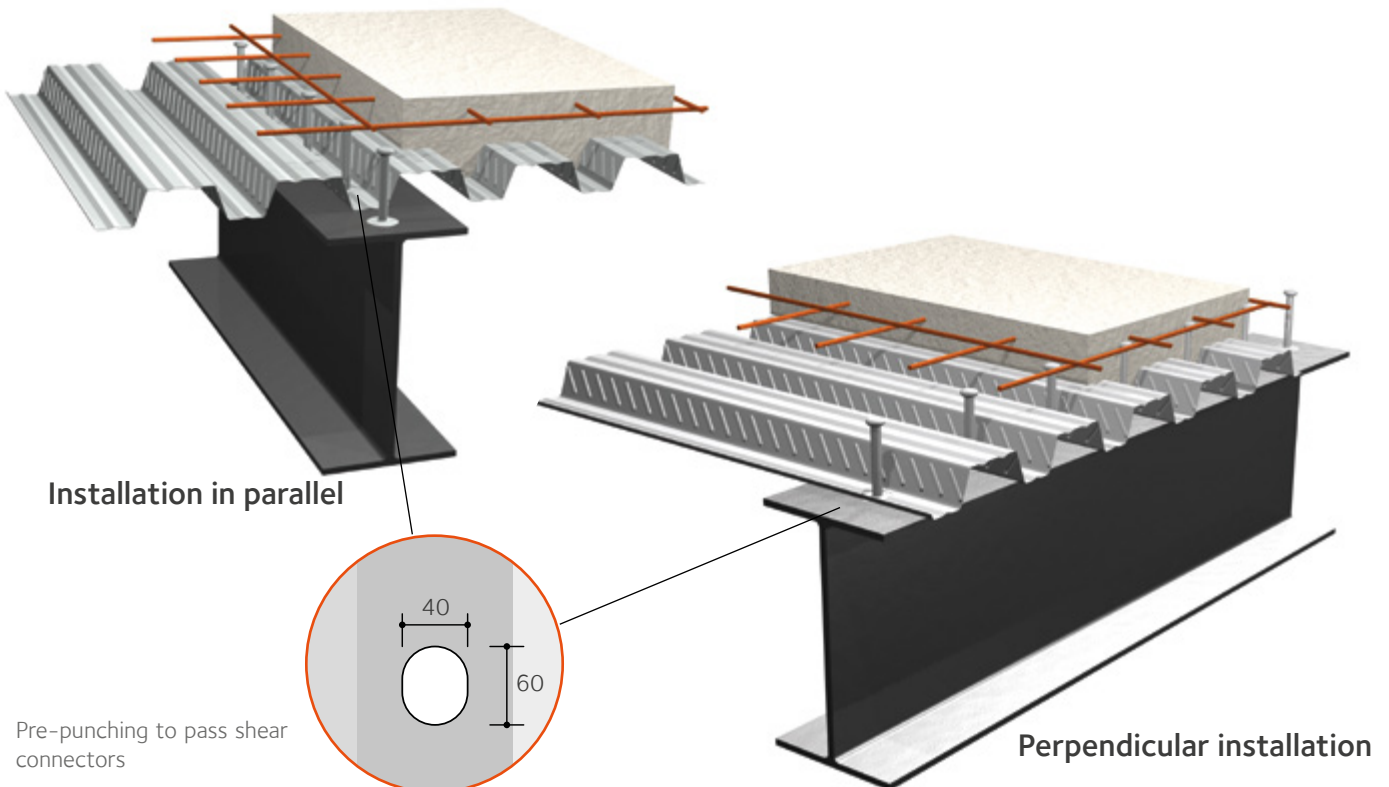
On concrete wall

The pinning of the steel angle will be consistent with the nature of the prop and the loading assumptions. This calculation is the responsibility of the project engineer or responsible design office.



