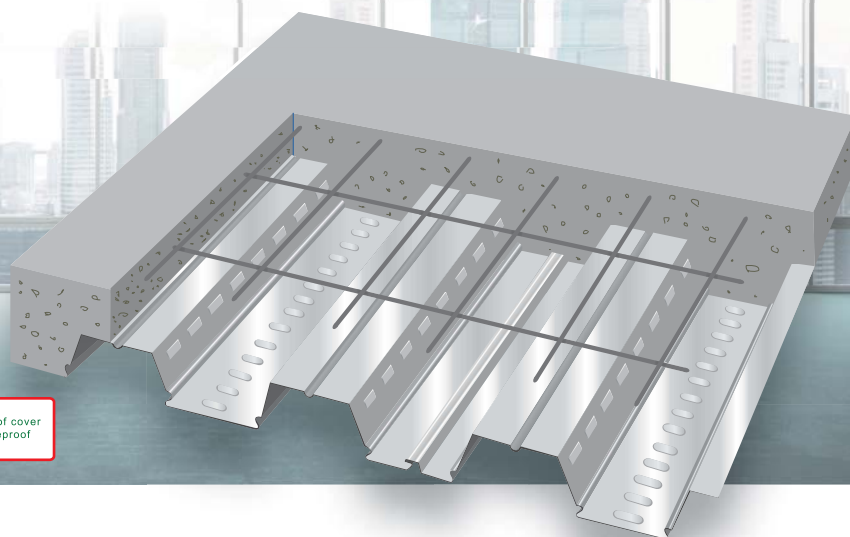# QL DECK

☑ Structural performance rating by the Japan Building Center
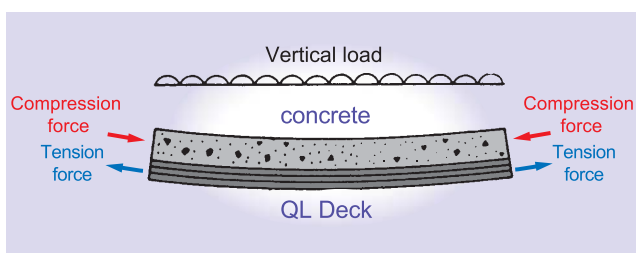[BCJ Rating - ST 007 - 04] Acquired

The surface of the deck plate is embossed (special non-slip),
effectively demonstrate the features of concrete and deck plate respectively
It is "deck plate for composite slab structure"

| Optional floor brace | No reinforcement | Non-fireproof cover 1-hour fireproof | Non-fireproof cover 2-hour fireproof |

Features

1 Composite Slab Structure

When casting concrete, after concrete forming and hardening,
deck plate is integrated with concrete deck and acts like reinforcement
in tension.

Vertical load

Compression force

concrete

Compression force

Tension force

Tension force

QL Deck

2 Weight Saving

Since the weight of the floor slab can be greatly reduced, the seismic performance is
improved and effective for design of column, beam and foundation.Unit weight is
lighter than other companies' products with the same height.

Overall constructions

QL

−20 % Lighter ※1

Load more than other companies' products

About 90 N/m² Lighter ※2

※1:Compared with the traditional method   ※2:Compare with 80mm QL-99-50-12
with other companies' products

3 Fireproof floor

Certification of Minister of Land, Infrastructure, Transport and Tourism
for 1-hour fireproof floor and 2-hour fireproof floor. We have received
fire-resistant coating etc. within the certification range is unnecessary.

Traditional deck

QL Deck

Certification conditions

Additional fireproof

No need

Fireproof floor
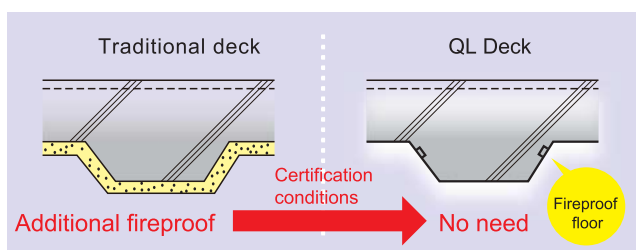
4 Flexibility to satisfy required construction time

Expansion of plate thickness, elimination of fireproof reinforcement
bars, support for high load newly available. We have acquired fire-proof
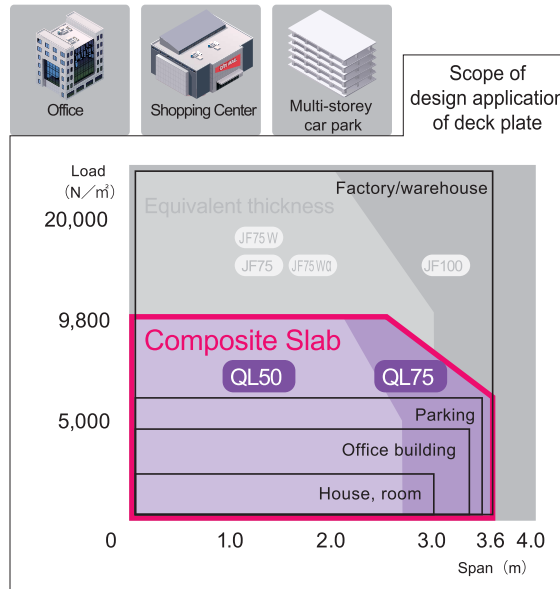certification and are responding to various demands.

Degree design freedom UP!

Building Performance UP!
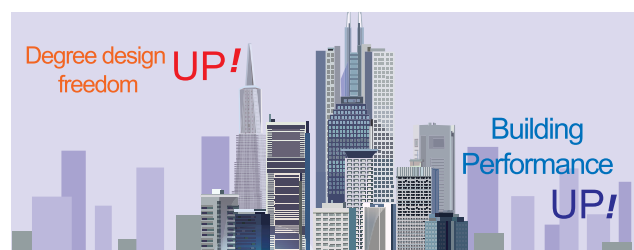
Product line up

Name of product	Rib height	Thickness
QL99-50-10	50	1.0
QL99-50-12	50	1.2
QL99-50-16	50	1.6
QL99-75-10	75	1.0
QL99-75-12	75	1.2
QL99-75-16	75	1.6

(mm)

■ Example normal QL Deck

QL99 - 50 - 12 G

Rib height　Thickness

Surface treatment
P : Anti-rust paint
G : Galvanized (Z12)
Z : Galvanized (Z27)
Nothing

Example usage, scope of design application

Office　Shopping Center　Multi-storey car park

Scope of design application of deck plate

Load（N／㎡）

20,000

Equivalent thickness

Factory/warehouse

JF75W
JF75　JF75WG　JF100

9,800

Composite Slab

QL50　QL75

5,000

Parking
Office building
House, room

0　1.0　2.0　3.0　3.6　4.0
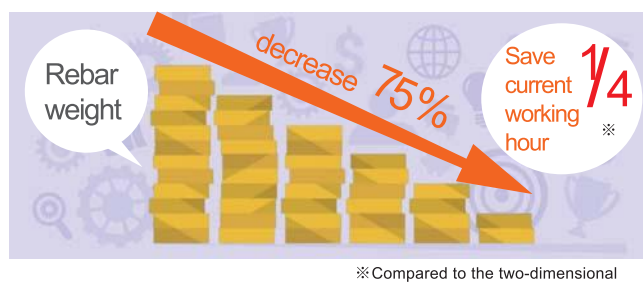
Span（m）

Page index

5 Economics

Since the main reinforcement is unnecessary, it is possible to drastically reduce inside reinforcement bars, so it is possible to shorten the construction period and reduce the cost.

5-❶ Reduce time, improve productivity

Spread 1/3

Increase construction productivity UP

※Time spread inside straight deck

5-❷ Significantly reduce the amount of reinforcement

Rebar weight

decrease 75%

Save current working hour 1/4 ※

※Compared to the two-dimensional

6 No floor brace

Composite slab and beam joined with shear studs by welding or hittingby rivets, the floor brace becomes unnecessary.

Floor brace　No brace with QL deck

Effect !
Clean !
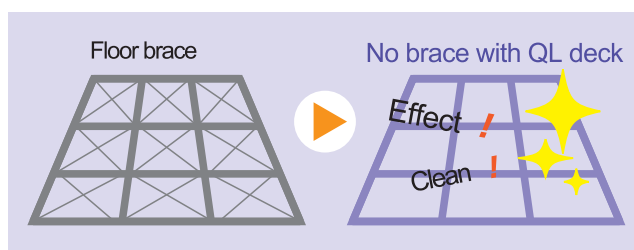
7 Comfortable indoor environment

Due to the large floor stiffness due to the composite slab structure, high level of sound insulation. We ensure performance and provide a comfortable indoor environment.

Comfortable

QL DECK Deckplate for composite slab structure

JF DECK Deck for formwork

R DECK Deck for reinforcement

QL Roof Deckplate fireproof for 30 minutes
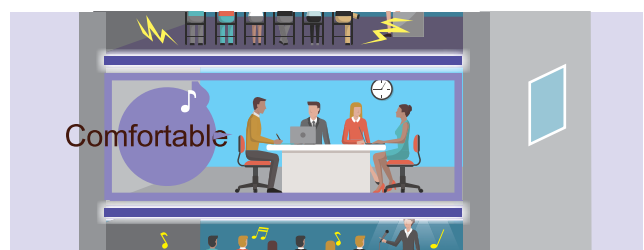
Specifications

1 Size - Weight - Cross Section

Name of product	Shape - size - type
QL99-50-10	
QL99-50-12	
QL99-50-16	
QL99-75-10	
QL99-75-12	
QL99-75-16	

2 Material - Specifications

Type	Mark	Surface treatment	Specifications	Zinc coating Minimum surface coverage with 2 sides g/m2	Chemical Composition %			Machine property		
					C	P	S	Productivity point N/mm2	Tension force N/mm2	Stretch %
QK Deck	QL99-50-12 QL99-75-12	Zinc coating No	JIS G 3352-2014 SDP1T	—	0.25 Bellow	0.05 Bellow	0.05 Bellow	205 Over	270 Over	18 Over
	QL99-50-12P QL99-75-12P	Painted products (Anti-rust 2 sides)								
	QL99-50-16 QL99-75-16	Zinc coating No	JIS G 3352-2014 SDP2	—	0.25 Bellow	0.05 Bellow	0.05 Bellow	235 Over	400 Over	17 Over
	QL99-50-16P QL99-75-16P	Painted products (Anti-rust 2 sides)								
	QL99-50-10G QL99-75-10G QL99-50-12G QL99-75-12G QL99-50-16G QL99-75-16G	Zinc coating Z12	JIS G 3352-2014 SDP2G (Z12)	120	0.25 Bellow	0.05 Bellow	0.05 Bellow	235 Over	400 Over	17 Over
	QL99-50-10Z QL99-75-10Z QL99-50-12Z QL99-75-12Z QL99-50-16Z QL99-75-16Z	Zinc coating Z27	JIS G 3352-2014 SDP2G (Z27)	275	0.25 Bellow	0.05 Bellow	0.05 Bellow	235 Over	400 Over	17 Over

3 Highly Anticorrosion Steel Plate

■ JFE Ecogal (R)

JIS G 3317

Hot-dip zinc -5% aluminum alloy steel plate

■ ZAM ®

JIS G 3323

Hot-dip zinc-aluminum-magnesium alloy plated steel sheet and steel strip

※JFE ecogal is JFE steel plate registered trademark.
※ZAM is registered trademark of Nisshin Steel.

