

ECONDEK® 歐鋼迪

Design to BS EN 1994-1-1

混凝土組合樓承板

Profile steel decking system



建築金屬 圍護系統服務
SOLUTION Provider of Metal Building Envelope

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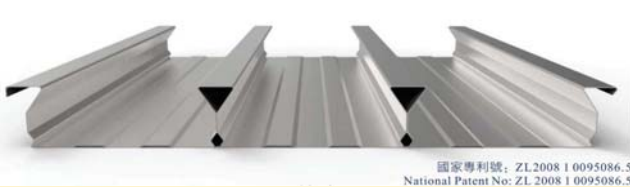
產品簡介

1. Products

產品簡介

1. Products

閉口型樓承板：歐鋼迪 65-555
Closed Rib Steel Decking : ECONDEK 65-555



國家專利號：ZL2008 1 0095086.5
National Patent No: ZL 2008 1 0095086.5



ECONDEK 歐鋼迪採用封閉式的板肋設計，倒三角波峯，具有強勁的抗縱向滑移（剪切-粘結）能力；可替代受拉鋼筋和模板的作用，在同等設計要求下，節省了鋼筋和混凝土的用量，無需拆模，無需臨時支撐，可多層面同施工，大大降低了工程綜合造價，縮短了工程進度，不需使用堵頭即可達到防止漏漿的效果；極強的耐火性能，耐火極限超過120分鐘，符合GB、BS、EN、SDI、ANSI、ASTM、JIS標準；完整美觀的吊頂效果，可省略內裝飾吊頂，增加空間高度，底板封閉提供更好的隔音效果。

The closed rib design and inverted triangular peaks of Econdek has a strong anti-longitudinal slip (shear - bonding) capacity, which can replace the tension reinforcement to reduce engineering cost and time by installing in multiple layers at the same time without temporary support and plug and meeting the same design requirements. While the fire resistance performance of more than 120 min is in line with Standards, including GB, BS, EN, SDI, ANSI, ASTM, JIS etc. Econdek can also provides better sound absorption by closing decking and increase space height without interior decorative ceiling.

ECONDEK 歐鋼迪國家專利證書 ECONDEK CHINA Patent Certificate



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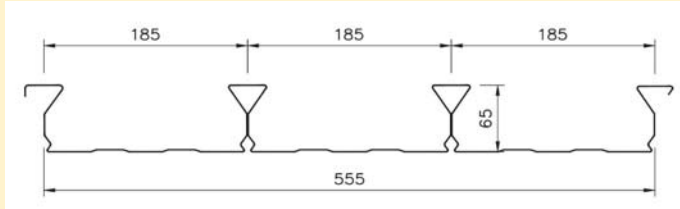


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產品簡介

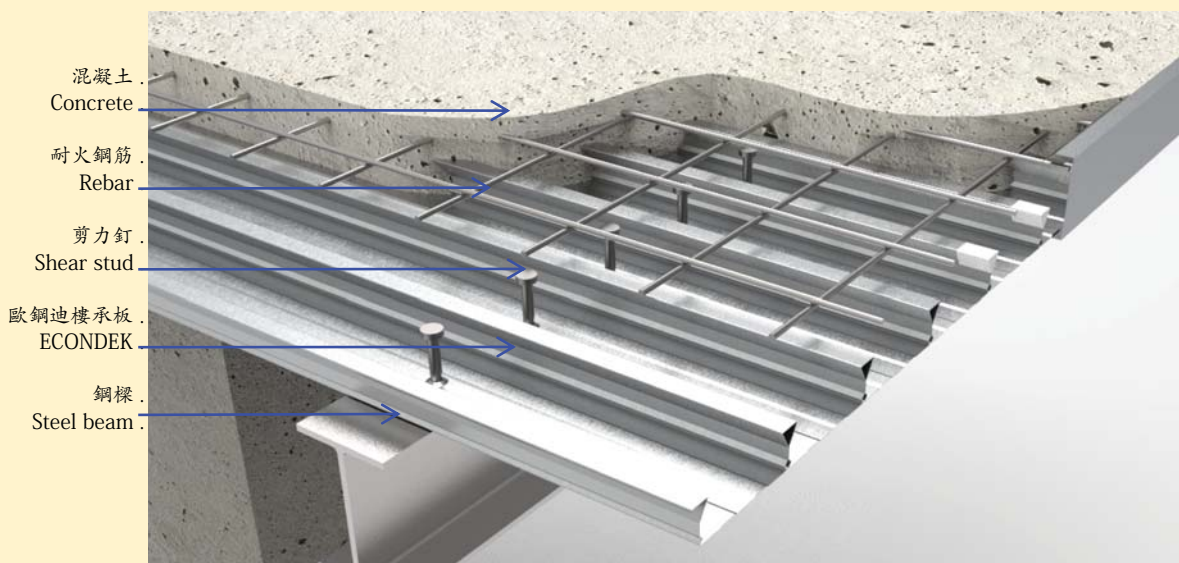
1. Products

ECONDEK 歐鋼迪規格:
Product Specifications:



厚度 Thickness mm	鍍層 Coating	材質 Steel grade	塗層 Colour Optional
0.75 / 1.0	Z 275 / Z 350 / 450	G 410 / G 550	髹塗 PE Coating
1.2/ 1.4/ 1.5	Z 275 / Z 350 / 450	G 410 / G 550	≈

ECONDEK 歐鋼迪 清華大學認證
ECONDEK Tsinghua University certification



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設計說明 2. Design

設計說明

2. Design

- 2.1 歐鋼迪65-555 壓型金屬板設計符合歐洲標準BS EN 1993-1-3: 2006” Design of steel structures ” 的要求。
ECONDEK 65-555 profiled steel decking is designed in accordance with the requirement of BS EN 1993-1-3:2006”Design of steel structures”.
- 2.2 組合樓板設計符合 BS EN1994-1-1:2004 “Design of Composite Steel and concrete structure” 。
The composite decking is designed in accordance with the requirement of BS EN 1994-1-1:2004”Design of Composite steel and concrete structure”.
- 2.3 清華大學和澳門大學依據BS EN 1994-1-1在實驗室對同一厚度的6塊組合樓板進行物理測試，得出經驗係數，用於抵抗壓型金屬板與混凝土間的抗縱向滑移失效。
Physical testing for 6 profiled steel decking in the same thickness have been carried out by Tsinghua University and Macau University in accordance with BS EN 1994-1-1 to evaluate the empirical parameters, for designing against slippage failure between profiled steel decking and concrete.

材料設計

3. Materials design

ECONDEK 歐鋼迪 65-555 G410

ECONDEK 65-555	基材厚度 Thickness (mm)	屈服強度 Yield strength Py N/mm ²	樓板厚度 Slab thickness	剪力粘結失效參數 Shear Bond Failure Parameter		最大施加荷載 Maximum Load kPa
				Mr	Kr	
	0.75 /1.0 /1.2 /1.45	410	115-150	186.537	0.329	10
			160-250	154.287	0.0674	

ECONDEK 歐鋼迪 65-555 G550

ECONDEK 65-555	基材厚度 Thickness (mm)	屈服強度 Yield strength Py N/mm ²	樓板厚度 Slab thickness	剪力粘結失效參數 Shear Bond Failure Parameter		最大施加荷載 Maximum Load kPa
				Mr	Kr	
	0.75 /1.0 /1.2 /1.4	550	115-150	186.537	0.329	10
			160-250	154.287	0.0674	



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施工階段設計 4 . Construction Design

施工階段設計

4 . Construction Design

◆、壓型鋼承板施工階段設計考慮：

The requirement and some matters need attention for profiled steel decking in construction:

- 1) 抗彎矩能力
Bending Capacity
- 2) 腹板抗屈曲能力
Web crushing resistance
- 3) 腹板抗剪能力
Web shear capacity
- 4) 同時考慮抗彎和抗屈曲
Combined bending and crushing
- 5) 同時考慮抗彎和抗剪
Combined bending and shear
- 6) 撓度
Deflection



◆、其最小的支承寬度在中間跨及端跨為 50mm~200mm，端部支座處可取 50mm，荷載跨度表中所有支承寬度均以 150mm 計算。

The minimum support width of mid-span and end-span is 50-200mm(including 50mm),as all the support width being calculated by 150mm in the load span table.