On composite steel beam with shear studs

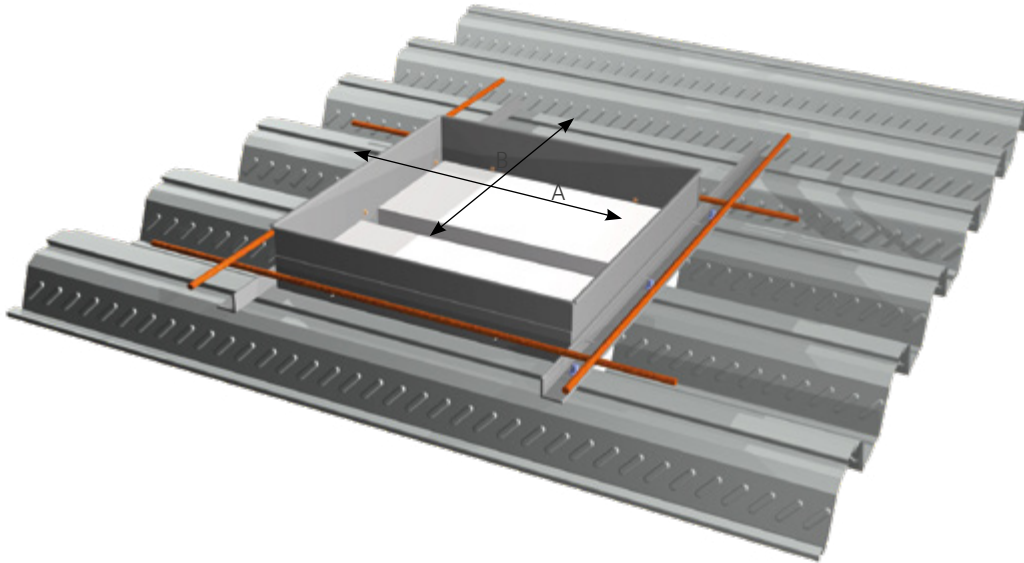
The ribs of the floor decking can be perpendicular or parallel to the composite beams. The pre-punching of the profiles gets done in the factory during the profiling process as per instructions on the form which will be given during the order.