4 End Closed Process

Prevented the outflow of concrete from the end of the QL deck at the time of concrete casting. Therefore, it is made by closing the end part, it is excellent in workability and economy.
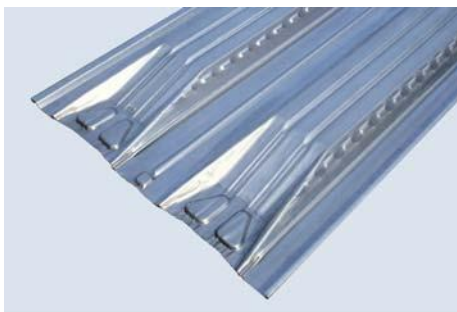
■ Note

1. If it is an end closed, depending on the minimum size of Factory shipment can be different

2. Can change the shape of end closed process of deck plate.

QL DECK Deckplate
for composite slab structure

JF DECK Deck
for formwork

R DECK Deck
for reinforcement

QL Roof Deckplate
fireproof for 30 minutes

Thickness (mm)	Cross section area (cm^2)	Product quality						Section property (per 1m width)		
		Unit weight (kg/m)			Weight per m2 (kg/m2)			Effective full cross section		Reference effective width
		No coating	Zinc coating		No coating	Zinc coating		Neutral axis	Moment of inertia	Section Modulus
			Z12	Z27		Z12	Z27	Y(cm)	Ix(× 10⁴mm⁴/m)	Z(× 10³mm³/m)
1.0	8.115	-	6.52(3.43)	6.68(3.52)	-	10.9	11.1	2.51	55.7	22.2
1.2	9.784	7.68	7.78(4.17)	7.99(4.26)	12.8	13.0	13.3	2.52	66.3	26.3
1.6	13.02	10.2	10.3(5.52)	10.5(5.61)	17.0	17.2	17.5	2.53	87.1	34.4
1.0	8.823	-	7.09(3.73)	7.26(3.82)	-	11.8	12.1	3.80	137	30.0
1.2	10.65	8.36	8.46(4.49)	8.69(4.58)	13.9	14.1	14.5	3.81	163	36.3
1.6	14.19	11.1	11.2(5.96)	11.5(6.05)	18.5	18.7	19.2	3.84	216	52.7

※ The inside of ( ) shows the weight of 300 width. In case using the 300 product, please contact us first.

5 Surface Treatment

■ For deck plates used for composite slabs, must be taken care of preventing rusting.
Galvanized products are recommended from the viewpoint of durability.
Please consider Z27 and ECOGAL · ZAM products when using in harsher environments. However, depending on the usage environment, galvanized products even rust may occur. For Z27 and Eco GAL · ZAM products, please contact us in advance.

■ On the back of the deck plate on site using a QL deck dedicated paint "QL primer" (corresponding to 2 types or 3 kinds of general rust preventive paint JIS K 5621). There are also products that take into consideration rust prevention until entering. Apply top coating as necessary. In case of re-painting, since adhesive paint, please use the following paint:

| 1. Oil painting | 2. Phthalic acid resin paint | 3. Synthetic resin formulation paint | 4. Phenolic resin enamel |

■ When painting on coating products, please discuss with the paint manufacturer.

6 Specification of composite slab

■ Deck plate
QL99-50 ; QL99-75

■ Concrete
Type: :Normal Concrete
:Light concrete (1 type, 2 type)
Design standard strength: 18N/mm2 or more
Slump :Recommend 100~150mm.
Thickness of Concrete: 60mm~100mm (rating).

■ Fireproof cover for rebars
Welded wire mesh [JIS G 3551] or deformed rebar
The amount of rebar of welded wire mesh is 0.2% or more of the concrete thickness (rebar ratio)

■ Fireproof covering
Certified as 1-hour and 2-hour fireproof as described on pages 11 and 12.
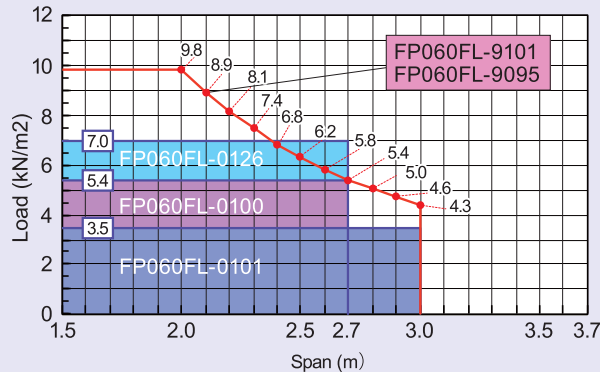Within the conditions fire resistant coating can be omitted.

Anti- cracking rebars
(Welded mesh or malformed rebars)

Concrete thickness

Concrete

QL Deck
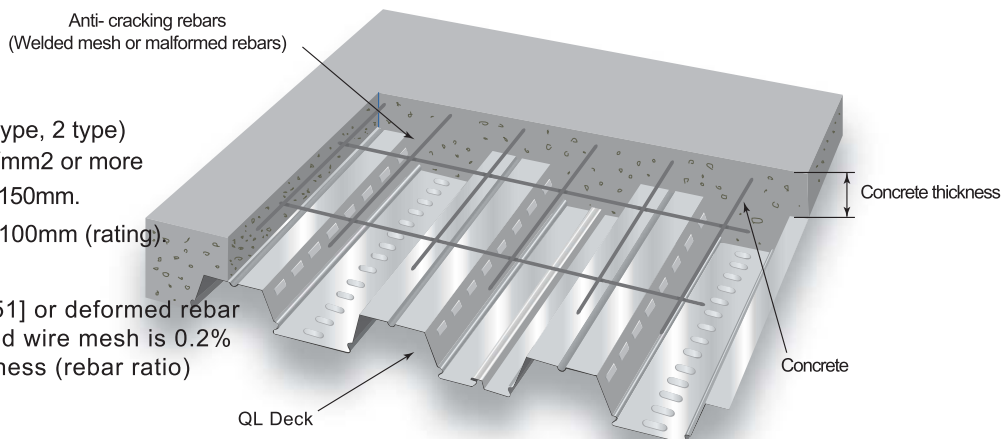
Certification of fire-proof structure

1 QL99-50

■ Allowable Load and Span

▌1-hour fireproof structure FP060FL-

FP060FL-9101
FP060FL-9095

FP060FL-0126
FP060FL-0100
FP060FL-0101

Load (kN/m2)
Span (m)

▌2-hour fireproof structure FP120FL-

FP120FL-9113
FP120FL-9107

Load (kn/m2)
Span (m)

■ Conditions and specifications

Classification	1-hour fireproof structure FP060FL-					2-hour fireproof structure FP120FL-					
Certified Number	0126	0100	0101	9101	9095	9113		9107			
Support conditions	Simple/continuous			Single	continuous	Single		continuous			
Allowable span L(m)	2.7	2.7	3.0	2.7	3.0	2.7		2.7			
Allowable stress (kN/m2)	7.0	5.4	3.5	5.4×(2.7/L)² and bellow 9.8kN/m²		5.4×(2.7/L)² and bellow 9.8kN/m²					
Thickness of deck plate (mm)	1.0,1.2,1.6			1.2,1.6		1.2,1.6					
Concrete / Thickness(mm)	80			80		95	85	95	85		
Concrete / Type	Normal			Normal	Light	Normal	Light	Normal	Light	Normal	Light
Concrete / Strength (N/mm2)	Fc18〜36			Fc18〜24		Fc18〜24					
Steel rebar / Anti-cracking	❶ or ❸			❶ or ❸		❷ or ❸					
Steel rebar / Fireproof rebar	no			D13 ditch	no	D13 ditch		no			
Joining with beam / Shear stud	○	○	○	○	○	○	○	○	○	○	○
Joining with beam / Welding plug	−	○	○	○	○	○	○	○	○	○	○
Joining with beam / Driving rivet	−	○	○	○	○	○	○	○	○	○	○
Slab sectional drawing	B C			A	C D	A		C D			

Note1: ☐ Support beams are steel beams.　　Note 2: Anti-cracking rebar.... ❶ D6-150x150　❷ D6-100x100　❸ D10-200x200

■ Allowable Load

QL99-50
$W = 5,400 \times \left(\dfrac{2.7}{L}\right)^2$ and 9,800N/m2 under

QL99-75
$W = 5,400 \times \left(\dfrac{3.4}{L}\right)^2$ and 9,800N/m2 under

■ Notes · Attachment condition (for QL deck)

1）Span is the distance between the center of the beam supporting the deck plate in the case of the steel beam, and in the case of the reinforced conc beam is the inward beam dimension.

2）When the steel beam has a span of more than 3.4 m, join the compos slab and the beam with a shear stud (diameter 16 mm or more, pitch 300mm or less).

3）In the case of steel beams, use welding, driving studs, or shear stu for joining with beams.

