Liebig Superplus BLS range

Functionality: The BLS self-undercut principle

Available in zinc plated carbon steel and A4 stainless steel, its design offers the high load capacity and reliability of an undercut anchor, with the ease of installation normally associated with an expansion anchor.

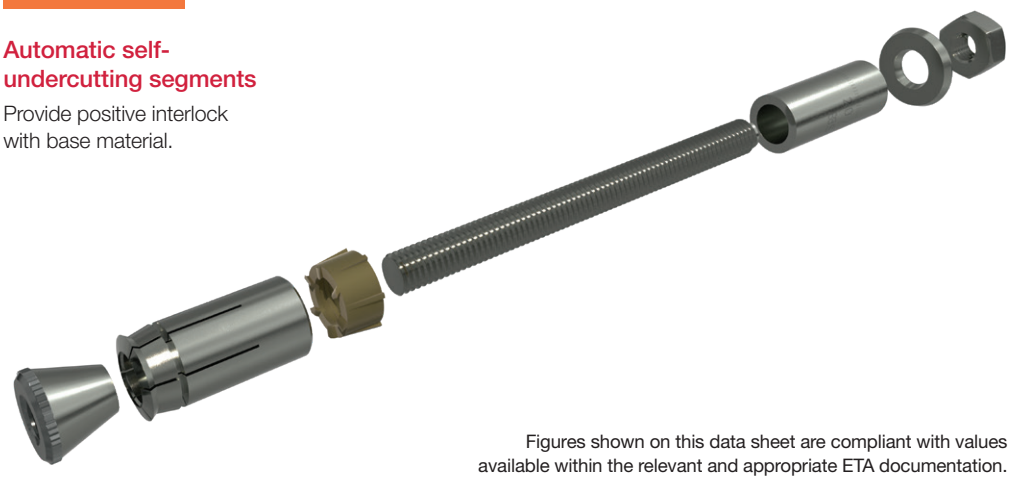
That means that, unlike any other competing product, the Superplus range does not require the expense of any special drill bits or setting tools.

Performance benefits and characteristics

- Unique automatic self-undercut / mechanical interlock anchor
- Very high load performance
- Setting is torque controlled - no special tools required
- Minimal expansion forces allow small spacings and edge distances
- M8 – M16, push-through or pre-installation options
- Two embedment depths per anchor diameter
- Range includes shallow embedment option
- Simplest, quickest and safest solution available
- For static, quasi-static and seismic loads
- UKTA approval
- ETA approval
- ACI 355 Nuclear Performance Standard

Automatic self-undercutting segments

Provide positive interlock with base material.



Figures shown on this data sheet are compliant with values available within the relevant and appropriate ETA documentation.

Information supplied should form part of a general guide and should performance data for a specific application be required please contact EJOT UK.

EJOT UK Ltd, Hurricane Close, Sherburn-in-Elmet, Leeds LS25 6PB.

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Tel: 01977 687040 **Email:** InfoUK@ejot.com

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Liebig Superplus BLS range

Type BLS
Stud with nut

Type BLS-P
Extended stud with nut

Type SLS Hex-agonal bolt

Type SKLS Coun-tersunk screw

Type ILS
Internal thread

Product material

- Grade 8.8 carbon steel, zinc plated
- A4-80 stainless steel

Product range

- BLS & BLS-P - M8, M12 and M16
  - zinc plated carbon steel
- ILS: M8
  - zinc plated carbon steel
- BLS (A4), SLS (A4), SKLS (A4)
  - A4 stainless steel
- Effective clamping thickness 0 - 300mm

Base material

- Cracked and non-cracked concrete: C20/25 to C50/60

Load range

- Tension: N_{perm} = 4.3 - 59.8 kN
- Shear: V_{perm} = 4.3 - 91.2 kN

Typical application area

- Power plants (nuclear, hydroelectric & fossil etc)
- Tunnel ventilation, jet fans
- Tunnel M&E: overhead lines, catenary systems
- Machinery
- Petrochemical and industrial plants
- Façades
- Structural steel work
- Base plates
- Safety barriers and guide rails
- Storage racking
- Lifts and elevator variations
- Cranes and crane rails