◆、施工階段任何時間，壓型金屬板施工荷載不應超過 3.0kPa。

The construction load on profiled steel decking can not be more than 3.0kPa.

設計荷載

4 . 1 Design Load

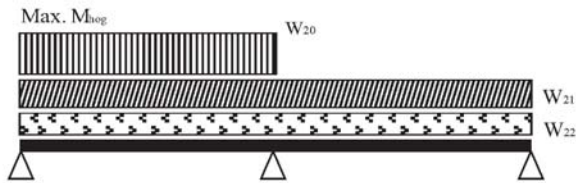
設計荷載 Design Load	荷載系數 Load Factor	設計值 Design value	
施工荷載 Construction load	1.5	施工人員與設備 Construction Personnel And Equipment	1.50 kN/m ²
恆荷載 Dead load	最小值 1.0(min) 最大值 1.35(max)	建築混凝土自重 Self weight of concrete	23.5 kN/m ³
		鋼承板密度 Density of profiled steel decking	78.5 kN/m ³
		t = 0 . 75 mm	0.115 kN/m ²
		t = 1 . 0 mm	0.153 kN/m ²
		t = 1 . 2 mm	0.183 kN/m ²
		t = 1 . 5 mm	0.229 kN/m ³

施工階段設計

4. Construction Design

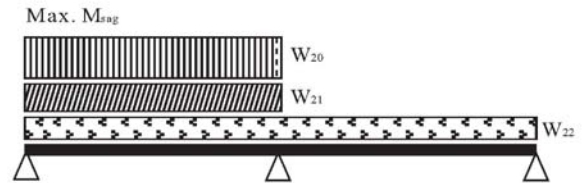
施工階段的設計係數

4.2 Design coefficient in construction stage



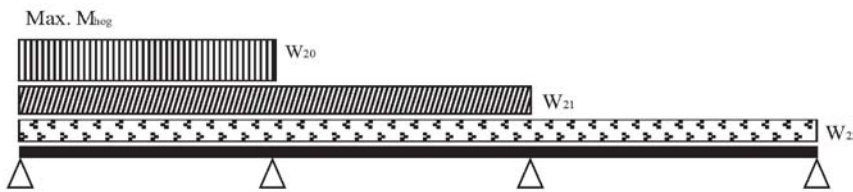
最大正彎矩組合
Maximum Positive Moment Combination

最大正彎矩 $Max. M_{sag} = 0.096W_{20} + 0.096W_{21} + 0.070W_{22}$
 最大負彎矩 $Max. M_{hog} = 0.063W_{20} + 0.125W_{21} + 0.125W_{22}$



最大負彎矩組合
Maximum Negative Moment Combination

最大剪力 $Max. V = 0.562W_{20} + 0.625W_{21} + 0.625W_{22}$
 最大支座反力 $Max. R = 0.625W_{20} + 1.250W_{21} + 1.250W_{22}$



最大正彎矩組合
Maximum Positive Moment Combination



最大負彎矩組合
Maximum Negative Moment Combination

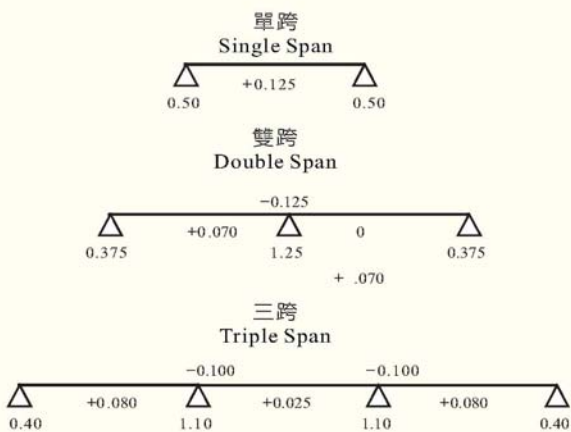
最大正彎矩 $Max. M_{sag} = 0.094W_{20} + 0.094W_{21} + 0.080W_{22}$
 最大負彎矩 $Max. M_{hog} = 0.067W_{20} + 0.117W_{21} + 0.100W_{22}$

最大剪力 $Max. V = 0.567W_{20} + 0.617W_{21} + 0.600W_{22}$
 最大支座反力 $Max. R = 0.650W_{20} + 1.200W_{21} + 1.100W_{22}$

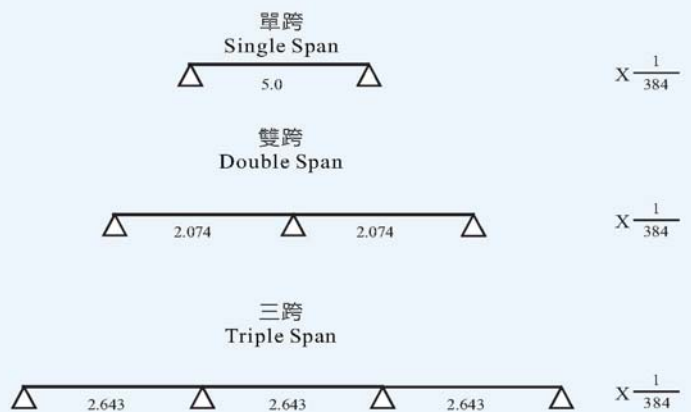
注釋 Notes:

- $W_{20} = 1.6 \times 2/3 \text{ LL Const}$
- $W_{21} = 1.4 \text{ DL conc} + 1.6 \times 1/3 \text{ LL Const}$
- $W_{22} = 1.4 \text{ DL deck}$

彎矩與支座反力係數 Bending Moment And Shear Force Coefficients



撓度係數 Deflection Coefficients

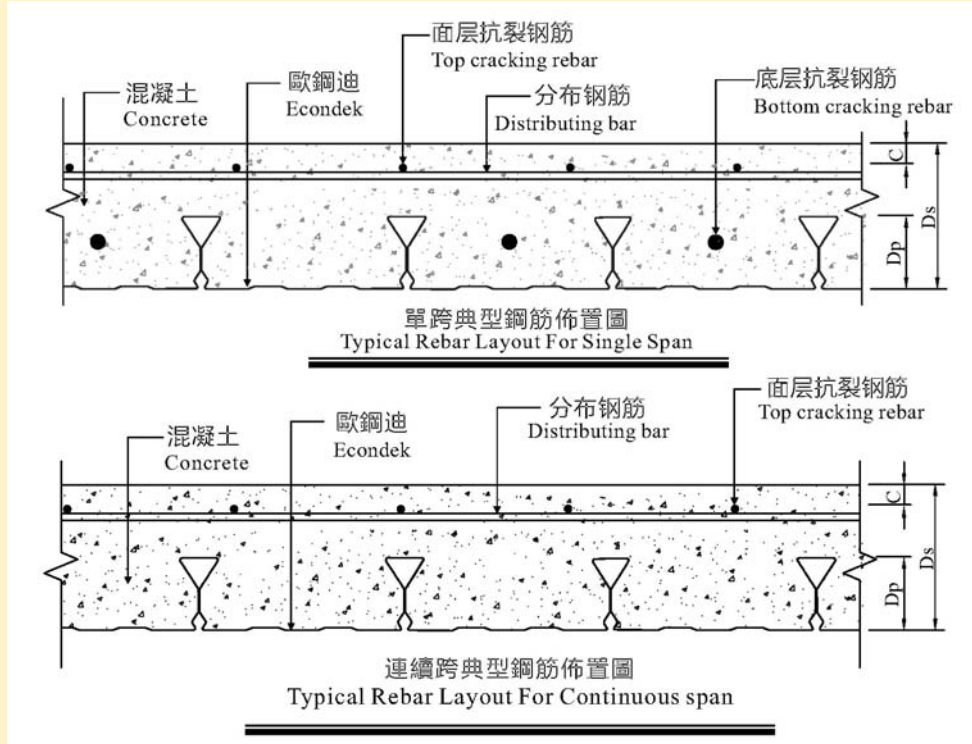


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施工階段設計 4. Construction Design

