EPG65

HIGH STRENGTH EPOXY INJECTION SYSTEM

FEATURES

- High load capacity for wide range of base material.
- Suitable for close edge and close anchor spacing.
- Suitable for cored and oversized holes.
- Low shrinkage and low chemical wastages.
- Extended working time ideally for tropical climate.
- Ideal for damp hole application.

APPLICATIONS

- Post-installed rebar connections.
- Shear connector applications.
- Strutting and wall barriers extensions.
- Structural steel-to-concrete connections.
- Stud rods fixings up to M30 in diameter.

SHELF LIFE

- Cartridges should be stored in their original packaging in cool conditions (5°C ~ 25°C) out of direct sunlight. When stored in this condition, the shelf life will be 24 months from the date of manufacture.

RANGE OF CONCRETE QUALITY

C20/25 ~ C50/60

RANGE OF LOADING

5.1 kN ~ 128.0 kN (SWL)

Heavy loads

HOLE ORIENTATION

BASE MATERIALS

Concrete

Concrete block solid stone

VA RODS AVAILABILITY

APPROVALS / CERTICIFICATIONS

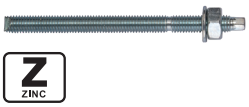
- ETA-21/1028 according to ETAG 001 Part 1 & 5 Option 7.

ORDERING DETAILS

PRODUCT DESCRIPTION	PACKING CONTENT (PCs.)	PRODUCT PART NO.	
EPG65 - 585ml (Dual Cartridge System)	10	EPG65	
Applicator Handgun - 585ml (For 585 Ratio 3:1Cartridges)	1	GZ58	
Square Mixing Nozzle - 255mm (Recommended for 500ml & above)	Bulk	NZ58S	
Hole Blower	1	HCP	
Hole Cleaning Brush Cleaning Brush - 10mm Cleaning Brush - 12mm Cleaning Brush - 18mm Cleaning Brush - 28mm	 1 1 1 1	 CB10 CB12 CB18 CB28	

VA CHEMICAL STUD RODS - STEEL CLASS 5.8 ZINC GALVANISED

PRODUCT DESCRIPTION	FIXTURE HOLE DIAMETER (mm)	MAX. FIXTURE THICKNESS (mm)	PACKING CONTENT (PCs.)	PRODUCT PART NO.
M8 x 110mm	9	15	10	VA8110
M10 x 130mm	12	20	10	VA10130
M12 x 160mm	14	30	10	VA12160
M16 x 190mm	18	40	10	VA16190
M20 x 260mm	22	50	6	VA20260
M24 x 300mm	28	55	6	VA24300

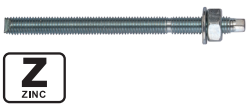


VA CHEMICAL STUD RODS - STEEL CLASS 5.8 HOT-DIPPED GALVANISED

PRODUCT DESCRIPTION	FIXTURE HOLE DIAMETER (mm)	MAX. FIXTURE THICKNESS (mm)	PACKING CONTENT (PCs.)	PRODUCT PART NO.
M8 x 110mm	9	15	10	VA8110GH
M10 x 130mm	12	20	10	VA10130GH
M12 x 160mm	14	30	10	VA12160GH
M16 x 190mm	18	40	10	VA16190GH
M20 x 260mm	22	50	6	VA20260GH
M24 x 300mm	28	55	6	VA24300GH

VAH CHEMICAL STUD RODS - STEEL CLASS 8.8 ZINC GALVANISED

PRODUCT DESCRIPTION	FIXTURE HOLE DIAMETER (mm)	MAX. FIXTURE THICKNESS (mm)	PACKING CONTENT (PCs.)	PRODUCT PART NO.
M8 x 110mm	9	15	10	VAH8110
M10 x 130mm	12	20	10	VAH10130
M12 x 160mm	14	30	10	VAH12160
M16 x 190mm	18	40	10	VAH16190
M20 x 260mm	22	50	6	VAH20260
M24 x 300mm	28	55	6	VAH24300