Approval

- ETA-01/0011 - Option 1
  A4 stainless steel / zinc plated carbon steel
- UKTA - Option 1
  A4 stainless steel / zinc plated carbon steel

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Performance Details

BLS M12 - 20 / 80 / 15

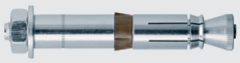
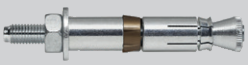
- Thread size
- Drill bit diameter
- Effective embedment depth (h_{ef})
- Maximum fixture thickness (h_{ef})

Standard size range

Thread size	Size - Drill ø / Anchorage depth h_{ef} / t_{fix}	t_{fix}	BLS (ZP)	BLS-P (ZP)	BLS (A4)	SLS (A4)	SKLS (A4)	ILS (ZP)
M8	M8-14	-	-	-	-	-	-	-
	M8-14/40/15	15	-	-	•	•	•	-
	M8-14/40	25	-	-	-		-	-
	M8-14/60	25	-	-	-	-	-	-
	M8-14/80	-	-	-	-	-	-	NO ETA
	M8-14/80/25	25	•	-	•	•	•	-
M12	M12-20/80/15	15	•	•	•	•	•	-
	M12-20/80/30	30	•	-	•	-	-	-
	M12-20/150/30	30	•	•	-	-	-	-
M16	M16-25/150/30	30	•	-	•	-	-	-
	M16-25/150/40	40	-	•	-	-	-	-
	M16-25/200/40	40	•	•	-	-	-	-
	M16-25/200/60	60	•	-	-	-	-	-

A4 = A4-80 stainless steel ZP = Zinc plated carbon steel

Special size range

Product Variant		Anchor Diameter	M8		M12		M16	
		Effective Embedment Depth h_{ef}	40	80	80	150	150	200
BLS		Max Fixture Thickness t_{fix} (mm)	100	150	200	250	250	300
BLS-P		Max Fixture Thickness t_{fix} (mm)	100	150	200	250	250	300
SKLS		Max Fixture Thickness t_{fix} (mm)	100	150	200	250	250	300
SLS		Max Fixture Thickness t_{fix} (mm)	100	150	200	250	250	300

Other Superplus BLS variants

Superplus SD

- Push through installations
- Used for fixing step irons
- A4-80 stainless steel

Superplus LPA

- Retrofitting grounding systems to reduce stray current from rebar
- A4-80 stainless steel

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Static and quasi-static loads

Recommended loads

BLS, BLS-P, SLS, SKLS

The data shown on the following tables is based on:

- ETA / UKTA approved anchors
- Concrete C20/25, $f_{ck,\ cube}$ = 25 N/mm²
- Installation has been done correctly (see pages 12 and 13)
- Without influence of edge and spacing distances

Zinc plated carbon steel anchors: BLS, BLS-P

		M8		M12		M16	
Effective anchorage depth h_{ef}		40	80	80	150	150	200
Non-cracked concrete							
Tensile N_{rec}	kN	6.1	13.9*	17.2	32.1	44.1	59.8*
Shear V_{rec} push through installation	kN	6.1	23.7*	34.4	40.0*	67.4*	67.4*
Shear V_{rec} pre-set through installation (BLS-P)	kN	6.1	8.6	19.3*	19.3*	35.9*	35.9*
Cracked concrete							
Tensile N_{rec}	kN	4.3	7.6	11.9	19.0	23.8	35.7
Shear V_{rec} push through installation	kN	4.3	23.7*	24.6	40.0*	63.0	67.4*
Shear V_{rec} pre-set through installation (BLS-P)	kN	4.3	8.6	19.3*	19.3*	35.9*	35.9*

*Failure mode = steel The partial safety factor for action is γ = 1.4

Permissible bending moments[1) 4)]