典型鋼筋佈置圖

4.3 Typical Reinforcement Layout



ECONDEK 65-555 截面特性

4.4 Section Properties

設計強度 Design strength	基材厚度 Metal thickness	抗翹曲 彎矩能力 Hogging moment capacity	抗下垂 彎矩能力 Sagging moment capacity	抗腹板 屈曲能力 Web crushing resistance	次彎矩面積 Second moment of area					
					總面積 Gross area	總計 Gross	下垂彎曲 Sagging moment	翹曲彎曲 Hogging moment	單跨 Single span (I _g +I _s)/2	多跨 Multiple span (2I _g +I _s +I _t)/4
Py (N/mm ²)	t (mm)	Mx.g (kNm/m)	Mx.h (kNm/m)	Pw (kN/m)	A _p (mm ² /m)	I _g (mm ⁴ /m)	I _s (mm ⁴ /m)	I _h (mm ⁴ /m)	I _{sv} (mm ⁴ /m)	I _{mv} (mm ⁴ /m)
410	0.75	6.23	6.76	59.47	1504	91203	599114	506334	552724	732363
	1	9.24	10.11	96.87	2005	1206338	915558	727869	821714	1014026
	1.2	11.30	12.34	131.93	2406	1438394	1159905	917722	1038814	1238604
	1.5	14.44	15.72	192.57	3008	1780858	1543265	1218880	1381073	1580966
550	0.75	7.89	8.92	68.88	1504	912002	572692	487557	530124	721063
	1	11.70	13.34	112.20	2005	1206338	872406	698333	785370	995854
	1.2	14.89	16.28	152.80	2406	1438393	1105773	879028	992400	1215397
	1.4	17.65	19.26	198.41	2807	1667447	1349038	1068552	1208795	1438121

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施工階段設計 4. Construction Design

4.5 ECONDEK 65-555 跨距表
ECONDEK 65-555 Span Table

ECONDEK G410 施工階段跨距表
ECONDEK G410 Load span table in construction stage

樓板厚度(mm) Slab Thickness	壓型板厚度(mm) Profiled Steel	單跨 Single Span	雙跨 Double Span	三跨 Triple Span
115	0.75	2900	3030	3100
	1.00	3280	3790	3890
	1.20	3520	4170	4280
	1.50	3840	4680	4620
120	0.75	2860	2980	3050
	1.00	3240	3730	3830
	1.20	3485	4115	4220
	1.50	3800	4620	4580
125	0.75	2830	2930	3010
	1.00	3200	3670	3770
	1.20	3440	4060	4170
	1.50	3750	4560	4450
130	0.75	2800	2880	2960
	1.00	3165	3620	3715
	1.20	3405	4000	4115
	1.50	3710	4500	4500
140	0.75	2740	2800	2870
	1.00	3100	3510	3610
	1.20	3330	3905	4010
	1.50	3635	4380	4430
150	0.75	2685	2720	2790
	1.00	3040	3420	3510
	1.20	3270	3810	3915
	1.50	3565	4280	4375
160	0.75	2635	2650	2720
	1.00	2980	3330	3420
	1.20	3200	3720	3825
	1.50	3500	4180	4300
180	0.75	2545	2510	2580
	1.00	2880	3170	3260
	1.20	3095	3560	3660
	1.50	3380	4000	4115
200	0.75	2465	2400	2470
	1.00	2790	3030	3110
	1.20	3000	3420	3520
	1.50	3200	3840	3955

注:表中數據是以支承寬度150mm計算, 施工荷載取值1.5kPa, 若荷載取值改變, 表中數據則需另行修正。按BS EN 1994-1-1規定的內容, 對以下情況驗算:
The data in the table is calculated basing on the support width 15mm and construction load is 1.5kpa. If the load value changes, data need to be separately amended. According to the BS EN 1994-1-1, check the following calculations:

- 1、正截面抗彎承載力 Positive section bending capacity
- 2、腹板抗剪承載力 Web Shearing Loading capacity
- 3、腹板承載力 Web loading Capacity
- 4、彎矩+剪力組合作用 Combined action of bending moment and shearing
- 5、彎矩+壓力組合作用 Combined action of bending moment and pressure
- 6、組合樓板跨中撓度 Composite Slabs Span Deflection

施工階段設計 4. Construction Design

4.5 ECONDEK 65-555 跨距表
ECONDEK 65-555 Span Table

ECONDEK G550 施工階段跨距表
ECONDEK G550 Load span table in construction stage

樓板厚度(mm) Slab Thickness	壓型板厚度(mm) Profiled Steel	單跨 Single Span	雙跨 Double Span	三跨 Triple Span
115	0.75	2820	3410	3500
	1.00	3180	4280	4145
	1.20	3410	4610	4340
	1.50	3620	4790	4510
120	0.75	2790	3350	3440
	1.00	3140	4220	4110
	1.20	3380	4570	4300
	1.50	3580	4750	4480
125	0.75	2760	3300	3390
	1.00	3110	4160	4065
	1.20	3330	4530	4265
	1.50	3540	4710	4440
130	0.75	2730	3250	3340
	1.00	3080	4090	4040
	1.20	3300	4490	4230
	1.50	3510	4670	4400
140	0.75	2670	3150	3240
	1.00	3010	3980	3970
	1.20	3240	4420	4170
	1.50	3440	4600	4340
150	0.75	2620	3060	3150
	1.00	2960	3870	3900
	1.20	3180	4360	4110
	1.50	3370	4530	4270
160	0.75	2570	2980	3065
	1.00	2900	3770	3830
	1.20	3120	4255	4050
	1.50	3310	4470	4220
180	0.75	2480	2830	2910
	1.00	3810	3590	3690
	1.20	3020	4070	3940
	1.50	3210	4360	4110
200	0.75	2410	2700	2780
	1.00	2720	3430	3530
	1.20	2930	3910	3830
	1.50	3110	4250	4020

注:表中數據是以支承寬度150mm計算, 施工荷載取值1.5kPa, 若荷載取值改變, 表中數據則需另行修正。按BS EN 1994-1-1規定的內容, 對以下情況驗算:
The data in the table is calculated basing on the support width 15mm and construction load is 1.5kpa. If the load value changes, data need to be separately amended. According to the BS EN 1994-1-1, check the following calculations:

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- 6、組合樓板跨中撓度 Composite Slabs Span Deflection

組合階段設計 5. Combination Design

組合階段設計

5. Combination Design

◆、壓型鋼承板組合階段設計考慮：

The requirement and some matters need attention for profiled steel decking in combination design:

- 1) 抗彎矩能力
Bending Capacity
- 2) 抗縱向滑移能力
Slippage resistance
- 3) 腹板抗剪能力
Web shear capacity
- 4) 支撐處抗剪能力
Shear capacity at the support
- 5) 撓度
Deflection



◆、混凝土的等級為C30，恆載中鋼筋混凝土的容重為23.5kN/m³，鋼筋設計強度為460N/mm²。

The concrete is Grade C30, the unit weight of reinforced concrete in dead load is 23.5kN/m³ and the reinforcement design strength is 460N/mm².

對於負彎矩的處鋼筋需要最小25mm的保護層厚度。

The minimum 25mm thickness of protective layer is required on negative moment reinforcement.

◆、邊緣和中間的支撐長度最小分別是：50mm，100mm。

The minimum length of the edge and the middle support are: 50mm, 100mm.