4）Fireproof cover of beams: If fire resistant performance is required for the beam for 1, 2 or 3 hours, fire resistant coating shall be applied according (This certification is not specified)

■ Slab cross section drawing

Simply supported composite slab　※For plate thickness of the deck plate, see the table above

A Necessary fire-proof rebar

Welded rebar mesh (D6-150x150 or D6-100x100)
or deformed bar (over D10, below @200) (full-surface applied)

Concrete thickness
QL deck height

fireproof reinforcement D13
QL deck (coating or anti-rust treatment)

Normal or lightweight concrete
over150mm

QL deck
Welded, driven rivet or shear Stud
fireproof rebar D13
Steel beam
beam center
Span

Normal concrete
over150mm

steel frame beam
beam center
Span

RC Beam or SRC beam

B Unnecessary fire-proof rebar

Welded rebar mesh (D6-150x150 or D6-100x100)
or deformed bar (over D10, below @200) (full-surface applied)

Concrete thickness
QL deck height

QL deck (coating or anti-rust treatment)

steel frame beam
beam center

Nomal Conrete

QL deck※
Welded, driven rivet or shear Stud
Span
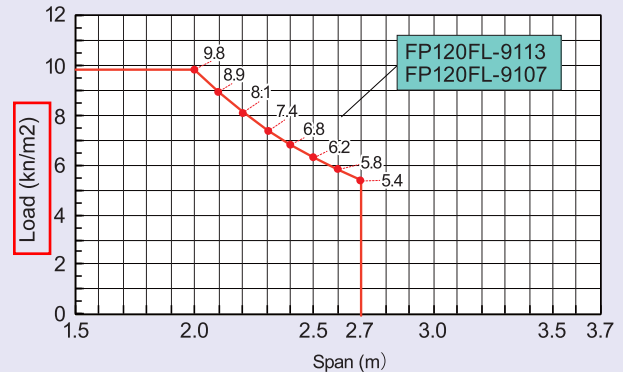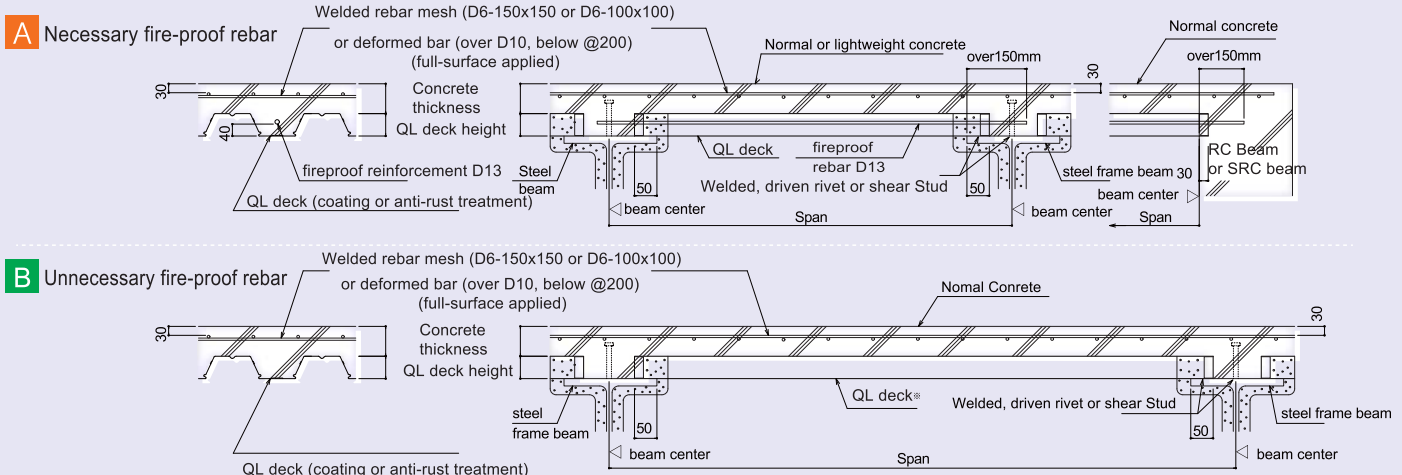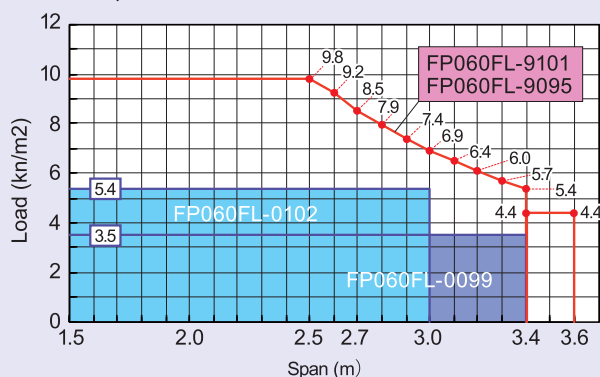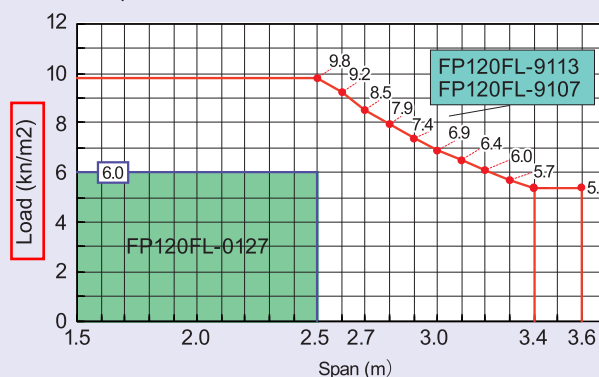beam center

steel frame beam
beam center

2 QL99-75

■ Allowable Load and Span

▌1-hour fireproof structure FP060FL-

▌2-hour fireproof structure FP120FL-

■ Conditions and specifications

※The allowable load is the value obtained by subtracting the floor load (deck plate + concrete + reinforcing bar) from the total load (including finishing load) applied to the floor.

5) Certificated numbers 0099, 0100, 0101, 0102, 0126, 0127 can be used only for steel frame construction.

6) In the case of continuous support composite slabs, the deck plate shall be supported at almost equal intervals (span ratio of about 3: 2) continuously by small beams over 2 spans or more.

7) For permissible span at construction, see pages 14 and 16.

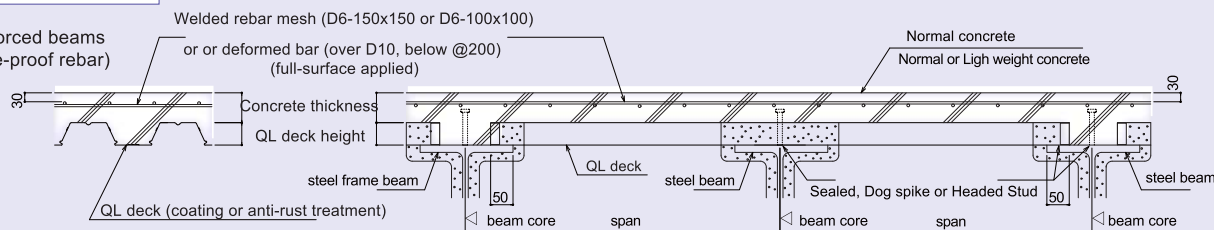| Classification		1-hour fireproof structure FP060FL-				2-hour fireproof structure FP120FL-		
Certified Number	0102	0099	9101	9095		0127	9113	9107
Support conditions	Simple/continuous		Single	continuous		Simple/continuous	Single	continuous
Allowable span L(m)	3.0	3.4	3.4	3.4	3.6	2.5	3.4	3.4	3.6
Allowable stress (kN/m2)	5.4	3.5	5.4×(3.4/L)² and bellow 9.8kN/m²		4.4	6.0	5.4×(3.4/L)² and bellow 9.8kN/m²		5.4
Thickness of deck plate (mm)	1.0,1.2,1.6		1.2,1.6			1.0,1.2,1.6	1.2,1.6		
Concrete — Thickness(mm)	80		80		90	90	90	85	90	85	95	90
Concrete — Type	Normal		Normal	Light	Normal	Light	Normal	Normal	Normal	Light	Normal	Light	Normal	Light
Concrete — Strength(N/mm2)	Fc18〜36		Fc18〜24			Fc18〜36	Fc18〜24		
Steel rebar — Anti-cracking	① or ③		① or ③		② or ③	② or ③		② or ③		③
Steel rebar — Fireproof rebar	NO		Channel D13	NO		NO	Channel D13	NO	
Joining with beam — Shear stud	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Joining with beam — Welding plug	○	–	○	○	○	○	–	○	○	○	○	○	–	–
Joining with beam — Driving rivet	–	–	○	○	○	○	–	–	○	○	○	○	–	–
Slab sectional drawing	B C		A	C D		B C	A	C D	

Note1: □ Support beams are steel beams. Note 2: Anti-cracking rebar.... ① D6-150x150 ② D6-100x100 ③ D10-200x200

Continuously supported composite slab

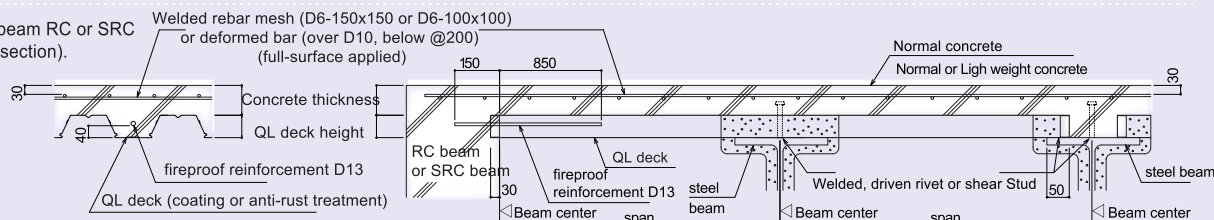※For plate thickness of the deck plate, refer to the table above

C In case reinforced beams (no need fire-proof rebar)

Welded rebar mesh (D6-150x150 or D6-100x100)
or or deformed bar (over D10, below @200) (full-surface applied)

30 / Concrete thickness / QL deck height / steel frame beam / QL deck (coating or anti-rust treatment)

Normal concrete / Normal or Ligh weight concrete / 30

QL deck / steel beam / Sealed, Dog spike or Headed Stud / 50 / steel beam

◁ beam core / span / ◁ beam core / span / ◁ beam core

50

D In cases, the beam RC or SRC (need a head section).