Openings & block-outs

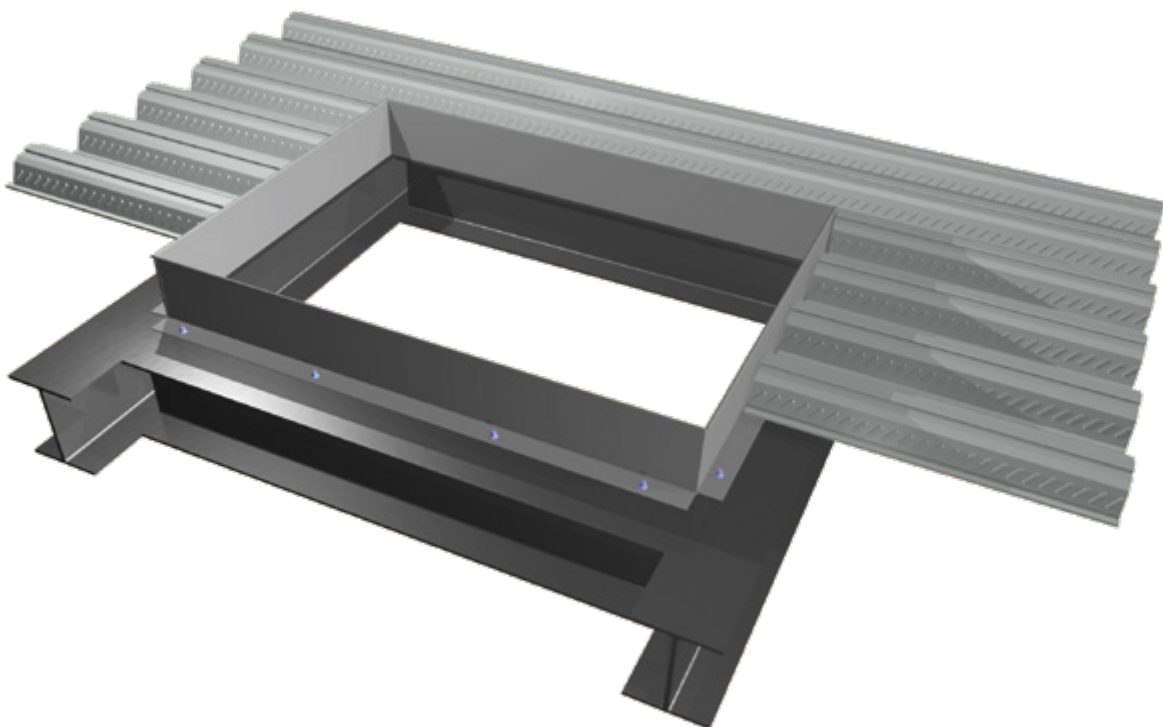
For openings or box out < 500 x 500 mm

The entire profile will be installed across the planned opening. Further, a box-out with a best matching negative geometry of the profile sheet gets installed at the place of the opening to keep away any fresh concrete. After the concrete has hardened, the box out will be removed and the the profile will be cut on request. Additional reinforcement bars get positioned in the thickness of the slab (mini 4 x Ø 10mm).



For openings or box out > 500 x 500 mm

A replacing stringer around the opening must either be incorporated in the thickness of the slab (reinforced concrete calculation to be done by the project engineer), or a secondary frame must be installed below the slab.

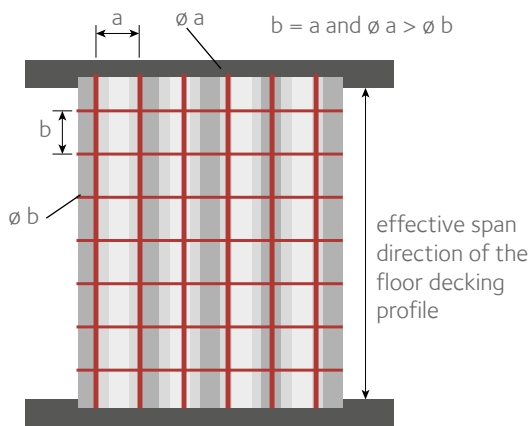


Installation - Reinforcement

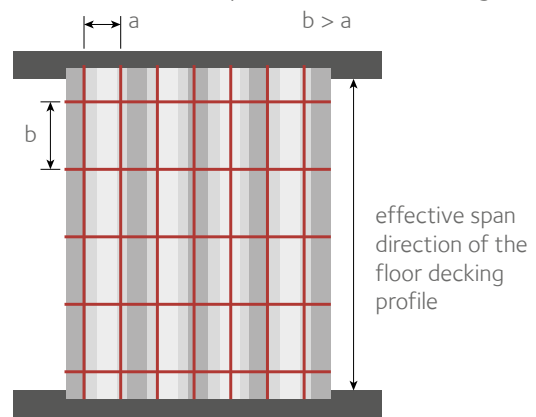
Installation recommendations for additional reinforcement

Orientation

The direction of the largest diameters of the welded mesh is always the direction of the effective span .

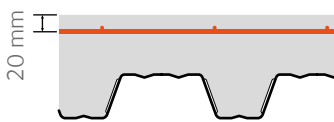


If the mesh consists of bars of the same diameter but different distances between 2 wires, the wire mesh must be positioned so that - per metre run - the greatest number of diameters is in the direction of the effective span of the floor decking.