設計荷載

5.1 Design Load

類型 Type	荷載系數 Load Factor	設計值 Design value	
組合樓板自重 Self weight of composite decking	1.0(min) 最小值 1.35(max) 最大值	鋼筋混凝土自重 Self weight of concrete	23.5 kN/m ³
		鋼承板密度 Steel decking Density	78.5 kN/m ³
		t = 0.75 mm	0.980 kN/m ²
		t = 1.0 mm	0.114 kN/m ²
		t = 1.2 mm	0.153 kN/m ²
恆荷載 Dead load	1.0(min) 最小值 1.35(max) 最大值	隔牆 Partition	按設計要求 By design requirements
		找平層與地面 Screedings	
		吊掛荷載 Services	
		其他構造 Other Permanent Structure	
活荷載 Live load	1.0(min) 最小值 1.5(max) 最大值	人流 Human Traffic	按設計要求 By design requirements
		傢俱與設備 Furniture And Equipment	
		堆壓物及其他 Heap Pressure And Other Material	

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組合階段設計 5. Combination Design

5.2 ECONDEK 65-555 跨距表
ECONDEK 65-555 Span Table

ECONDEK G410 組合階段跨距表
ECONDEK G410 Span table in compositing stage

樓板厚度(mm) Slab Thickness	壓型板厚度(mm) Profiled Thickness	施加活荷載後的最大跨度 The maximum span is applied after the live load			
		3.0kPa	5.0kPa	7.5kPa	10.0kPa
115	0.75	4055	4055	3925	3620
	1.00	4055	4055	4055	3690
	1.20	4055	4055	4055	3740
	1.50	4055	4055	4055	3810
120	0.75	4225	4225	4050	3730
	1.00	4225	4225	4120	3800
	1.20	4225	4225	4170	3840
	1.50	4225	4225	4225	3910
125	0.75	4395	4395	4170	3850
	1.00	4395	4395	4240	3910
	1.20	4395	4395	4285	3950
	1.50	4395	4395	4330	4015
130	0.75	4565	4565	4300	3965
	1.00	4565	4565	4360	4020
	1.20	4565	4565	4410	4065
	1.50	4565	4565	4470	4120
140	0.75	4905	4905	4570	4210
	1.00	4905	4905	4620	4260
	1.20	4905	4905	4660	4300
	1.50	4905	4905	4720	4350
150	0.75	5245	5245	4845	4455
	1.00	5245	5245	4895	4510
	1.20	5245	5245	4930	4545
	1.50	5245	5245	4985	4595
160	0.75	4425	3895	3435	3105
	1.00	5010	4425	3910	3535
	1.20	5430	4800	4245	3845
	1.50	5595	5310	4705	4265
180	0.75	4630	4095	3630	3285
	1.00	5240	4650	4125	3745
	1.20	5680	5045	4480	4070
	1.50	3265	5575	4960	4510
200	0.75	4810	4280	3805	3455
	1.00	5445	4850	4320	3930
	1.20	5895	5260	4690	4270
	1.50	6505	5190	4945	4730

注:表中數據是以支承寬度150mm計算, 施工荷載取值1.5kPa, 若荷載取值改變, 表中數據則需另行修正。按BS EN 1994-1-1規定的內容, 對以下情況驗算:
The data in the table is calculated based on the support width 15mm and construction load is 1.5kpa. If the load value changes, data need to be separately amended. According to the BS EN 1994-1-1, check the following calculations:

1、正截面抗彎承載力
Positive section bending capacity

3、混凝土與壓型板剪切-粘結能力

Concrete Shear And Pressure Plate - Bonding Capacity

2、抗剪能力

Shear Capacity

4、組合樓板跨中撓度

Composite Slabs Span Deflection

組合階段設計 5. Combination Design

5.2 ECONDEK 65-555 跨距表
ECONDEK 65-555 Span Table

ECONDEK G550 組合階段跨距表
ECONDEK G550 Span table in compositing stage

樓板厚度(mm) Slab Thickness	壓型板厚度(mm) Profiled Thickness	施加活荷載後的最大跨度 The maximum span is applied after the live load			
		3.0kPa	5.0kPa	7.5kPa	10.0kPa
115	0.75	4055	4055	3500	3620
	1.00	4055	4055	4145	3690
	1.20	4055	4055	4340	3740
	1.40	4055	4055	4510	3785
120	0.75	4225	4225	4050	3730
	1.00	4225	4225	4120	3800
	1.20	4225	4225	4170	3840
	1.40	4225	4225	4215	3885
125	0.75	4395	4395	4170	3850
	1.00	4395	4395	4240	3910
	1.20	4395	4395	4285	3950
	1.40	4395	4395	4330	3990
130	0.75	4565	4565	4300	3965
	1.00	4565	4565	4360	4020
	1.20	4565	4565	4410	4065
	1.40	4565	4565	4450	4100
140	0.75	4905	4905	4570	4210
	1.00	4905	4905	4620	4260
	1.20	4905	4905	4660	4300
	1.40	4905	4905	4700	4335
150	0.75	5245	5245	4845	4455
	1.00	5245	5245	4895	4510
	1.20	5245	5245	4930	4545
	1.40	5245	5245	4965	4575
160	0.75	4425	3895	3435	3105
	1.00	5010	4425	3910	3535
	1.20	5430	4800	4245	3845
	1.40	5595	5145	4560	4130
180	0.75	4630	4095	3630	3285
	1.00	5240	4650	4125	3745
	1.20	5680	5045	4480	4070
	1.40	6080	5405	4810	4370
200	0.75	4810	4280	3805	3455
	1.00	5445	4850	4320	3930
	1.20	5895	5260	4690	4270
	1.40	6310	5640	5035	4585

注:表中數據是以支承寬度150mm計算, 施工荷載取值1.5kPa, 若荷載取值改變, 表中數據則需另行修正。按BS EN 1994-1-1規定的內容, 對以下情況驗算:
The data in the table is calculated based on the support width 15mm and construction load is 1.5kpa. If the load value changes, data need to be separately amended. According to the BS EN 1994-1-1, check the following calculations:

1、正截面抗彎承載力
Positive section bending capacity

3、混凝土與壓型板剪切-粘結能力

Concrete Shear And Pressure Plate - Bonding Capacity

2、抗剪能力

Shear Capacity

4、組合樓板跨中撓度

Composite Slabs Span Deflection

性能介紹 6. Performance

性能介紹-耐腐蝕

6.1 Performance - Corrosion Resistance

6.1.1 ◆、組合樓板的耐腐蝕性能

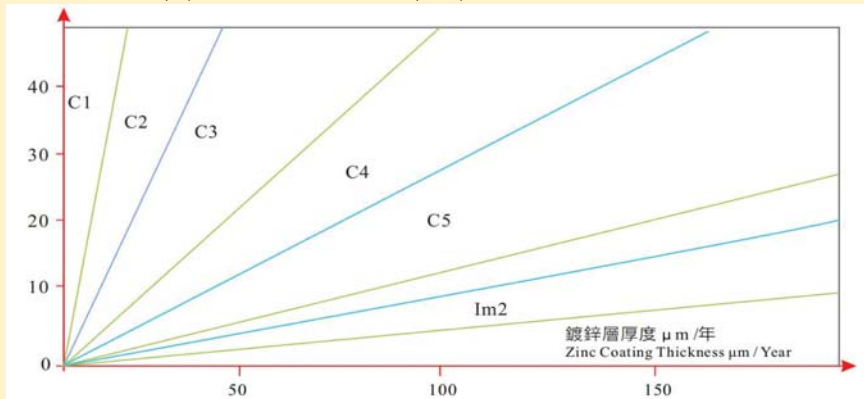
設計複合樓板時，要保證壓型鋼板在使用年限內不會被腐蝕，ECONDEK 歐鋼迪採用優質的鍍鋅鋼板，具有優秀的抗腐蝕能力。

ECONDEK has good corrosion resistance capacity by using excellent galvanized steel to ensure that the profiled steel will not be corroded in the service life.