VAH CHEMICAL STUD RODS - STEEL CLASS 8.8 HOT-DIPPED GALVANISED

PRODUCT DESCRIPTION	FIXTURE HOLE DIAMETER (mm)	MAX. FIXTURE THICKNESS (mm)	PACKING CONTENT (PCs.)	PRODUCT PART NO.
M8 x 110mm	9	15	10	VAH8110GH
M10 x 130mm	12	20	10	VAH10130GH
M12 x 160mm	14	30	10	VAH12160GH
M16 x 190mm	18	40	10	VAH16190GH
M20 x 260mm	22	50	6	VAH20260GH
M24 x 300mm	28	55	6	VAH24300GH

G

VAR CHEMICAL STUD RODS - STAINLESS STEEL CLASS 304 (A2)

PRODUCT DESCRIPTION	FIXTURE HOLE DIAMETER (mm)	MAX. FIXTURE THICKNESS (mm)	PACKING CONTENT (PCs.)	PRODUCT PART NO.
M8 x 110mm	9	15	10	VAR8110
M10 x 130mm	12	20	10	VAR10130
M12 x 160mm	14	30	10	VAR12160
M16 x 190mm	18	40	10	VAR16190
M20 x 260mm	22	50	6	VAR20260
M24 x 300mm	28	55	6	VAR24300

A2 INOX

VAS CHEMICAL STUD RODS - STAINLESS STEEL CLASS 316 (A4)

PRODUCT DESCRIPTION	FIXTURE HOLE DIAMETER (mm)	MAX. FIXTURE THICKNESS (mm)	PACKING CONTENT (PCs.)	PRODUCT PART NO.
M8 x 110mm	9	15	10	VAS8110
M10 x 130mm	12	20	10	VAS10130
M12 x 160mm	14	30	10	VAS12160
M16 x 190mm	18	40	10	VAS16190
M20 x 260mm	22	50	6	VAS20260
M24 x 300mm	28	55	6	VAS24300

A4 INOX

** Stud rod diameter larger than M27 and above are made-to-order or on indent basis.*

INSTALLATION PERIMETER & LOADING DATA

EPG65 WITH VA (STEEL CLASS 5.8) RODS - ZINC GALVANISED & HOT DIPPED GALVANISED

ANCHOR SIZE	HOLE DIAMETER (mm)	ANCHORAGE DEPTH (mm)	MINIMUM CONCRETE THICKNESS (mm)	TIGHTENING TORQUE (Nm)	RECOMMENDED SPACING & EDGE DISTANCE TO FULL LOAD (mm)		ABSOLUTE MINIMUM SPACING & EDGE DISTANCE (mm)		RECOMMENDED LOAD[1] (kN)	
					TENSION	SHEAR	TENSION	SHEAR	TENSION	SHEAR
M8	10	80	110	10	160	80	40	40	8.6	5.1
M10	12	90	120	20	180	90	45	45	13.8	8.6
M12	14	110	140	40	220	110	55	55	20.0	12.0
M16	18	125	155	80	250	125	65	65	31.4	22.3
M20	24	170	220	150	340	170	85	85	50.9	34.9
M24	28	210	270	200	420	210	105	105	75.4	50.3
M27	30	250	310	270	500	250	125	125	90.9	65.7
M30	35	270	340	300	540	270	135	135	109.1	80.0

[1] Loading based on non-cracked concrete, $f_{ck,cube}$ = 25 N/mm² (C20/25).

EPG65 WITH VAH (STEEL CLASS 8.8) RODS - ZINC GALVANISED & HOT DIPPED GALVANISED

ANCHOR SIZE	HOLE DIAMETER (mm)	ANCHORAGE DEPTH (mm)	MINIMUM CONCRETE THICKNESS (mm)	TIGHTENING TORQUE (Nm)	RECOMMENDED SPACING & EDGE DISTANCE TO FULL LOAD (mm)		ABSOLUTE MINIMUM SPACING & EDGE DISTANCE (mm)		RECOMMENDED LOAD[1] (kN)	
					TENSION	SHEAR	TENSION	SHEAR	TENSION	SHEAR
M8	10	80	110	10	160	80	40	40	12.4	8.6
M10	12	90	120	20	180	90	45	45	17.5	13.1
M12	14	110	140	40	220	110	55	55	23.7	19.4
M16	18	125	155	80	250	125	65	65	31.4	36.0
M20	24	170	220	150	340	170	85	85	50.9	56.0
M24	28	210	270	200	420	210	105	105	75.4	80.6
M27	30	250	310	270	500	250	125	125	90.9	105.1
M30	35	270	340	300	540	270	135	135	109.1	128.0

[1] Loading based on non-cracked concrete, $f_{ck,cube}$ = 25 N/mm² (C20/25).