$M_{rec,s}$	Nm	17.0	60.0	152.0

A4 stainless steel anchors: BLS-A4, BLS-P-A4, SLS-A4, SKLS-A4

		M8		M12		M16	
Effective anchorage depth h_{ef}		40	80	80	150	150	200
Non-cracked concrete							
Tensile N_{rec}	kN	6.1	13.1*	17.2	30.1*	44.2	56.1*
Shear V_{rec} push through installation	kN	6.1	24.0*	34.4	48.5*	88.4	91.2*
Cracked concrete							
Tensile N_{rec}	kN	4.3	5.7	11.9	19.0	28.6	28.6
Shear V_{rec} push through installation	kN	4.3	24.0*	24.5	48.5*	63.0	91.2*

*Failure mode = steel The partial safety factor for action is γ = 1.4

Permissible bending moments[1) 4)]

$M_{rec,s}$	Nm	16.0	56.0	143.0

Fire resistance

Recommended loads

Design method according to EOTA TR 020

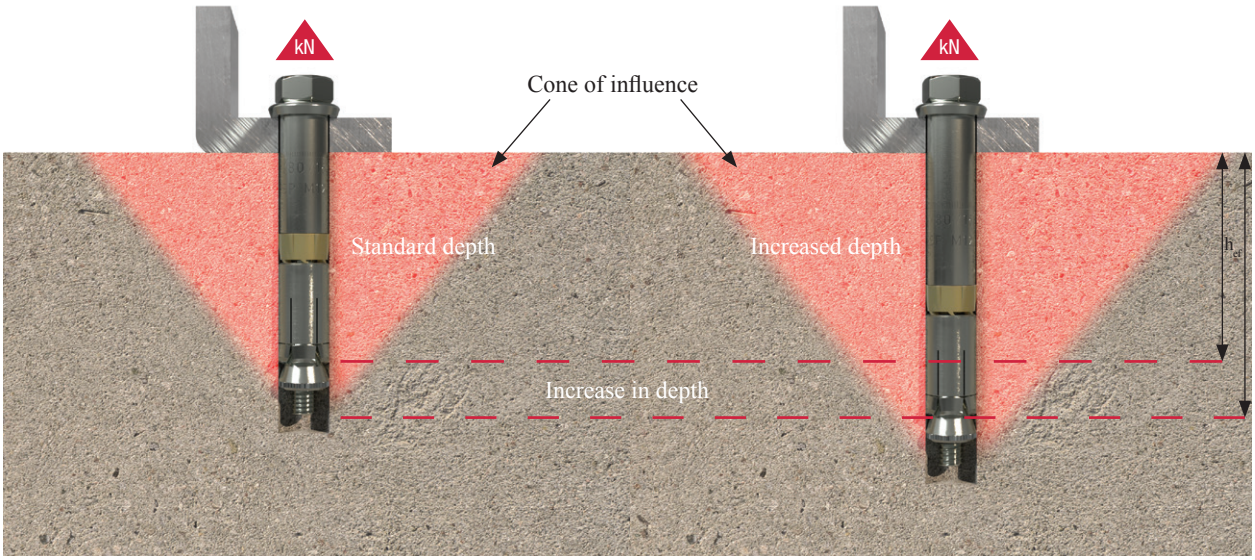
The data of the following table is based on:

- ETA-01/0011: Zinc plated and A4 stainless steel anchors
- UKTA: Zinc plated and A4 stainless steel anchors
- Concrete C20/25, $f_{ck,cube}$ = 25 N/mm²
- Without influence of edge and spacing distances
- Installation procedure is correct and according to parameters given on pages 12 and 13

				M8		M12		M16	
		Effective anchorage depth h_{ef}		40	80	80	150	150	200
		Cracked and non-cracked concrete							
Zinc plated	R30	Tensile N_{rec}	kN	0.37		1.70		3.10	
		Shear V_{rec}	kN	0.37		1.70		3.10	
	R120	Tensile N_{rec}	kN	0.18		0.84		1.60	
		Shear V_{rec}	kN	0.18		0.84		1.60	
A4 stainless steel	R30	Tensile N_{rec}	kN	0.73		2.50		4.70	
		Shear V_{rec}	kN	0.73		2.50		4.70	
	R120	Tensile N_{rec_c}	kN	0.37		1.30		2.50	
		Shear V_{rec}	kN	0.37		1.30		2.50	

In absence of other national regulations the partial safety factor for resistance under fire exposure γM,FI = 1.0 is recommended

Cone of influence



The above diagram shows how increasing the effective embedment depth of the anchor achieves a greater cone of influence and a greater resistance from the concrete which results in a greater tensile resistance from the anchorage.