Welded rebar mesh (D6-150x150 or D6-100x100) or deformed bar (over D10, below @200) (full-surface applied)

30 / 40 / Concrete thickness / QL deck height / fireproof reinforcement D13 / QL deck (coating or anti-rust treatment)

150 / 850

RC beam or SRC beam / 30 / QL deck / fireproof reinforcement D13 / steel beam

Normal concrete / Normal or Ligh weight concrete / 30

QL deck / Welded, driven rivet or shear Stud / 50 / steel beam

◁Beam center / span / ◁Beam center / span / ◁ Beam center

Design Data

1 QL99-50

■ Composite slab sectional performance table

- Young's modulus ratio n=15
- Per 1m width

Product name	QL99-50-10					QL99-50-12					QL99-50-16				
Thickness of Concrete (mm)	60	70	80	90	100	60	70	80	90	100	60	70	80	90	100
cIn ($\times 10^4$ mm^4)	6,850	8,660	10,700	13,100	15,700	7,740	9,810	12,200	14,900	17,900	9,260	11,700	14,600	17,900	21,500
cZc ($\times 10^3$ mm^3)	1,670	1,960	2,280	2,620	2,990	1,770	2,080	2,420	2,790	3,170	1,930	2,270	2,640	3,040	3,460
cZt ($\times 10^3$ mm^3)	66.2	76.1	86.4	97.0	108	77.9	89.7	102	114	127	99.5	115	131	147	164
cSn ($\times 10^3$ mm^3)	842	974	1,110	1,250	1,380	956	1,110	1,260	1,420	1,590	1,150	1,340	1,530	1,730	1,940
eI ($\times 10^4$ mm^4)	10,100	13,100	16,600	20,800	25,600	10,700	13,800	17,500	21,800	26,800	11,700	15,100	19,100	23,700	29,000
eZt ($\times 10^3$ mm^3)	1,950	2,310	2,690	3,110	3,570	2,010	2,370	2,770	3,200	3,670	2,120	2,500	2,910	3,360	3,840
cXn (cm)	4.10	4.41	4.71	4.99	5.26	4.37	4.71	5.03	5.34	5.63	4.79	5.17	5.54	5.89	6.22
eXn (cm)	5.20	5.69	6.18	6.68	7.17	5.32	5.82	6.32	6.82	7.31	5.53	6.04	6.55	7.06	7.57

Code	Details	Unit	Code	Details	Unit
cIn	Moment of inertia of effective cross section about neutral axis of composite slab , it is seriously concrete convert (convert concrete).	x10^4 mm^4	eI	Moment of inertia of cross section about the neutral axis of the composite slab is effective full cross section convert concrete).	x10^4 mm^4
cXn	Distance from compressed edge of composite slab's effective cross section to neutral axis.	cm	eXn	Distance from the firt of composite slab's effective full cross section to the neutral axis.	cm
cZc	Coefficient of compressive cross section of effective cross section.	x10^3 mm^3	eZt	Coefficient of cross-section edge on composite slab's effective full cross section.	x10^3 mm^3
cZt	Coefficient of Stretch cross section of effective cross section.	x10^3 mm^3	cSn	Primary Moment of inertia of effective cross-section about the neutral axis.	x10^3 mm^3

■ Method to calculate the weight

Weight of composite slab

The weight of composite slab should be calculated according to the actual condition by the following formula which adds the weight of the crack prevention reinforcement to the value of Table A. Refer to Table B for the weight of the anti-cracking rebar and fireproof rebar.

Simple Support: Weight (N/m2) = [the value of Table A] + [Weight of anti- cracking rebar]+ ([Weight of fireproof rebar])

Continuous support: Weight (N/m2)=[the value of Table A]+ [Weight of anti-cracking rebar]

A. QL Deck + Concrete weight   (Unit:N/m^2)

Name of product	QL99-50-10					QL99-50-12					QL99-50-16				
Type \ Thickness of concretes(mm)	60	70	80	90	100	60	70	80	90	100	60	70	80	90	100
Light-weight type 1	1,689	1,879	2,069	2,259	2,449	1,709	1,899	2,089	2,279	2,469	1,751	1,941	2,131	2,321	2,511
Light-weight type 2	1,523	1,693	1,863	2,033	2,203	1,543	1,713	1,883	2,053	2,223	1,585	1,755	1,925	2,095	2,265
Normal	2,022	2,252	2,482	2,712	2,942	2,042	2,272	2,502	2,732	2,962	2,084	2,314	2,544	2,774	3,004

Concrete unit weight: Light-weight concrete 1 [γ=19 kN/m3], light-weight concrete 2 [γ =17 kN/m3], Normal-weight concrete [γ =23 kN/m3].
Deck surface treatment: Z12

B. Weight of anti-cracking rebar   (Unit:N/m^2)

Rebar Diameter- Spacing		Weight per m2
Anti- craking rebar	D6-150×150	29.1
	D6-100×100	43.6
	D10-@200	55.0
	D10-@150	73.3
Fireproof Tendon	D13-@300	32.6

Weight calculation example

Deckplate QL99-50-12, Normal concrete S =80mm, using anti- craking rebar D6-150X150

In case of continuous support
W_{DL} = 2,502 + 29.1 = 2,531.1   → 2,540N/m^2

Incase using fireproof rebar with simply support
W_{DL} = 2,502 + 29.1 + 32.6 = 2,563.7 → 2,570N/m^2

■ Table of allowed weight (N/m2)

Maximum range with unnecessary supports during construction

| Simple | 2 continuous | 3 continuous |

Note 1) Normal concrete (Fc = 18 N/mm2) is used for the table, load is calculated as 1470 N / m 2.
Note 2) As far as the numerical value is not stated, an intermediate support is required at the time of construction. Please contact our company for the numerical value of that range.
Note 3) The maximum span is limited to 32 times or less of the total thickness of the slab (deck height + concrete thickness) in consideration of floor vibration.
Note 4) Numerical values in the table are values obtained by subtracting the weight of composite slab from the total load applied to the floor (including the finishing load of ceiling, floor, etc.)
Note 5) Weight of composite slab is weight of deck plate and concrete, weight of anti-cracking rebar (assuming D10-200 × 200) weight is taken into consideration.

QL99-50-10

Concrete thickness	Span (mm)															
	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3
60	12,020	11,380	10,820	10,300	9,830	9,400	9,010	8,650	8,320	7,850	7,150	6,530	5,960	5,450	4,990	
70	13,130	12,440	11,820	11,260	10,750	10,280	9,850	9,460	9,090	8,750	8,300	7,580	6,930	6,340		
80	14,240	13,490	12,820	12,210	11,650	11,140	10,680	10,250	9,860	9,490	9,150	8,690	7,960			
90	15,480	14,670	13,930	13,270	12,670	12,120	11,610	11,150	10,720	10,320	9,950	9,610				
100	16,810	15,920	15,130	14,410	13,750	13,150	12,600	12,100	11,630	11,200	10,800					

QL99-50-12

Concrete thickness	Span (mm)															
	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3
60	14,300	13,550	12,870	12,260	11,700	11,190	10,720	10,150	9,380	8,700	8,090	7,540	7,040	6,600	6,190	5,700
70	15,610	14,790	14,050	13,380	12,770	12,210	11,710	11,240	10,800	10,300	9,580	8,930	8,340	7,810	7,240	6,670
80	17,100	16,200	15,390	14,660	13,990	13,380	12,820	12,310	11,840	11,400	10,990	10,390	9,710	9,040	8,330	
90	18,530	17,560	16,680	15,880	15,160	14,500	13,900	13,340	12,830	12,350	11,910	11,500	11,050	10,170		
100	19,880	18,840	17,900	17,040	16,270	15,560	14,910	14,320	13,760	13,250	12,780	12,340	11,930			

QL99-50-16

Concrete thickness	Span (mm)															
	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3
60	18,960	17,960	16,720	15,170	13,820	12,640	11,610	10,700	9,890	9,170	8,530	7,950	7,430	6,960	6,530	6,140
70	20,560	19,480	18,510	17,620	16,300	14,910	13,700	12,620	11,670	10,820	10,060	9,380	8,760	8,210	7,700	7,240
80	22,470	21,290	20,230	19,260	18,390	17,360	15,940	14,690	13,580	12,600	11,710	10,920	10,200	9,550	8,970	8,430
90	24,370	23,080	21,930	20,890	19,940	19,070	18,270	16,960	15,680	14,540	13,520	12,610	11,780	11,030	10,350	9,730
100	26,100	24,730	23,490	22,370	21,350	20,430	19,570	18,790	17,930	16,620	15,460	14,410	13,460	12,610	11,830	11,130

■ Table of allowed span at construction

If span exceed value in the table below, need a support. Unit (m)

Thickness of Concrete	60			70			80			90			100		
Thickness of plate (mm)	1.0	1.2	1.6	1.0	1.2	1.6	1.0	1.2	1.6	1.0	1.2	1.6	1.0	1.2	1.6
Single (inner size)	2.38	2.52	2.75	2.33	2.47	2.69	2.29	2.42	2.64	2.24	2.38	2.59	2.21	2.33	2.55
2 continuous	3.20	3.39	3.67	3.10	3.32	3.62	3.01	3.26	3.55	2.93	3.18	3.49	2.85	3.09	3.43
3 continuous	2.95	3.13	3.41	2.89	3.06	3.34	2.84	3.00	3.28	2.78	2.95	3.22	2.74	2.89	3.16

QL DECK Deckplate for composite slab structure

JF DECK Deck for formwork

R DECK Deck for reinforcement

QL Roof Deckplate fireproof for 30 minutes

Design Data

2 QL99-75

■ Feature table of cross section, plate composit

Name of products	QL99-75-10					QL99-75-12					QL99-75-16				
Thickness of Concrete	60	70	80	90	100	60	70	80	90	100	60	70	80	90	100
cIn (×10^4 mm^4)	10,900	13,200	15,800	18,700	21,800	12,400	15,000	18,000	21,300	24,900	15,100	18,200	21,800	25,800	30,300
cZc (×10^3 mm^3)	2,360	2,670	3,020	3,390	3,780	2,510	2,850	3,220	3,610	4,030	2,780	3,140	3,540	3,970	4,430
cZt (×10^3 mm^3)	82.0	92.0	102	113	124	96.6	108	121	134	147	125	140	156	172	190
cSn (×10^3 mm^3)	1,070	1,220	1,360	1,510	1,670	1,220	1,390	1,560	1,730	1,910	1,470	1,680	1,900	2,120	2,340
eI (×10^4 mm^4)	17,900	22,100	26,800	32,200	38,400	18,900	23,100	28,100	33,700	40,100	20,600	25,200	30,500	36,500	43,400
eZt (×10^3 mm^3)	2,910	3,320	3,760	4,240	4,750	2,990	3,410	3,870	4,350	4,870	3,160	3,590	4,060	4,560	5,090
cXn (cm)	4.63	4.93	5.22	5.50	5.77	4.94	5.27	5.59	5.89	6.18	5.43	5.80	6.16	6.51	6.84
eXn (cm)	6.18	6.65	7.12	7.60	8.09	6.30	6.78	7.26	7.75	8.24	6.53	7.02	7.52	8.01	8.51