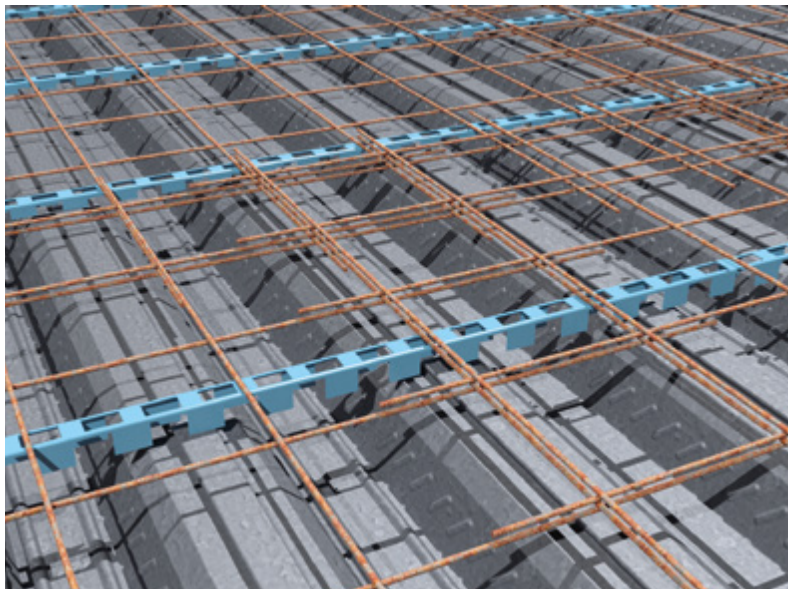
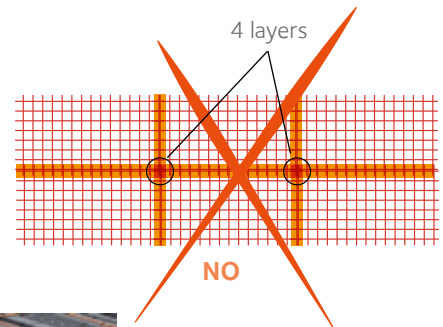
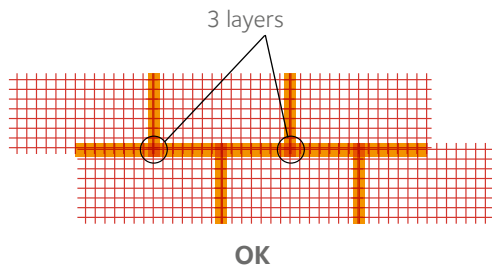


In order to provide the necessary concrete cover, only 3 layers of reinforcement meshes should be installed. It is therefore important to respect the following recommendations:

Minimum concrete cover



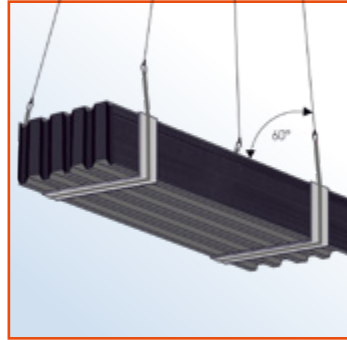
Overlaps and lapped joints of reinforcement meshes



General safety instructions



1 - Check usage & conditions of the PPE



2 - Use adequate slings and lifting tools to unload bundles



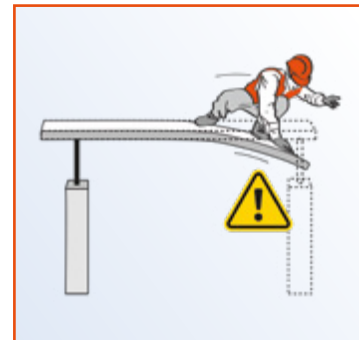
3 - Ensure individual safety



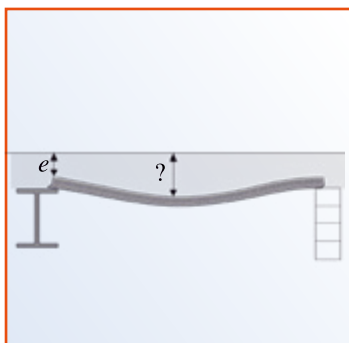
4 - Ensure collective safety



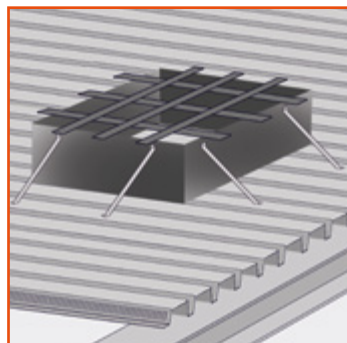
5 - Nail profiles in accordance with the installation progress



6 - Prop cantilevers larger than 200 mm



7 - Survey concrete thicknesses using a pin rather than a laser level which is not considering deflection of the main structures