EPG650 WITH VAR & VAS (STAINLESS STEEL) RODS - CLASS 304 (A2) & CLASS 316 (A4)

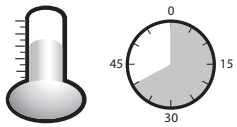
ANCHOR SIZE	HOLE DIAMETER (mm)	ANCHORAGE DEPTH (mm)	MINIMUM CONCRETE THICKNESS (mm)	TIGHTENING TORQUE (Nm)	RECOMMENDED SPACING & EDGE DISTANCE TO FULL LOAD (mm)		ABSOLUTE MINIMUM SPACING & EDGE DISTANCE (mm)		RECOMMENDED LOAD[1] (kN)	
					TENSION	SHEAR	TENSION	SHEAR	TENSION	SHEAR
M8	10	80	110	10	160	80	40	40	9.8	6.0
M10	12	90	120	20	180	90	45	45	15.4	9.2
M12	14	110	140	40	220	110	55	55	23.7	13.7
M16	18	125	155	80	250	125	65	65	31.4	25.2
M20	24	170	220	150	340	170	85	85	50.9	39.4
M24	28	210	270	200	420	210	105	105	75.4	56.8
M27	30	250	310	270	500	250	125	125	90.9	73.7
M30	35	270	340	300	540	270	135	135	109.1	89.7

[1] Loading based on non-cracked concrete, $f_{ck,cube}$ = 25 N/mm² (C20/25).

GEL AND CURING TIME[1]

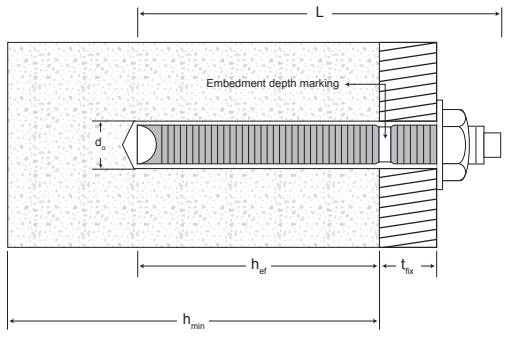
BASE MATERIAL TEMPERATURE $T_{base\ material}$ (°C)	GEL TIME (WORKING TIME) t_{gel} (mins)	CURING TIME FOR DRY HOLE t_{cure} (hrs)	CURING TIME FOR DAMP HOLE t_{cure} (hrs)
$+10 \leq T_{base\ material} < +15$	600	48	72
$+15 \leq T_{base\ material} < +20$	150	30	45
$+20 \leq T_{base\ material} < +25$	60	24	36
$+25 \leq T_{base\ material} < +30$	30	15	20
$+30 \leq T_{base\ material} < +35$	15	10	12
$+35 \leq T_{base\ material} < +40$	8	6	8

Note: If during the installation of the rod the temperature drop below -6°c or rises above 60°c, please contact our Engineers for the proper procedures.

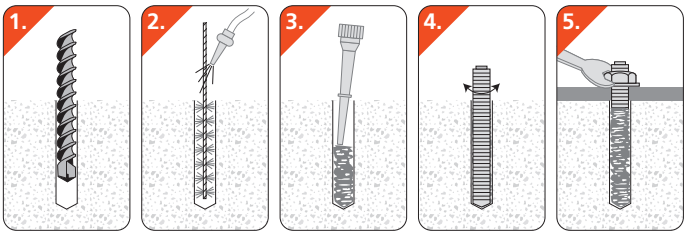


[1] Cartridge should be > +10°C.