Code	Detail	Unit	Code	Detail	Unit
cIn	Secondary Monen effective cross section around Neutral axis of plate composit , it is seriously concrete convert (concrete convert)	x10^4 mm^4	eI	The secondary Monen cross section around the neutral axis of the plate composite is effective full cross section (convert concrete).	x10^4 mm^4
cXn	Distance from compressed edge plate composite effective cross section to neutral axis	cm	eXn	Distance from the firt of plate composit effective full cross section to the neutral axis	cm
cZc	Coefficient of compressioned cross section of effective cross section	x10^3 mm^3	eZt	Coefficient of cross-section edge on plate composite efective full cross section	x10^3 mm^3
cZt	Coefficient of Stretch cross section of effective cross section	x10^3 mm^3	cSn	Primary Momen effective cross-section around the neutral axis of the effective cross-section	x10^3 mm^3

■ Method to calculate the weight

Plate composit weight

Calculate the plate composite weight according to the bellow formula after adding the weight of the fireproof , anti- craking rebar into the value of table A following actual situation. The weight of anti- craking rebar and fireproof rebar please refer to the bellow table.

Simple support: Weight (N/m2) = [the value of Table A] + [Weight of anti- craking rebar]+ ([Weight of fireproof rebar])

Continuous support: Weight (N/m2)=[the value of Table A]+ [Weight of anti-craking rebar]

A. QL Deck + Concrete weight

(Unit:N/m^2)

Name of prodcut	QL99-75-10					QL99-75-12					QL99-75-16				
Type \ Thickness of concrete s(mm)	60	70	80	90	100	60	70	80	90	100	60	70	80	90	100
Light-weight type 1	1,945	2,135	2,325	2,515	2,705	1,967	2,157	2,347	2,537	2,727	2,012	2,202	2,392	2,582	2,772
Light-weight type 2	1,753	1,923	2,093	2,263	2,433	1,775	1,945	2,115	2,285	2,455	1,820	2,990	2,160	2,330	2,500
Normal	2,330	2,560	2,790	3,020	3,250	2,352	2,582	2,812	3,042	3,272	2,397	2,627	2,857	3,087	3,317

Concrete unit weight: Light-weight concrete 1 [γ=19 kN/m3], light-weight concrete 2 [γ =17 kN/m3], Normal-weight concrete [γ =23 kN/m3].
Deck surface treatment: Z12

B. Anti- craking rebar weight

(Unit:N/m^2)

Rebar Diameter- Spacing		Weight per m2
Anti- craking rebar	D6-150×150	29.1
	D6-100×100	43.6
	D10-@200	55.0
	D10-@150	73.3
Fireproof rebar	D13-@300	32.6

Weight calculation example

Deck plate QL99-50-12, Normal concrete S =80mm, using anti- cracking rebar D6-150X150
 In case of continuous support
W_{DL} = 2,812 + 29.1 = 2,841.1   → 2,850N/m^2
Incase using fireproof rebar with simply support
W_{DL} = 2,812 + 29.1 + 32.6 = 2,873.7 → 2,880N/m^2

Maximum range with unnecessary supports during construction

■ Table of allowed weight (N/m2)

| Simple | 2 continuous | 3 continuous |

Note 1) Normal concrete (Fc = 18 N/mm2) is used for the table, load is calculated as 1470 N / m 2.

Note 2) As far as the numerical value is not stated, an intermediate support is required at the time of construction. Please contact our company for the numerical value of that range.

Note 3) The maximum span is limited to 32 times or less of the total thickness of the slab (deck height + concrete thickness) in consideration of floor vibration.

Note 4) Numerical values in the table are values obtained by subtracting the weight of composite slab from the total load applied to the floor (including the finishing load of ceiling, floor, etc.)

Note 5) Weight of composite slab is weight of deck plate and concrete, weight of anti-cracking rebar (assuming D10-200 × 200) weight is taken into consideration.

QL99-75-10

Thickness of concrete \ Span (m)	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0
60	10,830	10,420	9,910	9,040	8,270	7,570	6,940	6,360	5,840	5,360	4,930	4,530				
70	11,510	11,060	10,650	10,210	9,340	8,560	7,850	7,200	6,620	6,080	5,590					
80	12,360	11,880	11,440	11,030	10,410	9,540	8,750	8,040	7,390	6,800	6,250					
90	13,170	12,660	12,200	11,760	11,350	10,650	9,780	8,980	8,260	7,610						
100	13,880	13,350	12,860	12,400	11,970	11,570	10,800	9,930	9,140	8,420						

QL99-75-12

Thickness of concrete \ Span (m)	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0
60	12,920	12,430	11,970	11,030	10,110	9,290	8,550	7,870	7,250	6,720	6,210	5,730	5,300	4,900	4,530	
70	13,720	13,190	12,700	12,250	11,370	10,450	9,610	8,860	8,200	7,570	6,990	6,470	5,980	5,530		
80	14,670	14,110	13,580	13,100	12,650	11,790	10,860	10,040	9,270	8,570	7,920	7,330	6,790			
90	15,660	15,050	14,500	13,980	13,500	13,500	12,110	11,200	10,350	9,570	8,850	8,200				
100	16,580	15,940	15,350	14,800	14,290	13,810	13,370	12,360	11,420	10,570	9,780	9,070				

QL99-75-16

Thickness of concrete \ Span (m)	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0
60	15,950	14,750	13,680	12,720	11,860	11,080	10,370	9,740	9,150	8,620	8,140	7,690	7,280	6,780	6,310	5,880
70	18,130	16,760	15,540	14,450	13,470	12,590	11,790	11,060	10,400	9,800	9,250	8,740	8,270	7,740	7,210	6,730
80	19,450	18,710	17,570	16,340	15,230	14,230	13,330	12,510	11,760	11,080	10,460	9,880	9,360	8,840	8,250	7,700
90	20,640	19,840	19,110	18,350	17,110	15,990	14,970	14,050	13,210	12,450	11,750	11,100	10,510	9,870	9,210	8,600
100	21,960	21,110	20,330	19,600	18,930	17,850	16,710	15,690	14,750	13,890	13,110	12,390	11,730	11,000	10,270	9,600

■ Table of allowed span at construction

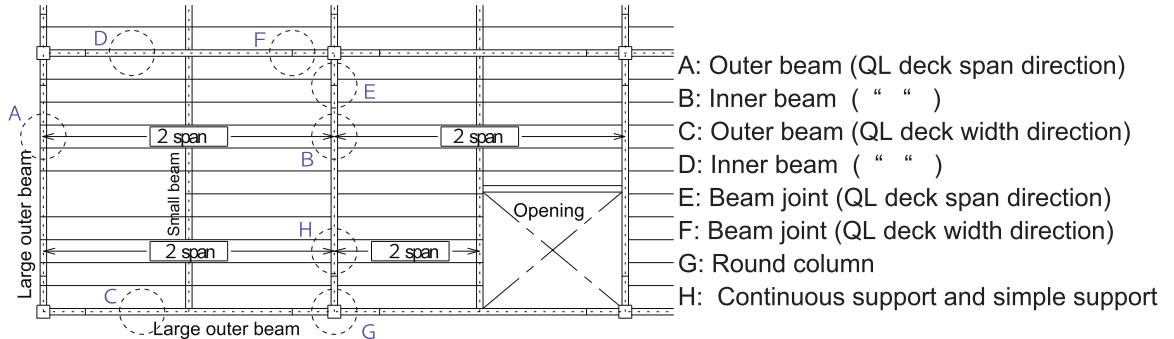If span exceed value in the table below, need a support. Unit (m)

Thick ness of concrete (mm)	60			70			80			90			100		
Thickness of plate (mm)	1.0	1.2	1.6	1.0	1.2	1.6	1.0	1.2	1.6	1.0	1.2	1.6	1.0	1.2	1.6
Support conditions — Single (inner size)	3.13	3.31	3.62	3.07	3.25	3.55	3.02	3.19	3.49	2.96	3.13	3.43	2.92	3.08	3.38
2 continuous	3.57	3.91	4.31	3.46	3.80	4.25	3.37	3.70	4.19	3.28	3.60	4.14	3.20	3.52	4.09
3 continuous	3.64	3.79	4.06	3.58	3.74	4.00	3.52	3.69	3.95	3.46	3.64	3.90	3.40	3.60	3.85

QL DECK Deckplate for composite slab structure

JF DECK Deck for formwork

R DECK Deck for reinforcement
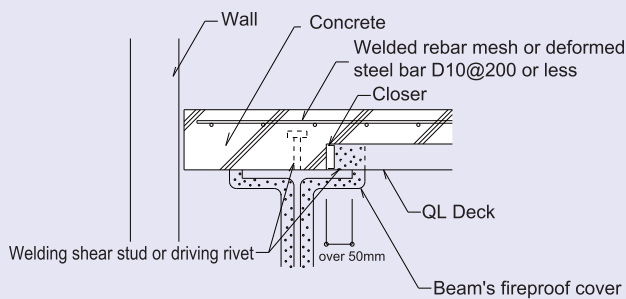
QL Roof Deckplate fireproof for 30 minutes