6.1.2 ◆、環境種類、腐蝕風險和腐蝕速率 Environment, corrosion risk and corrosion rate ISO 14713-1 General principles of design and corrosion resistance / GB/T 19355.1-2016

C 腐蝕等級 - 腐蝕水平 鋅的腐蝕速率 Zinc Corrosion Rate $r_{corr}/(\mu\text{m/a})$	典型環境 Typical environments (examples)	
	室內 Internal	室外 External
C1- 很低 Very Low $r_{corr} \leq 0.1$	有採暖的, 溫度相對較低, 如辦公室, 學校, 博物館 Heated spaces with low relative humidity and insignificant pollution, e.g. offices, schools, museums	乾燥或寒冷地區污染非常低, 少凝露的大氣環境, 如沙漠, 南北極中心區 Dry or cold areas with very low pollution and less condensation, such as deserts, South/Arctic
C2- 低 Low $0.1 < r_{corr} \leq 0.7$	無採暖的, 溫度有變化, 相對潮濕, 較少產生凝露, 如倉庫, 體育館 Unheated spaces with varying temperature and relative humidity. Low frequency of condensation and low pollution, e.g. storage, sport halls	溫帶氣候區, 污染較低 ($\text{SO}_2 < 5\mu\text{g}/\text{m}^2$) 的大氣環境, 如農村, 小城鎮 Temperate climate zone, atmospheric environment with low pollution ($\text{SO}_2 < 5\mu\text{g}/\text{m}^2$), such as rural areas, small towns
C3- 中等 Medium $0.7 < r_{corr} \leq 2$	有時產生凝露, 受中度污染, 如食品廠, 洗衣房 Spaces with moderate frequency of condensation and moderate pollution from production process, e.g. food-processing plants, laundries, breweries, dairies	溫帶氣候區, 中等污染, 有氯化物影響的, 如市區, 部分沿海地區 Temperate climate zone, moderate pollution, chloride influence, such as urban areas, some coastal areas
C4- 高 High $2 < r_{corr} \leq 4$	經常產生凝露, 有高度污染, 如工業生產廠房, 游泳池 Condensation often occurs, with high pollution, such as industrial production plants, swimming pools	溫帶氣候區, 高污染, 較多氯化物影響的, 如污染的工業區, 平靜海灘 Temperate climate zone, high pollution, high chloride influence, such as polluted industrial area, calm beach
C5- 很高 Very high $4 < r_{corr} \leq 8$	凝露非常頻繁, 受高度污染 Condensation is very frequent and highly polluted	溫帶亞熱帶地區, 嚴重污染, 且有嚴重氯化物影響的, 如重工業區, 沿海海灘 Temperate and subtropical regions, heavily polluted, and severely affected by chlorides, such as heavy industrial areas, coastal beaches
CX- 極高 Extreme $8 < r_{corr} \leq 25$	長時間冷凝或暴露於極端濕度影響和高污染的 prolonged condensation or exposure to extreme humidity effects and high contamination	亞熱帶和熱帶地區, 污染極嚴重, 工業污染及氯化物影響, 如極端工業污染區域, 有海水飛濺的海岸 Subtropical and tropical areas, extremely polluted, industrial pollution and chloride effects, such as extreme industrial pollution areas, coasts with sea water splashes

免維護年限(年) Maintenance-Free Life(Year)



6.1.3 ◆、不同鍍鋅含量的免維護年限 Maintenance-free life of different content

Type	C1	C2	C3	C4	C5
Z120	>83	12~83	4~12	2~4	1~2
Z150	>104	15~104	5~15	3~5	1~3
Z180	>125	18~125	6~18	3~6	2~3
Z275	>196	27~196	10~27	5~10	2~5
Z350	>243	35~243	12~35	6~12	3~6
Z450	>312	45~312	16~45	8~12	4~8

注:上表的鍍鋅含量為雙面的總量,建議使用鍍鋅量Z275以上的鋼板作為複合樓板。

The galvanized content in the table is for double sides sheet and using composite steel decking of Z275 or above is preferred.

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性能介紹 6. Performance

性能介紹-耐火

6.2 Performance - Fire Resistance

◆、組合樓板的耐火時間與最小厚度要求符合BS5950: Part8要求。樓板內混凝土溫度分佈參考英標BS5950-8, 而壓型金屬板和鋼筋溫度分佈則根據耐火測試的結果。

The requirement of fire resistance time and minimum thickness of composite decking is in accordance with BS5950:Part8 and the temperature distribution of decking concrete is accordance with BS5950-8, while distribution of profiled metal decking and reinforcement is based on the fire test results.

◆、混凝土、鋼筋及壓型鋼板在高溫下的強度折減系數依據英標BS5950-8, 彎矩抵抗能力採用了分層計算的模型。

The strength reduction factor of concrete, reinforcement and profiled steel under high temperature is according to BS5950-8, and the bending moment capacity is calculated by using layered calculation model.

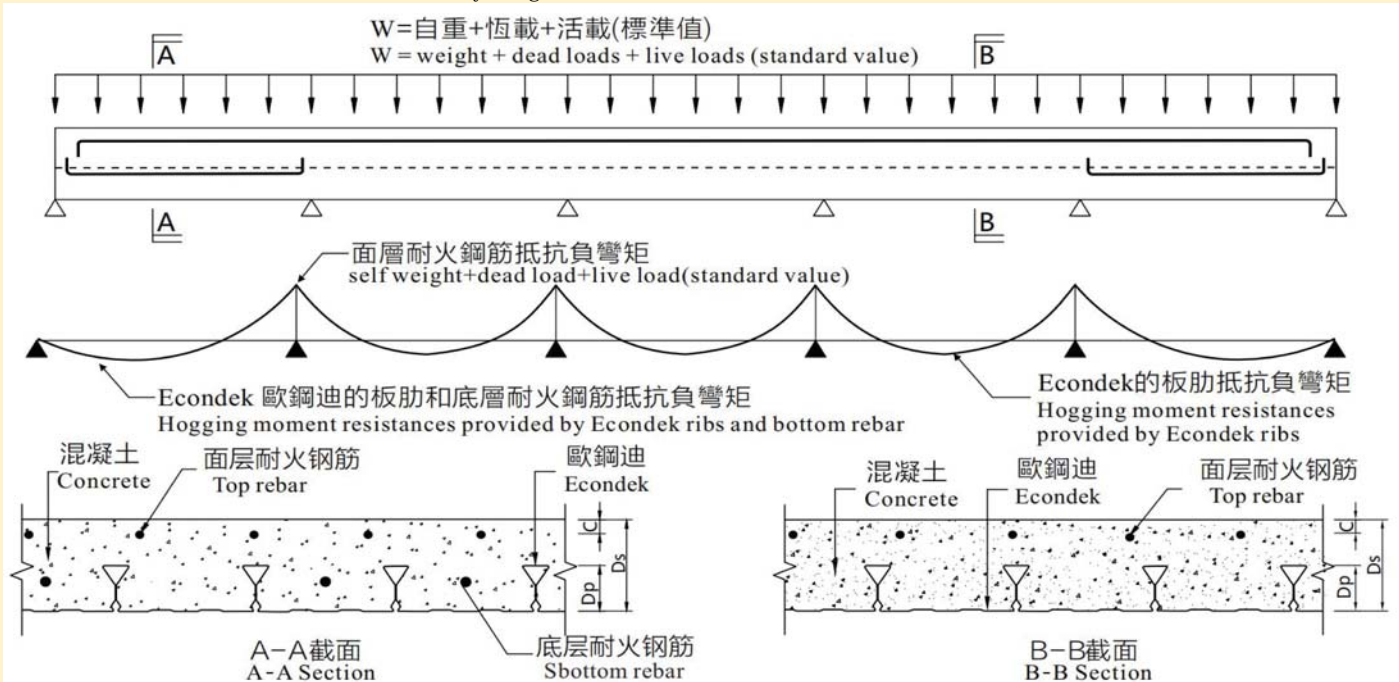
◆、耐火檢測結果符合BS EN 1365-2和BS EN 1363-1要求。

Fire testing results is in accordance with BS EN 1365-2 and BS EN 1363-1.