SETTING DIAGRAM



INSTALLATION PROCEDURE



EPG65 HIGH STRENGTH EPOXY FOR POST-INSTALLED REBAR APPLICATIONS
(Design Load Approach with BS8110 Bond Strength Method)

Concrete Compressive Strength: $f_{ck,cube}$ = 25 N/mm² ~ 55 N/mm²

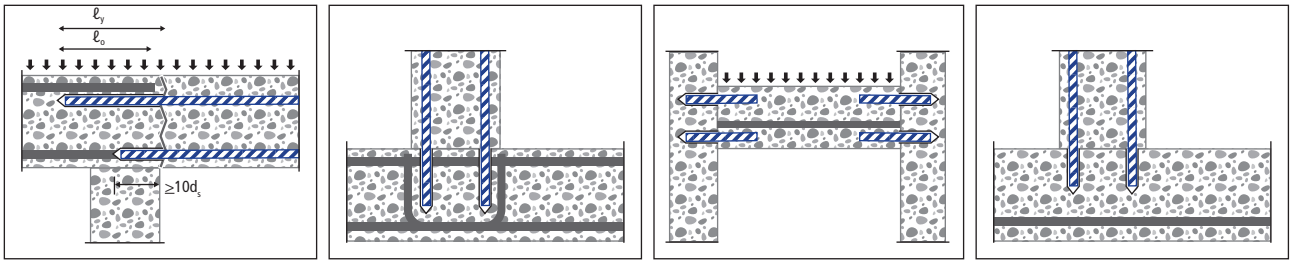
Rebar Size, d_s		ϕ10	ϕ12	ϕ16	ϕ20	ϕ25	ϕ32
Design Steel Resistance, $N_{Rd,s}$	[kN]	31.4	45.2	80.4	125.7	196.4	321.7
Design Bond Stress, τ_{Rd}	[N/mm²]	7.3	7.3	7.0	6.3	6.0	6.0
Drilled Hole Diameter, d_o	[mm]	13 ~ 14	15 ~ 16	20 ~ 22	25 ~ 28	30 ~ 32	40 ~ 42
Bar Spacing, s	[mm]	50	65	80	100	125	160
Edge Distance, c	[mm]	40	40	40	50	65	80
$L_{b,rqd}$ / Rebar ϕ		14	14	14	16	17	17
Anchorage Length, L_b [mm]		Design Tensile Bonding Capacity, N_{Rd} [kN]					
100		23.0					
120		27.6	33.2				
140		**31.4**	38.7				
160			44.2	56.3			
170			**45.2**	59.8			
200				70.4	79.6		
230				**80.4**	91.5		
250					99.5	117.8	
280					111.4	132.0	
320					**125.7**	150.8	193.0
350						165.0	211.1
400						188.5	241.3
420						**196.4**	253.4
550							**321.7**
Length to Develop Steel Yield, $L_{b,rqd}$ [mm]		136	163	228	316	417	533

"Minimum depth to develop full steel shear"

DESIGN CRITERIAS:
1) Safety Factor for Design Tensile Steel Resistance: $\gamma_{Ms,N}$ = 1.15 (based on steel yield strength of 460 N/mm²).
2) Safety factor for Design Tensile Concrete Pull-Out Resistance: $\gamma_{Mp,N}$ = 1.5.
3) Loading applicable to Non-Cracked Concrete with design comply in accordance to BS8110.
4) Safety factor for Design Tensile Concrete Cone Resistance: $\gamma_{MC,N}$ = 1.5
5) Minimum spacing shall be $4d_s$ bar to bar or $5d_s$ centre-to-centre.
6) Minimum edge distance shall be $2d_s$ bar to bar or $2.5d_s$ centre-to-centre.

TEST CERTIFICATIONS
1) Tested to SIRIM QAS to BS8539 for studs and rebars.