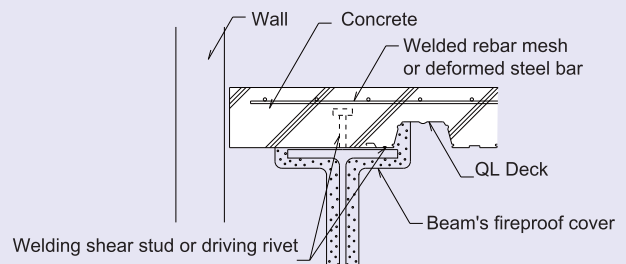## Standard Fit

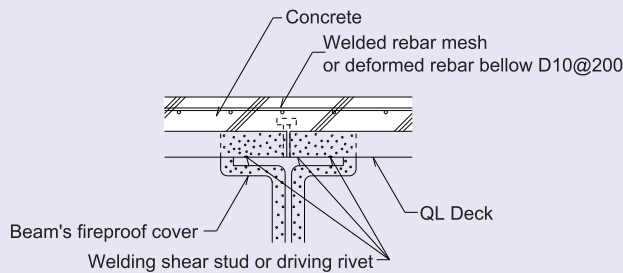### 1 Structure S (Steel structure)

Support beam : Fixed steel beam

D
F
E
A
2 span
2 span
B
Large outer beam
Small beam
H
2 span
2 span
Opening
C
Large outer beam
G

A: Outer beam (QL deck span direction)
B: Inner beam (" ")
C: Outer beam (QL deck width direction)
D: Inner beam (" ")
E: Beam joint (QL deck span direction)
F: Beam joint (QL deck width direction)
G: Round column
H: Continuous support and simple support

PART A Beam: steel outer beam
QL deck span direction

Wall
Concrete
Welded rebar mesh or deformed
steel bar D10@200 or less
Closer
QL Deck
Welding shear stud or driving rivet
over 50mm
Beam's fireproof cover

PART C Beam: steel outer beam
QL deck width direction

Wall
Concrete
Welded rebar mesh
or deformed steel bar
QL Deck
Welding shear stud or driving rivet
Beam's fireproof cover

PART B Deck plate in span direction
When QL deck is matched

Concrete
Welded rebar mesh
or deformed rebar bellow D10@200
QL Deck
Beam's fireproof cover
Welding shear stud or driving rivet

Continuous QL deck

Welded rebar mesh
or deformed rebar
Door for fireproof cover
QL Deck
Fireproof cover
Welding shear stud or driving rivet
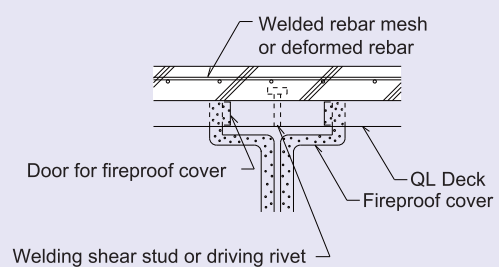
PART D Deck plate in width direction

Welding or drill screw
under Φ4-13 bellow @600
Welded rebar mesh or deformed rebar
Concrete
QL Deck
Fireproof cover
Bellow   over
200mm   50mm
Welding shear stud or driving rivet

PART E Fitting of beam joint
QL deck span direction

Closer
Welded rebar mesh or deformation rebar bellow D10 @ 200
Welding or driving rivet
Concrete
Welding or driving rivet
QL Deck
QL deck receiving material
FB65 × 6 etc.
(In case of APW, FB65x9 etc.)
Fireproof cover
※
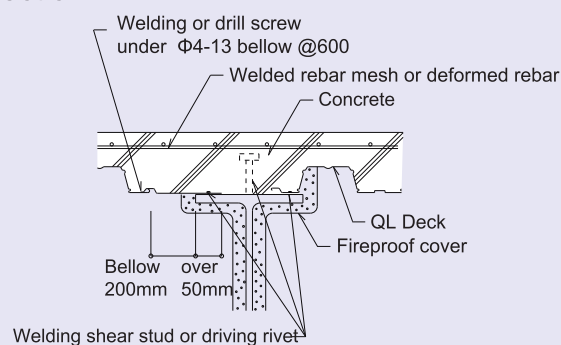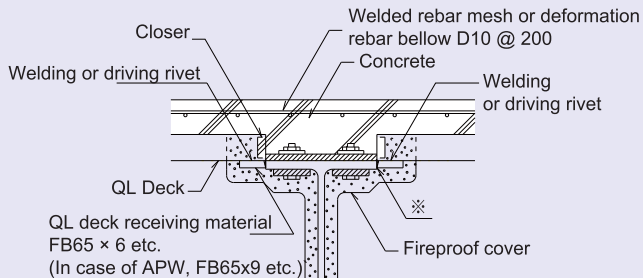
※ Welding method etc. need to be studied separately
(see Synthetic Slab Industry Association Q & A)
APW: Automatic welding

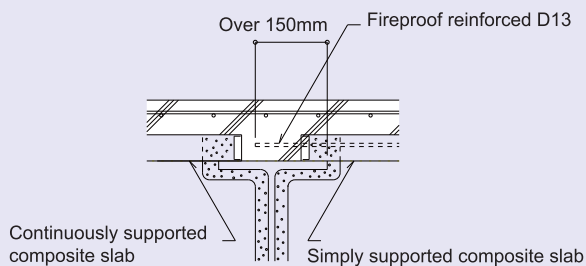**PART F** Fitting of beam joint
QL deck width direction
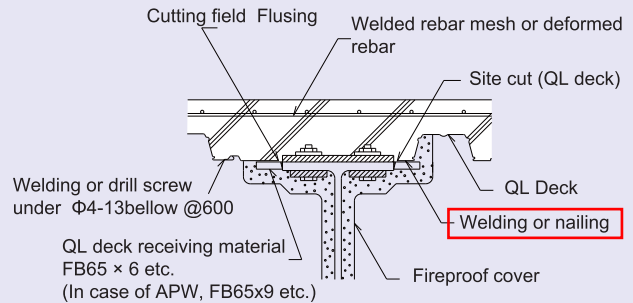
Cutting field Flusing
Welded rebar mesh or deformed rebar
Site cut (QL deck)
QL Deck
Welding or drill screw
under Φ4-13bellow @600
Welding or nailing
QL deck receiving material
FB65 × 6 etc.
(In case of APW, FB65x9 etc.)
Fireproof cover
APW: Automatic welding

PART G Fix around collumn

Welding shear stud or driving rivet
Beam
column
a
a
QL deck
Cutting mistake QL, block collum

Cross section a-a
Welded rebar mesh or deformation rebar
concrete
QL Deck material
Collumn
QL Deck
Fireproof cover
※
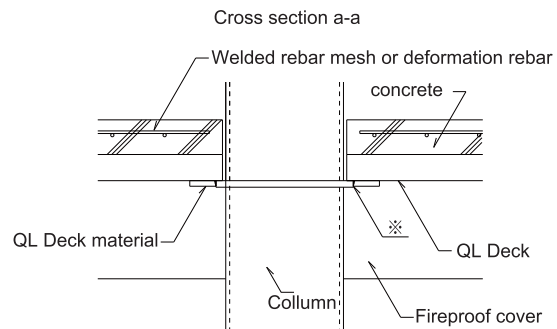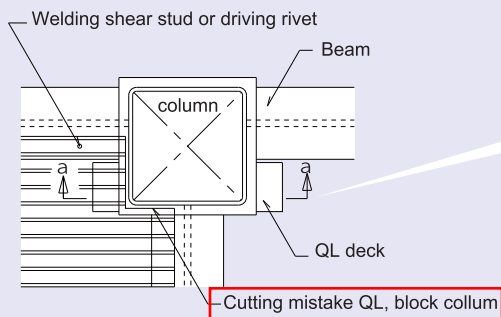
PART H Fix simple and continuous supports

Over 150mm
Fireproof reinforced D13

Continuously supported
composite slab
Simply supported composite slab

Filling of welded rebar mesh or deformed rebar

Deformation rebar bellow D10
@200, Size of overlap is over 45d
Overlap dimension (dimension between
horizontal stripes of welded rebar gauze)
Over 150 (Φ6-100x100)
over 200 (Φ6-150x150)

Welded mesh
or deformation rebar
bellow D10@200
concrete
30
Transverse rebar
QL Deck
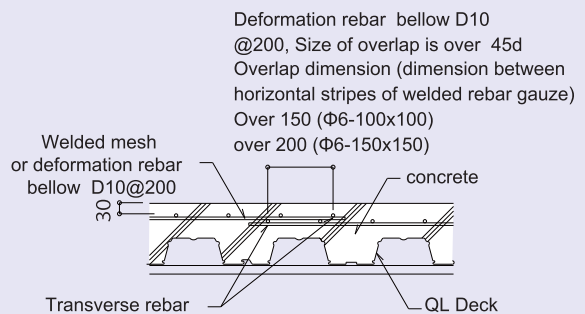
Items not mentioned are based on JASS 5 Reinforced Concrete Construction

Fireproof reinforcement

In case of simple supported composite slab (FP060FL-9101, FP120FL-9113)

Welded rebar mesh or deformation rebar
concrete
30
Spacer bellow @ 1.0m
40
Reinforced fireproof D13

Over 150mm
Fireproof cover
over 50mm
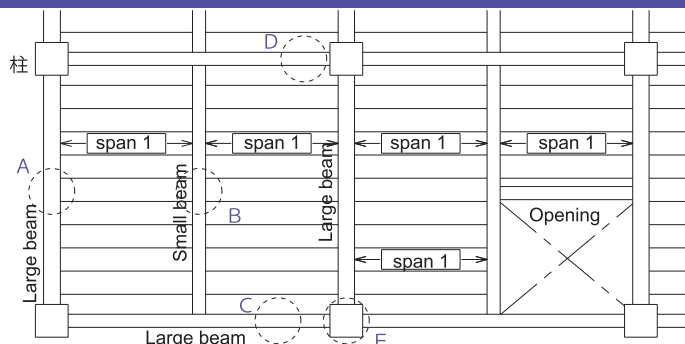Welding shear stud
or driving rivet
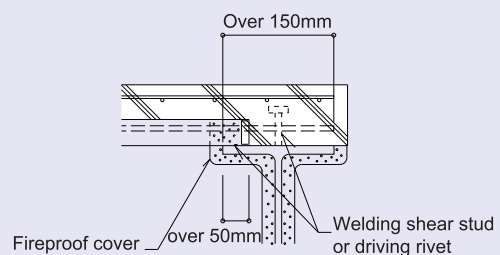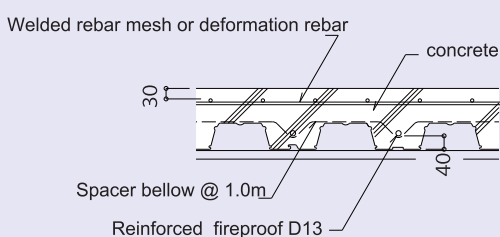
Note) When fireproof reinforcement can not be 150 mm on
the beam, Be sure to bend to L shape and secure 150 mm or more.
Item recorded follow JASS 5 construction of reinforced concrete