6.2.1 設計荷載 Design load

類型 Type	荷載系數 Load Factor	設計值 Design value	
組合樓板自重 Self weight of composite decking	1.0(min) 最小值 1.35(max) 最大值	鋼筋混凝土自重 Self weight of concrete	23.5 kN/m ³
		鋼承板密度 Steel decking Density	78.5 kN/m ³
		t = 0.75 mm	0.980 kN/m ²
		t = 1.0 mm	0.114 kN/m ²
		t = 1.2 mm	0.153 kN/m ²
恆荷載 Dead load	1.0(min) 最小值 1.35(max) 最大值	隔牆 Partition	按設計要求 By design requirements
		找平層與地面 Screedings	
		吊掛荷載 Services	
		其他構造 Other Permanent Structure	
施加荷載 Imposed load	1.0(min) 最小值 1.5(max) 最大值	人流 Human Traffic	按設計要求 By design requirements
		傢俱與設備 Furniture And Equipment	
		堆壓物及其他 Heap Pressure And Other Material	

6.2.2 耐火設計方法 Refractory design



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性能介紹 6. Performance

6.2.3 組合樓板耐火設計要求 Fire design requirement of composite decking

壓型鋼板組合樓板的溫度分佈
Temperature distribution of profiled steel composite decking

樓板深度 (mm) Floor Depth	不同耐火時間下的溫度分佈℃Temperature distribution of profiled steel composite decking							
	60Min分鐘		90Min分鐘		120Min分鐘		180Min分鐘	
	NW	LW	NW	LW	NW	LW	NW	LW
10	650	620	790	720	*	770	*	*
20	530	480	650	580	720	640	*	740
30	420	380	540	460	610	530	700	630
40	330	290	430	360	510	430	600	520
50	250	220	370	280	440	340	520	430
60	200	170	310	230	370	280	460	380
70	170	130	260	170	320	220	410	320
80	140	80	220	130	270	180	360	270
90	120	70	180	100	240	150	320	230
100	100	60	160	80	210	140	280	190

注: * 表示溫度超過800, NW 為一般混凝土, LW 為輕質混凝土。
Note: * indicates that the temperature is higher than 800, NW is for general concrete, and LW is for light concrete.

縮口型樓板的最小厚度 The minimum thickness of the Reentrant type decking

混凝土種類 Types of concrete	不同耐火時間的最小樓板厚度 mm			
	The minimum decking thickness under different firing time			
	60Min分鐘	90Min分鐘	120Min分鐘	180Min分鐘
一般 General	90	110	125	150
輕質 Light	90	105	115	135

混凝土在高溫下的強度折減係數
The strength reduction factor of concrete under high temperature

混凝土種類 Types of concrete	不同溫度(℃)下的強度折減係數								
	The minimum decking thickness of different firing time								
	20	100	200	300	400	500	600	700	800
一般 General	1.00	0.95	0.90	0.85	0.70	0.60	0.45	0.30	0.15
輕質 Light	1.00	1.00	1.00	1.00	0.88	0.76	0.64	0.52	0.40

注: 其它溫度的係數可通過線型插值法得出。 Note: Additional temperature coefficient can be obtained by linear interpolation

冷彎型鋼在高溫下的強度折減係數
The strength reduction factor of cold-rolled steel under high temperature

名義應變 Nominal Strain	不同溫度(℃)下的強度折減係數								
	The minimum decking thickness of different firing time								
	200	250	300	350	400	450	500	550	600
0.50%	0.945	0.890	0.834	0.758	0.680	0.575	0.471	0.370	0.269
1.50%	1.000	0.985	0.949	0.883	0.815	0.685	0.556	0.453	0.349
2.00%	1.000	1.000	1.000	0.935	0.867	0.730	0.590	0.490	0.390

注: 其它溫度的係數可通過線型插值法得出。 Note: Additional temperature coefficient can be obtained by linear interpolation

熱軋鋼筋在高溫下的強度折減係數
The strength reduction factor of hot-rolled steel under high temperature

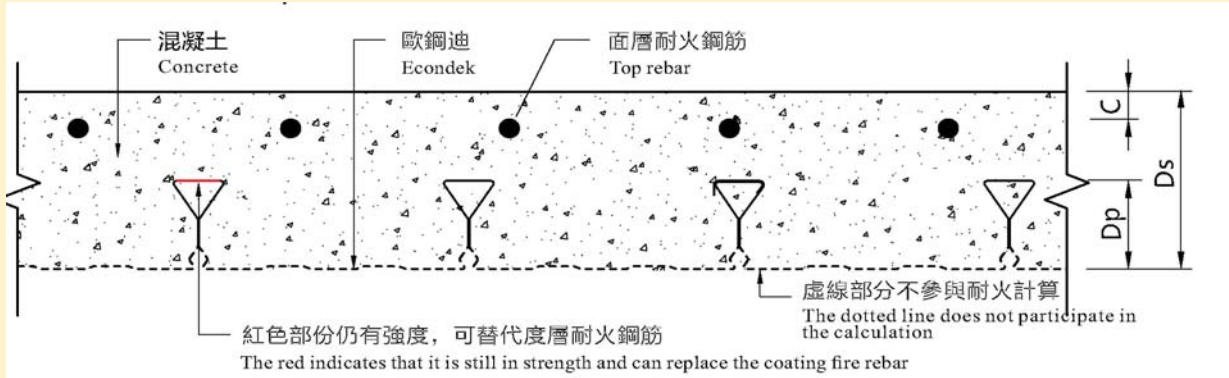
名義應變 Nominal Strain	不同溫度(℃)下的強度折減係數								
	The minimum decking thickness of different firing time								
	350	400	450	500	550	600	650	700	750
2.00%	1.000	0.970	0.934	0.776	0.627	0.474	0.337	0.232	0.158

注: 其它溫度的係數可通過線型插值法得出。 Note: Additional temperature coefficient can be obtained by linear interpolation

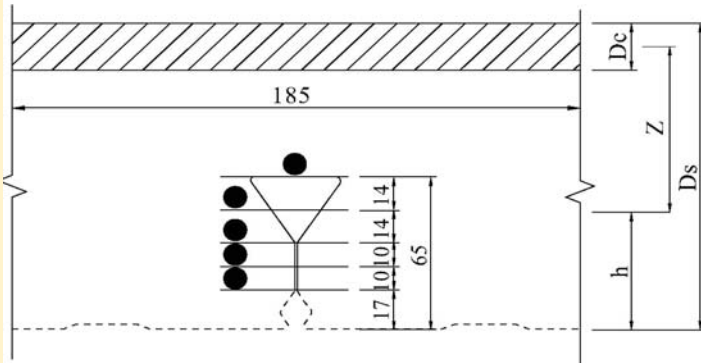
性能介紹 6. Performance

從耐火試驗數據可看出，在1.5小時的耐火時間，ECONDEK歐鋼迪的波峰溫度不高，仍有較大的強度，可充當正彎矩耐火鋼筋的用量，達到節省成本的效果。

According to the fire testing results, ECONDEK is still in high strength with low peak temperature after 1.5 hours firing. So it can be used as positive moment fire rebar to save costs.

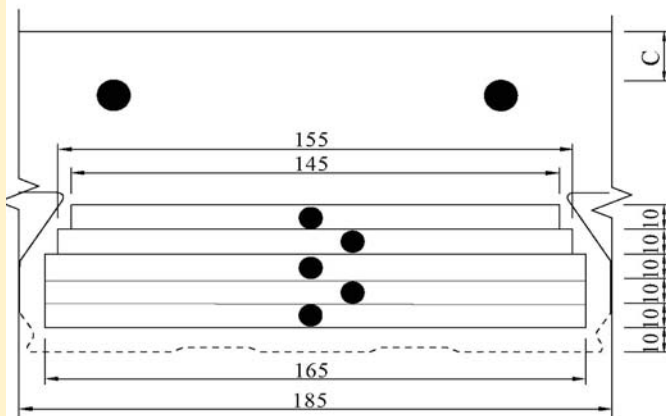


正彎矩抵抗能力計算
The calculation of positive moment capacity



編號 Numbering	中心溫度 Center temperature	折減係數 Reduction factor
1	290	1.00
2	330	0.96
3	400	0.87
4	435	0.77
5	545	0.50
總長度 Total length	140mm/波距 140mm / pitch	
綜合折減係數 Comprehensive reduction factor		0.85
合力中心高度 Composition center height		5.03