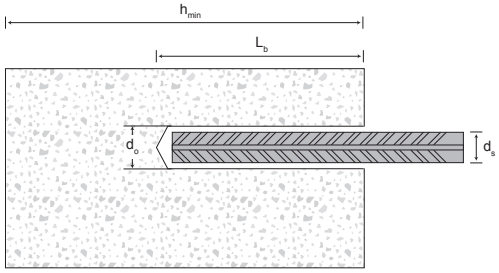
SUGGESTED APPLICATIONS



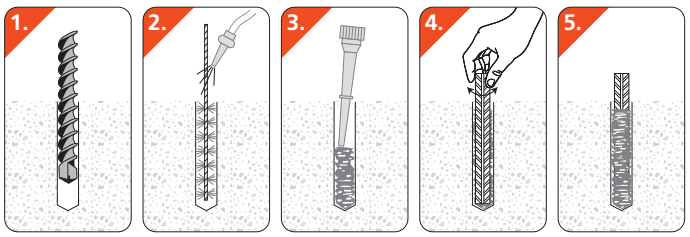
Overlap joints for slabs and beams or foundation column or wall; rebar connection for simply supported slabs or beams; shear connector or compression component joints.

Important note: Architect or design engineer must conduct final checked with the actual site condition for any variations against tabulated data.

SETTING DIAGRAM



INSTALLATION PROCEDURE



EPG65 HIGH STRENGTH EPOXY FOR POST-INSTALLED REBAR APPLICATIONS

(Design Load Approach with BS8110 & ACI 318 Concrete Splitting Criteria)

Concrete Compressive Strength: $f_{ck,cube}$ = 25 N/mm²

Rebar Size, d_s		ϕ10	ϕ12	ϕ16	ϕ20	ϕ25	ϕ32	ϕ40
Design Steel Resistance, $N_{Rd,s}$	[kN]	34.4	49.6	88.1	137.6	215.1	352.4	550.6
Splitting Bond Stress, τ_{Rd}	[N/mm²]	3.49	3.49	3.49	3.25	2.80	2.80	2.80
Drilled Hole Diameter, d_o	[mm]	13 ~ 14	15 ~ 16	20 ~ 22	25 ~ 28	30 ~ 32	40 ~ 42	50 ~ 52
Bar Spacing, s	[mm]	50	60	80	100	125	160	200
Edge Distance, c	[mm]	40	40	40	50	65	80	100
Anchorage Length, L_b [mm]		Design Tensile Pull-Out/Concrete Cone Resistance, N_{Rd} [kN]						
100		11.0						
120		13.2	15.8					
160		17.5	21.1	28.1				
200		21.9	26.3	35.1	40.8			
250		27.4	32.9	43.9	51.1	55.0		
300		32.9	39.5	52.6	61.3	66.0		
320		**34.4**	42.1	56.1	65.4	70.4	90.1	
400			**49.6**	70.2	81.7	88.0	112.6	140.8
525				**88.1**	107.2	115.5	147.8	184.7
600					122.5	132.0	168.9	211.1
675					**137.6**	148.5	190.0	237.5
980						**215.1**	275.9	344.9
1000							281.5	351.9
1300							**352.4**	457.5
1400								492.7
1565								**550.6**
Length to Develop Steel Yield, $L_{b,rqd}$ [mm]		314	377	502	674	978	1,252	1,565

"Minimum depth to develop full steel shear"

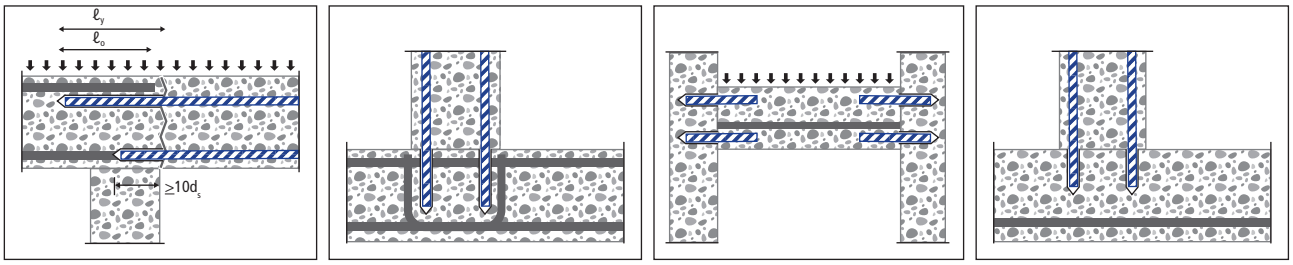
DESIGN CRITERIAS:

1) Design tensile steel resistance: $N_{Rd,s} = f_y * A_s / \gamma_{Ms,N}$ where $\gamma_{Ms,N}$ = 1.05 (based on steel yield of 460 N/mm²).
2) Design value complied in accordance to BS8110 and ACI 318 Concrete Splitting Criteria.
3) Minimum spacing shall be $4d_s$ bar to bar or $5d_s$ centre-to-centre.
4) Minimum edge distance shall be $2d_s$ bar to bar or $2.5d_s$ centre-to-centre.
5) Applicable to dry and wet concrete application.
6) Design value based on non-cracked concrete.

TEST CERTIFICATIONS

1) Tested to SIRIM QAS to BS8539 for studs and rebars.

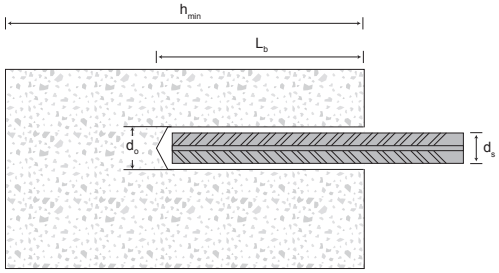
SUGGESTED APPLICATIONS



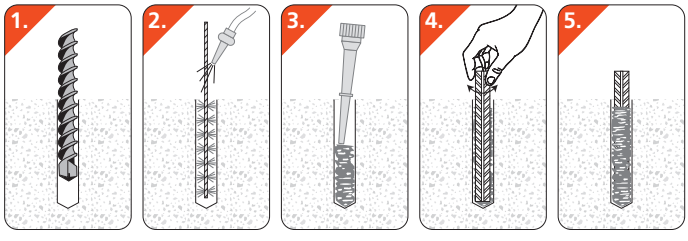
Overlap joints for slabs and beams or foundation column or wall; rebar connection for simply supported slabs or beams; shear connector or compression component joints.

Important note: Architect or design engineer must conduct final checked with the actual site condition for any variations against tabulated data.

SETTING DIAGRAM



INSTALLATION PROCEDURE



EPG65 HIGH STRENGTH EPOXY FOR POST-INSTALLED REBAR APPLICATIONS

(Design Load Approach with BS8110 & ACI 318 Concrete Splitting Criteria)

Concrete Compressive Strength: $f_{ck,cube}$ = 30 N/mm²

Rebar Size, d_s		ϕ10	ϕ12	ϕ16	ϕ20	ϕ25	ϕ32	ϕ40
Design Steel Resistance, $N_{Rd,s}$	[kN]	34.4	49.6	88.1	137.6	215.1	352.4	550.6
Splitting Bond Stress, $\tau_{sp,d}$	[N/mm²]	3.91	3.91	3.91	3.63	3.13	3.13	3.13
Drilled Hole Diameter, d_o	[mm]	13 ~ 14	15 ~ 16	20 ~ 22	25 ~ 28	30 ~ 32	40 ~ 42	50 ~ 52
Bar Spacing, s	[mm]	50	60	80	100	125	160	200
Edge Distance, c	[mm]	40	40	40	50	65	80	100
Anchorage Length, L_b [mm]		Design Tensile Pull-Out / Concrete Cone Resistance, N_{Rd} [kN]						
100		12.3						
120		14.7	17.7					
160		19.7	23.6	31.5				
200		24.6	29.5	39.3	45.6			
250		30.7	36.9	49.1	57.0	61.5		
275		33.8	40.5	54.1	62.7	67.6		
300		**34.4**	44.2	59.0	68.4	73.8		
320			47.2	62.9	73.0	78.7	100.7	
350			**49.6**	68.8	79.8	86.1	110.1	
400				78.6	91.2	98.3	125.9	157.4
450				**88.1**	102.6	110.6	141.6	177.0
525					119.8	129.1	165.2	206.5
625					**137.6**	153.7	196.7	245.9
750						184.4	236.0	295.0
875						**215.1**	275.4	344.2
950							299.0	373.7
1120							**352.4**	440.6
1300								511.4
1400								**550.6**
Length to Develop Steel Yield, $L_{b,rqd}$ [mm]		280	336	448	603	875	1,120	1,400