QL DECK Deckplate
for composite slab structure

JF DECK Deck
for formwork

R DECK Deck
for reinforcement

QL Roof Deckplate
fireproof for 30 minutes

18

Standard Fit

2 RC Structure (Reinforced Concrete) and SRC Structure (Steel Reinforced Concrete)

Shelf beam: Fix standard reinforced concrete and reinforced concrete beams

柱

D

span 1   span 1   span 1   span 1

A

Large beam

Small beam

B

Large beam

span 1

Opening

C

E

Large beam

A: Outer beam (QL deck span direction)
B: Inner beam (" ")
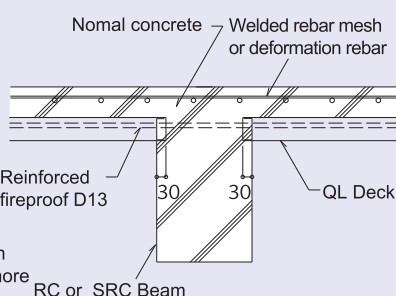C: Outer beam (QL deck width direction)
D:Inner beam (" ")
E: round column

PART A | Outside building QL deck span direction | RC / SRC

Nomal concrete
Welded rebar mesh or Deformation rebar
QL Deck Bending on beam 30mm
30
over 150mm
ReinfoFireproof rebar D13 QL deck fixing to each beam 1 groove each 150 mm or more
RC or SRC beam
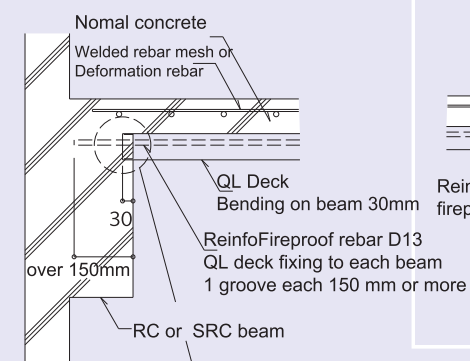
PART B | Building inner girder beam QL deck span direction | RC / SRC

Nomal concrete   Welded rebar mesh or deformation rebar
Reinforced fireproof D13
30   30   QL Deck
RC or SRC Beam

PART C | Outside building QL deck width direction | RC / SRC

Weld meat or screw Φ4-13 bellow @600
30
40mm
Reinforced fireproof D13 QL deck each groove   Flushing   over 10mm
RC or SRC Beam

---

nail
30

Closer
nail
30
QL Deck
Beam frame
Closer
nail
Closer
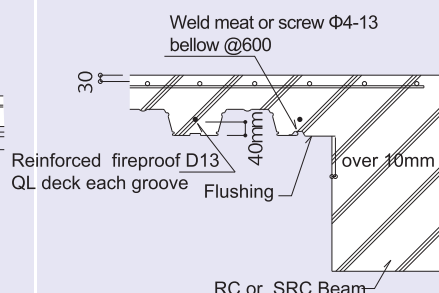
PART D | Building interior girder beam QL deck width direction | RC / SRC

Weld or screw Φ4-13 bellow@600
10   10   Flushing
RC or SRC beam
Fireproof rebar D13 QL deck each groove

PART E | Round column

beam width   Fix in 30mm
Fireproof rebar (QL Deck ditch 1)
a   a
Cutting QL Deck, do not fix in the column
Over 10mm   QL Deck
beam width
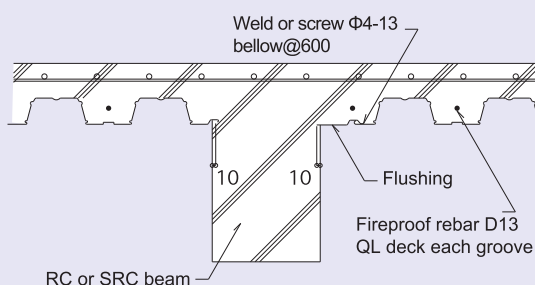
Round column, fitting at construction | RC / SRC

Cutting QL Deck, do not fix in the column
Weld or screw Φ4-13 bellow @600
QL Deck
wooden concrete block
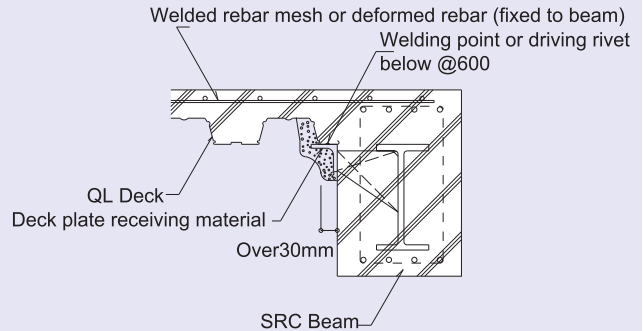Flushing
Column frame
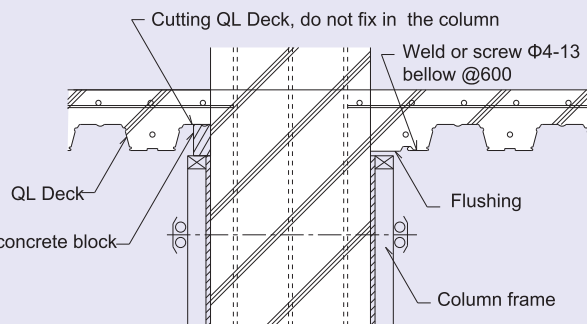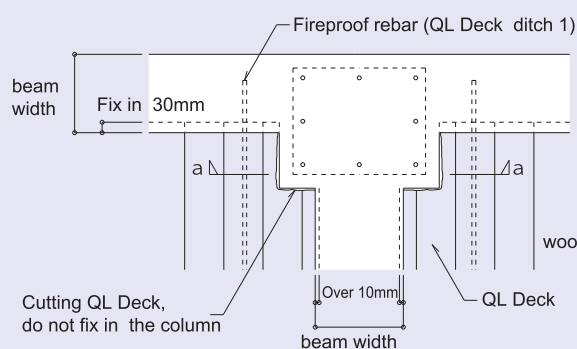
PART A Beam: Steel Reinforced concrete beam, bracket support SRC
QL deck span direction (QL deck continuous support)

Welded rebar mesh or deformed rebar (fixed to beam)

Welding point or driving rivet below @600

QL Deck

Fireproof cover

50

Deck plate receiving material
(Channel steel, angle steel, etc.)

SRC Beam
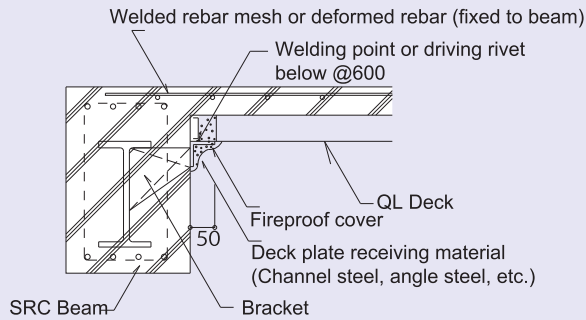
Bracket

PART C Beam: steel frame reinforced concrete beam, bracket SRC
support. QL deck width direction

Welded rebar mesh or deformed rebar (fixed to beam)

Welding point or driving rivet below @600

QL Deck

Deck plate receiving material

Over30mm

SRC Beam

3 Features

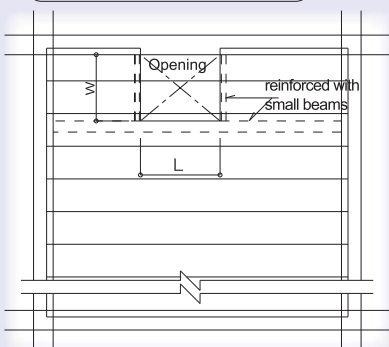### ■ Proposed opening reinforcement

A）Opening interval ≧ 3 × opening diameter
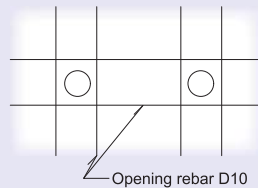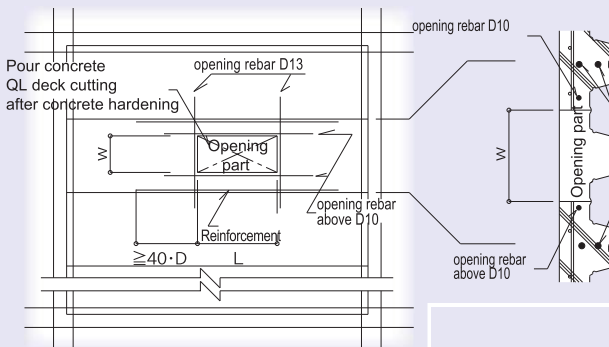
B）Opening interval < 3 × opening diameter
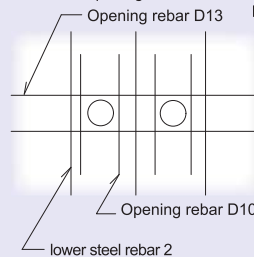
C) When the openings are continuous opening spaces
It is regarded as an opening group (virtual opening), and
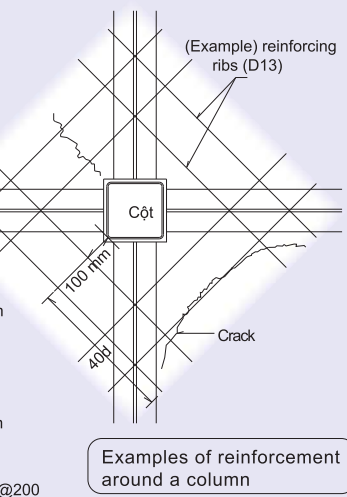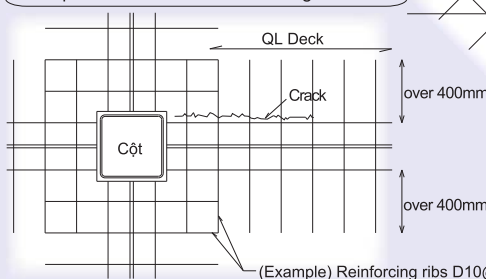Depending on the size, reinforce according to 2) or 3)