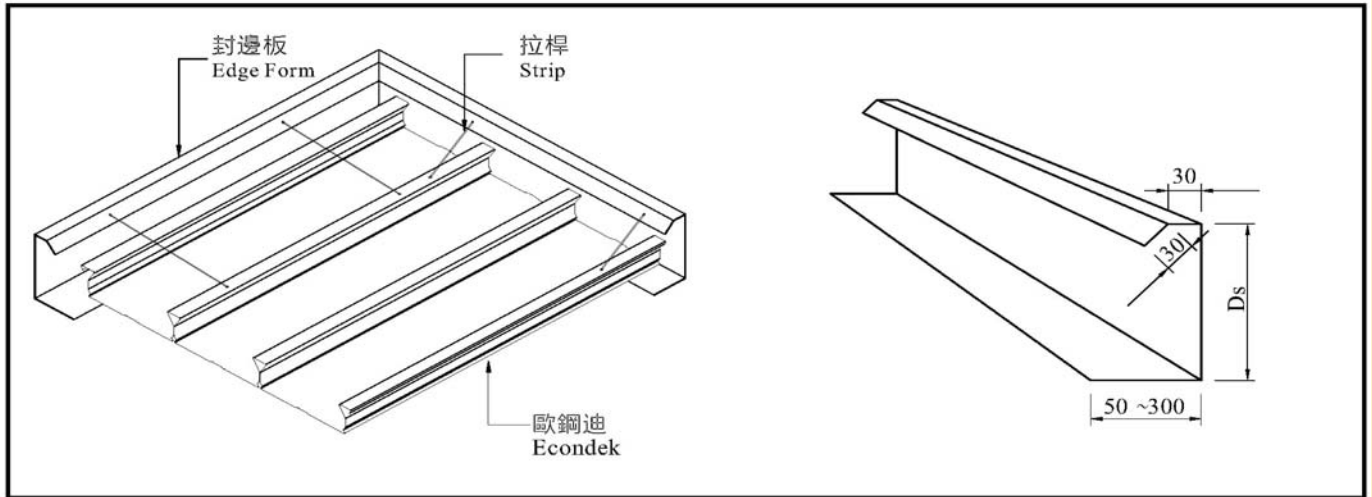
負彎矩抵抗能力計算
The calculation of negative moment capacity



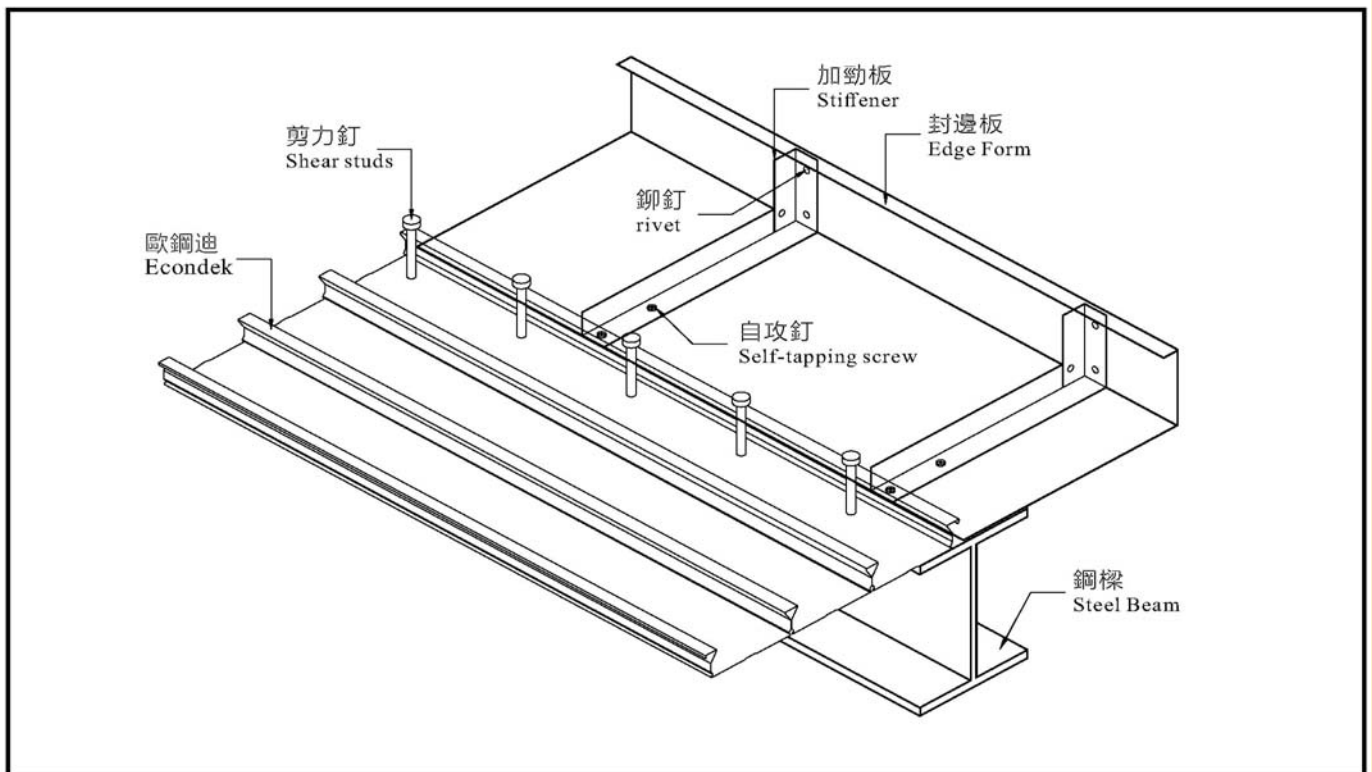
編號 Numbering	中心溫度 Center temperature	折減係數 Reduction factor
1	720	0.27
2	330	0.46
3	400	0.62
4	435	0.70
5	545	0.79

樓承板配件 7. Decking Accessories

樓承板配件 7. Decking Accessories



封邊板和拉桿
Edge form and strip



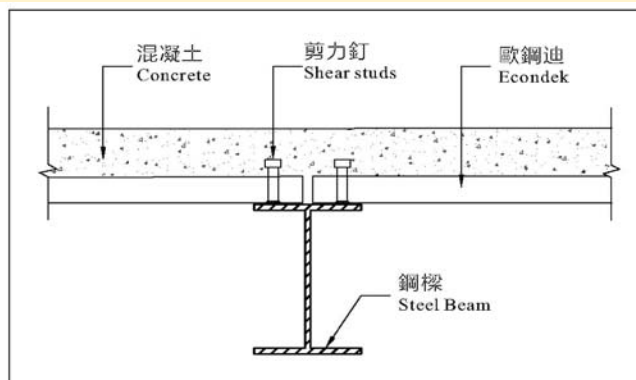
懸挑封邊板和加勁板
Cantilever edge form and stiffiener