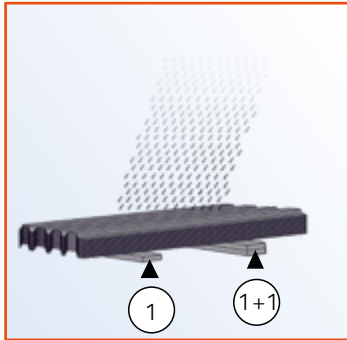


8 - Install fall protection for openings and block-outs

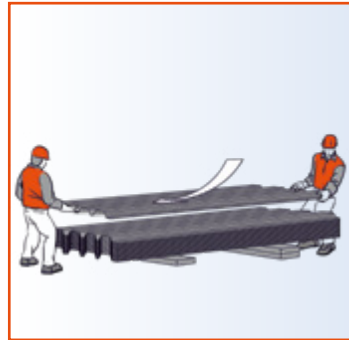


9 - Use a suitable prop equipment

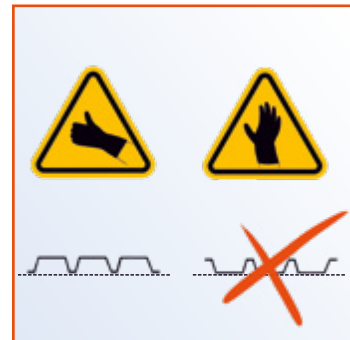
General installation instructions



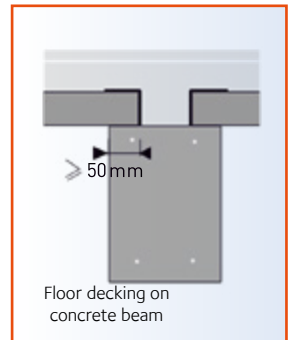
10 - Store profile bundles with a slight slope to avoid accumulation of rainwater



11 - Handle profile sheets correctly



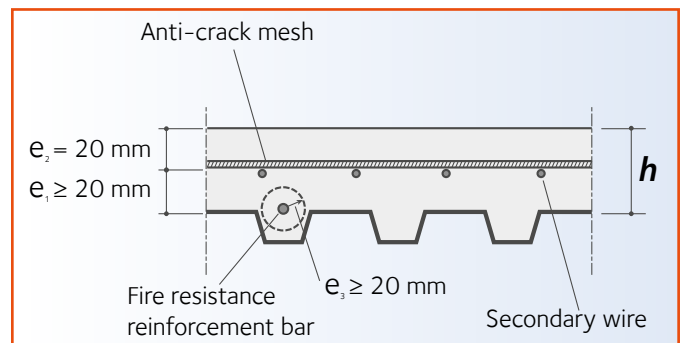
12 - Comply with correct orientation of the profile sheet



13 - Comply with minimum supports widths

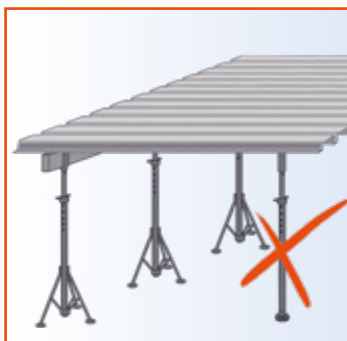


14 - Fix profiles sheets on supports and stitch them among each other (2 fixings per profile sheet and per end support)

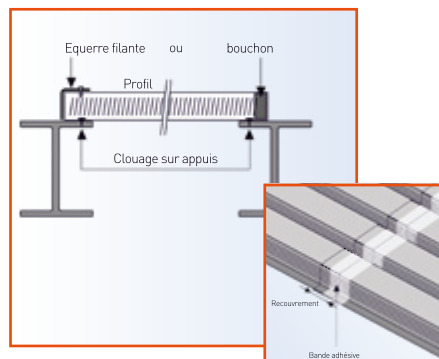


15 - Place the welded reinforcement mesh in the right position

16 - Comply with required concrete using adequate spacers for mesh and rebar reinforcement



17 - In case of propping, use a classical formwork beams instead of single props



18 - Ensure sealing & tightness at the end supports and on the overlaps



19 - **Avoid any concrete accumulation while concreting**



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