1）Opening Φ150

Opening rebar D10

Opening rebar D13

Opening rebar D10

lower steel rebar 2

Assuming opening

L

W

2） W: Bellow 600mm
L: Bellow level 900mm

opening rebar D10

Pour concrete
QL deck cutting
after concrete hardening

opening rebar D13

Opening part

W

opening rebar above D10

Reinforcement

≧40・D   L

W

Opening part

opening rebar above D10

$at=M/(txj)$ fireproof rebar
M: Increasing bending moment of adjacent slab caused by opening

When fireproof reinforcement is cut, take the larger of ad or at
Fireproof rebar $a=1.27x(1+n/2)$cm (simple support)
Fireproof rebar $a=M/(ftxj)$cm²
n: Required for fireproof specification of FP060FL-9101, FP120FL-9113
D13 Number of cut fireproof rebar when fireproof rebar is cut

3）If W>600 Must be reinforced
with small beams

Opening

reinforced with small beams

W

L

■ Proposed reinforcement for anti-cracking

Example of reinforcement on large beams

QL Deck

Crack

Cột

over 400mm

over 400mm

(Example) Reinforcing ribs D10@200

(Example) reinforcing ribs (D13)

Cột

100 mm

40d

Crack

Examples of reinforcement around a column

Packing

1 Packing and shipping

2 Marking

Maximum
30 Plate

Packing standard

9,400
3,000 within
9,000 within
2,300
3,300

Example of transportation load (in case of 10 ton truck)
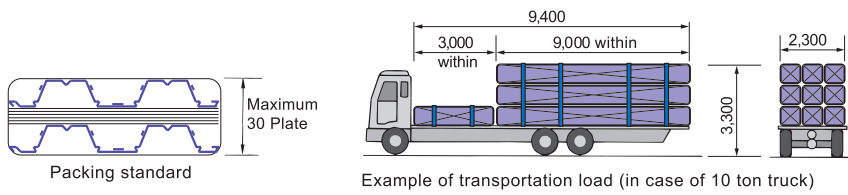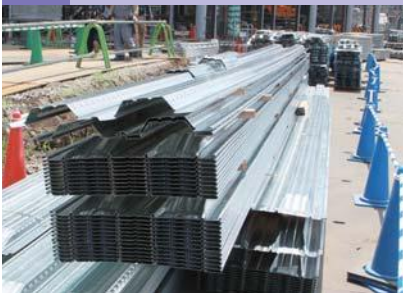
Label pasted for each packing

Construction work

1 Attach using materials
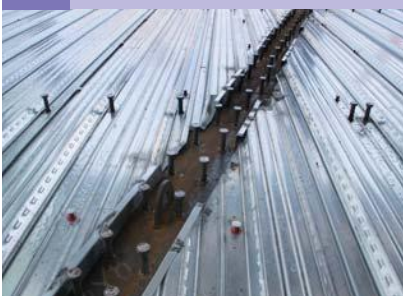Unloading (temporary
placement / lifting)

2 QL Deck installation
(Temporary fixing / mating)
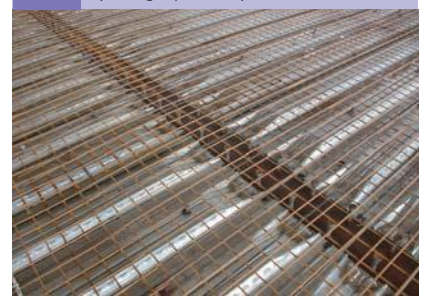

3 Joining of QL Deck ⬚ Inspection
and beam

4 Small block
Example of use of L type closer

5 Concrete stopper

6 Install and rearrange
welded rebar mesh ⬚ Inspection
(using spacers)

7 Concrete pouring

8 Wait for curing

9 Finished

Accessories

The shape etc. of the deck plate accessory may be changed.

※ Closer (refer to the part A P.1 7)
Closer
(See page 17)
for preventing outflow concrete
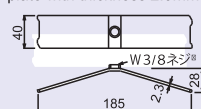It's a small cover

Small cover

NCS50S

NCS75S

※ Hanger bracket
After pouring concrete,
use the underside of the QL Deck,
a revolutionary accessory used to
insert attachable ceiling

■ Specifications
Metal hook isgalvanized
plate with thickness 2.3mm

40
W 3/8 ネジ※
185
2. 3
28

■ Attchment method

■ Load deformation relationship

P(N) P(kg)
6000 — 600
5000 — 500   Pmax＝5300N（540kg）
4000 — 400   Designed with endurance
3000 — 300   (straight)(Safety rate ν = 4)
2000 — 200
1000 — 100 1320N（135kg）
0   δ（mm）
0   1   2 Deformation
Load

Wit (inch) screw "W3 / 8" is approximately 9.5 mm
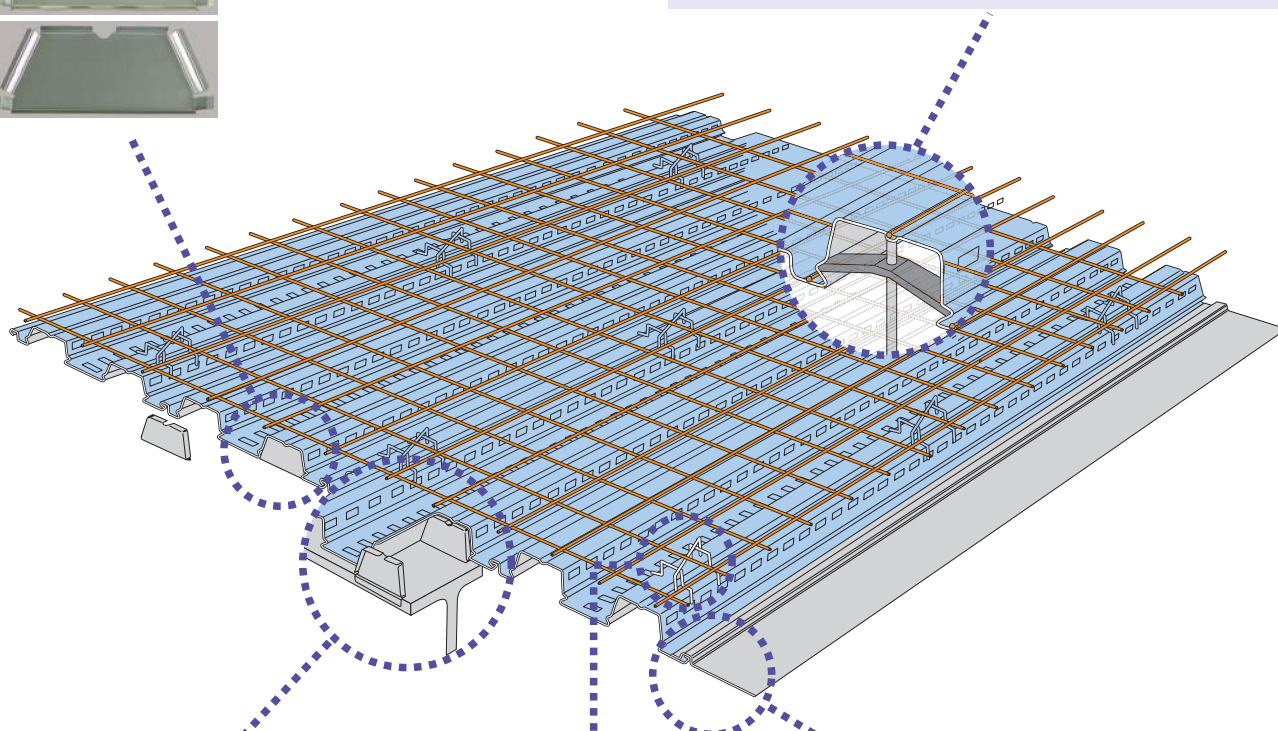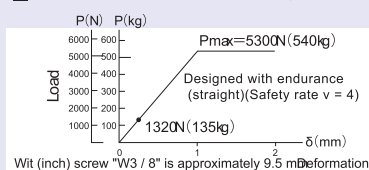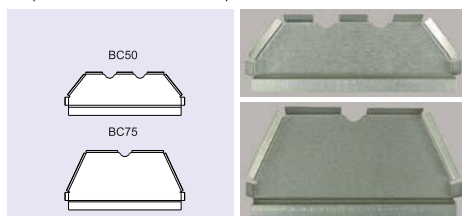
Be sure to screw the hanger
bolt until it is pressed against
the deck plate surface, and fix
it with 3 points of the metal
fitting and the bolt.

※ Closer used for beam
(refer to part right of figure B P.17ES)

Surface door used for fireproof beam
(Closer usued for beam)

BC50

BC75
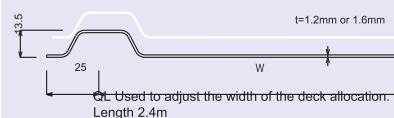
※ L type closer
It is a small entrance at the time of site diagonal cutting.
(Please do not block the the channel)

CS50
29
52
t=1.2
Length 2.4m

CS75
29
77
t=1.2
CS50,CS75 Length 2.4m

※ Flushing
QL Used to adjust the width
of the deck allocation.

※ Specifications
〈t=1.2mm〉   〈t=1.6mm〉
FS0（w＝250）   FS0A（w＝250）
FS1（w＝200）   FS1A（w＝200）
FS2（w＝150）   FS2A（w＝150）
FS3（w＝100）   FS3A（w＝100）

43.5
25   W
t=1.2mm or 1.6mm
QL Used to adjust the width of the deck allocation.
Length 2.4m

※ Spacer Please contact accessories manufacturer

For securing the height of the welded rebar mesh.
Just placing it on the deck plate's surface to prevent
settlement of the welded rebar mesh and ensure concrete
fogging

※Attachment method
After installing to the proper position and
installing welded rebar mesh or laying welded
rebar mesh, insert from the mesh and install
(please contact the accessory maker separately).

鉄線結束

QL DECK Deckplate for composite slab structure

JF DECK Deck for formwork

R DECK Deck for reinforcement

QL Roof Deckplate fireproof for 30 minutes