"Minimum depth to develop full steel shear"

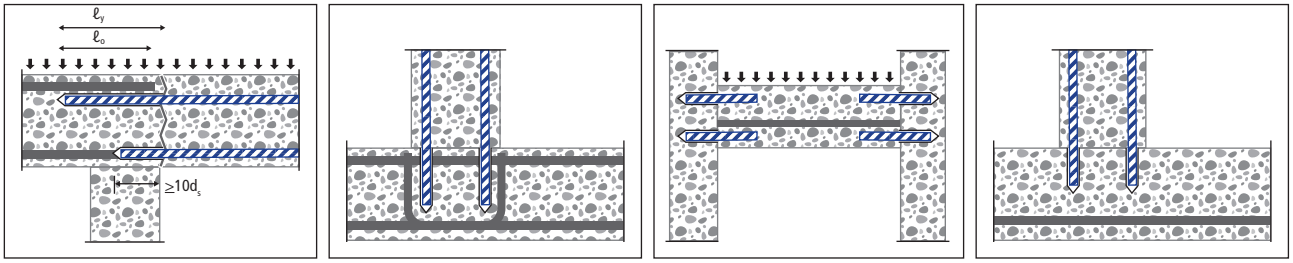
DESIGN CRITERIAS:

1) Design tensile steel resistance: $N_{Rd,s} = f_y * A_s / \gamma_{Ms,N}$ where $\gamma_{Ms,N}$ = 1.05 (based on steel yield of 460 N/mm²).
2) Design value complied in accordance to BS8110 and ACI 318 Concrete Splitting Criteria.
3) Minimum spacing shall be $4d_s$ bar to bar or $5d_s$ centre-to-centre.
4) Minimum edge distance shall be $2d_s$ bar to bar or $2.5d_s$ centre-to-centre.
5) Applicable to dry and wet concrete application.
6) Design value based on non-cracked concrete.

TEST CERTIFICATIONS

1) Tested to SIRIM QAS to BS8539 for studs and rebars.

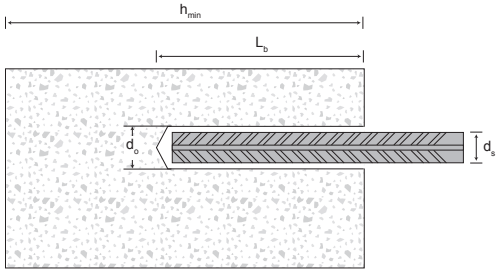
SUGGESTED APPLICATIONS



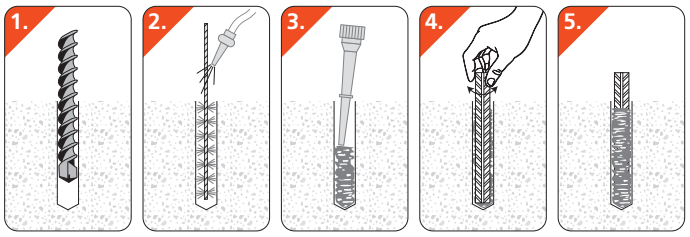
Overlap joints for slabs and beams or foundation column or wall; rebar connection for simply supported slabs or beams; shear connector or compression component joints.

Important note: Architect or design engineer must conduct final checked with the actual site condition for any variations against tabulated data.

SETTING DIAGRAM



INSTALLATION PROCEDURE



EPG65 HIGH STRENGTH EPOXY FOR POST-INSTALLED REBAR APPLICATIONS

(Design Load Approach with BS8110 & ACI 318 Concrete Splitting Criteria)