典型節點 8. Typical Details

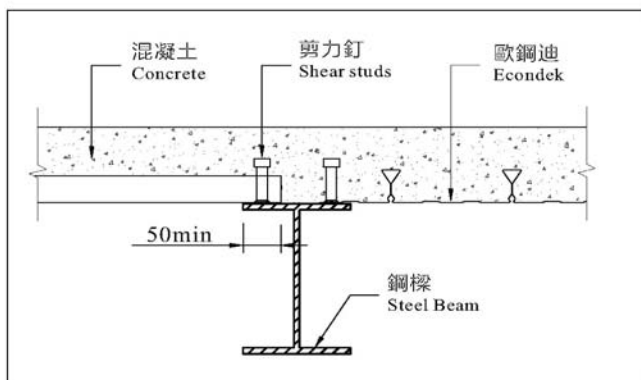
8. Typical Details



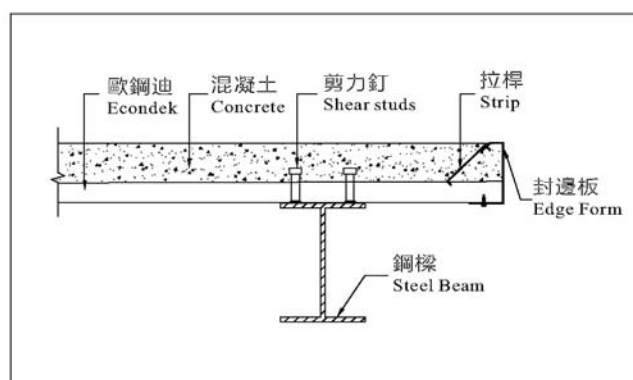
Econdek系統圖
Econdek system diagram



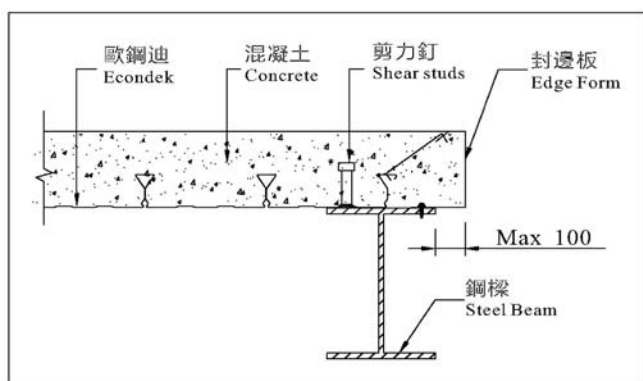
Econdek在鋼樑上對接
Support on steel beam



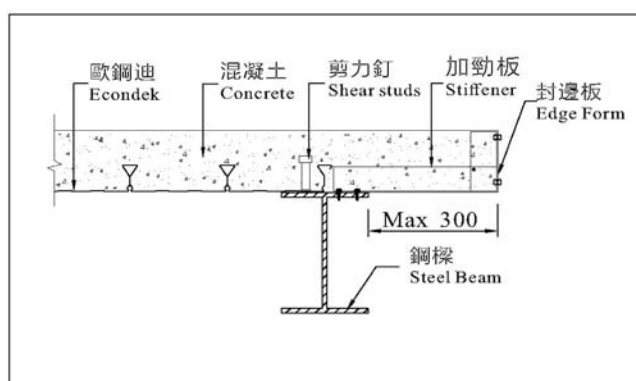
Econdek在鋼樑上對接
Support on steel beam



Econdek懸挑封邊節點
Econdek cantilever edge detail



Econdek側邊封邊節點
Econdek side edge detail

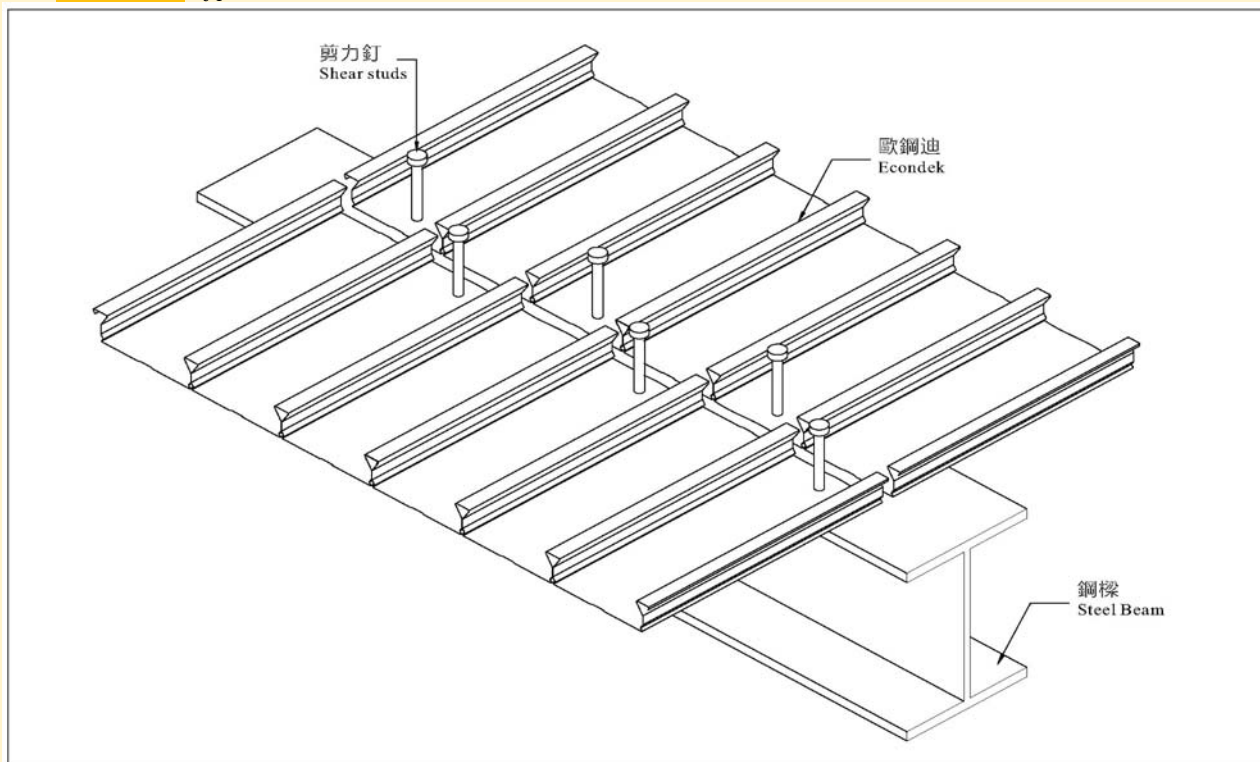


Econdek側邊懸挑節點
Econdek side cantilever detail

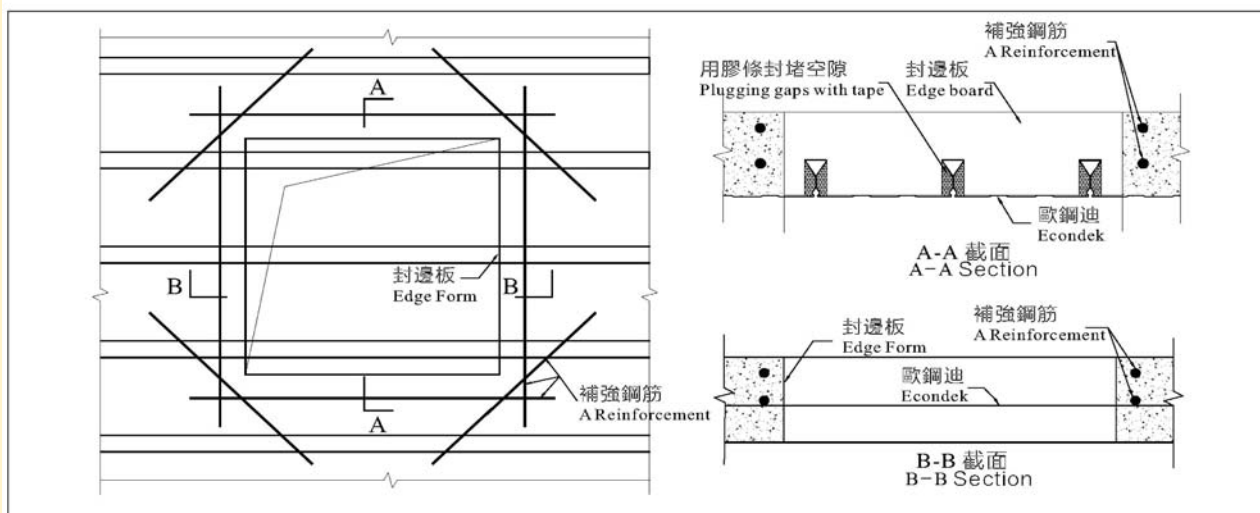
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典型節點 8 . Typical Details

8 . Typical Details



剪力釘佈置圖
Shear studs layout



樓板開孔處理
Floor opening

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工程案例
9 . Project Reference

工程案例
9 . Project Reference



ECONDEK® 歐鋼迪

Design to BS 5950-4/6/8

混凝土組合樓承板

Profile steel decking system



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