Concrete Compressive Strength: $f_{ck,cube}$ = 35 N/mm²

Rebar Size, d_s		ϕ10	ϕ12	ϕ16	ϕ20	ϕ25	ϕ32	ϕ40
Design Steel Resistance, $N_{Rd,s}$	[kN]	34.4	49.6	88.1	137.6	215.1	352.4	550.6
Splitting Bond Stress, $\tau_{sp,d}$	[N/mm²]	4.17	4.17	4.17	3.88	3.34	3.34	3.34
Drilled Hole Diameter, d_o	[mm]	13 ~ 14	15 ~ 16	20 ~ 22	25 ~ 28	30 ~ 32	40 ~ 42	50 ~ 52
Bar Spacing, s	[mm]	50	60	80	100	125	160	200
Edge Distance, c	[mm]	40	40	40	50	65	80	100
Anchorage Length, L_b [mm]		Design Tensile Pull-Out / Concrete Cone Resistance, N_{Rd} [kN]						
100		13.1						
120		15.7	18.9					
160		21.0	25.2	33.5				
200		26.2	31.4	41.9	48.8			
250		32.8	39.3	52.4	61.0	65.6		
275		**34.4**	43.2	57.6	67.1	72.1		
300			47.2	62.9	73.1	78.7		
320			**49.6**	67.1	78.0	84.0	107.5	
375				78.6	91.4	98.4	125.9	
425				**88.1**	103.6	111.5	142.7	178.4
450					109.7	118.1	151.1	188.9
575					**137.6**	150.9	193.1	241.4
700						183.6	235.1	293.8
850						**215.1**	285.4	356.8
900							302.2	377.8
1050							**352.4**	440.8
1100								461.7
1200								503.7
1315								**550.6**
Length to Develop Steel Yield, $L_{b,rqd}$ [mm]		263	315	420	565	820	1,049	1,312

"Minimum depth to develop full steel shear"

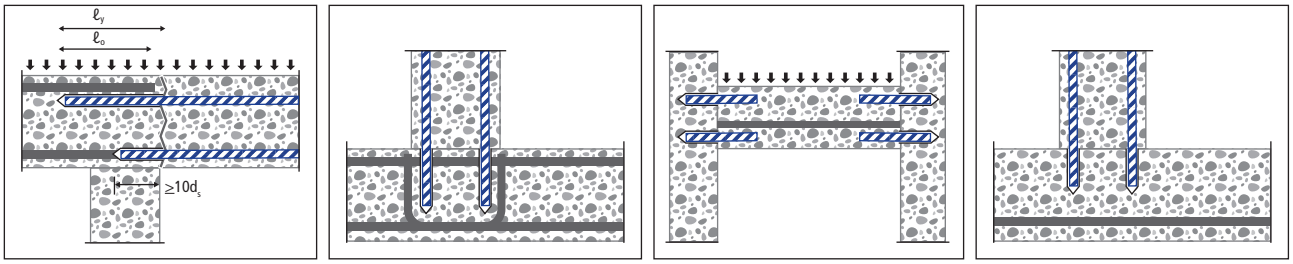
DESIGN CRITERIAS:

1) Design tensile steel resistance: $N_{Rd,s} = f_y * A_s / \gamma_{Ms,N}$ where $\gamma_{Ms,N}$ = 1.05 (based on steel yield of 460 N/mm²).
2) Design value complied in accordance to BS8110 and ACI 318 Concrete Splitting Criteria.
3) Minimum spacing shall be $4d_s$ bar to bar or $5d_s$ centre-to-centre.
4) Minimum edge distance shall be $2d_s$ bar to bar or $2.5d_s$ centre-to-centre.
5) Applicable to dry and wet concrete application.
6) Design value based on non-cracked concrete.

TEST CERTIFICATIONS

1) Tested to SIRIM QAS to BS8539 for studs and rebars.

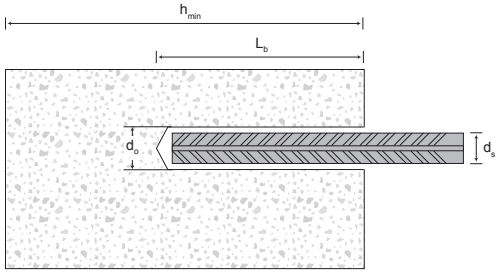
SUGGESTED APPLICATIONS



Overlap joints for slabs and beams or foundation column or wall; rebar connection for simply supported slabs or beams; shear connector or compression component joints.

Important note: Architect or design engineer must conduct final checked with the actual site condition for any variations against tabulated data.

SETTING DIAGRAM



INSTALLATION PROCEDURE