Liebig Superplus BLS range

Installation data

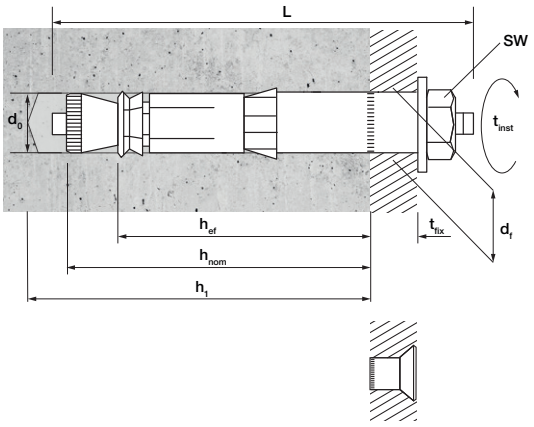
BLS, BLS-P, BLS-A4, SD(M8), SLS-A4, SKLS-A4

			M8		M12		M16	
Parameters and anchor sizes								
Effective anchorage depth h_{ef}		mm	40	80	80	150	150	200
Nominal anchorage depth h_{nom}		mm	52	92	96	166	168	218
Drill hole diameter d_0		mm	14		20		25	
Diameter of the drill bit at the upper tolerance limit $d_{cut,max} \leq$		mm	14.50		20.55		25.55	
Depth of drilled hole to deepest point $h_1 \geq$		mm	60	100	105	175	185	235
Diameter of clearance hole in the fixture	In-place installation (BLS) $d_f \leq$	mm	16		21		26	
	Mounting on the threaded bolt (BLS-P /dist. Mounting) $d_f \leq$		10		14		18	
Installation torque T_{inst}		Nm	25		80		180	
Minimum thickness of base material h_{inst}		mm	100	160	160	300	300	400

Push-through installation

BLS, BLS-A4, SLS-A4, SKLS-A4

- BLS and SD versions installed through fixture using an ordinary hammer and tightened to specified torque.



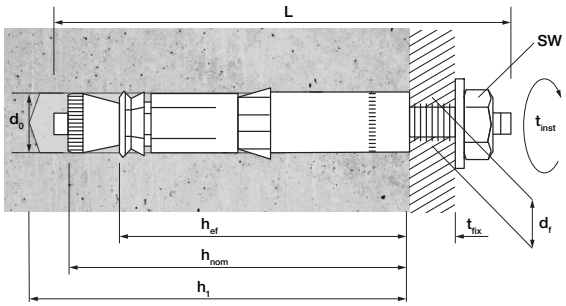
SKLS-A4

- Hex drive.

Pre-set installation

BLS-P

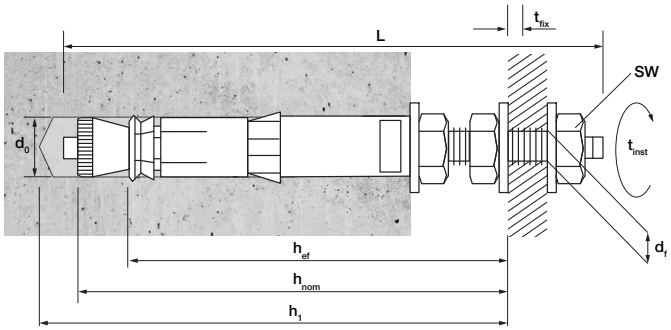
- BLS-P versions installed into the drill-hole using an ordinary hammer. Then, nut and washer are removed, fixture installed, washer and nut installed, and tightened to the specified torque.



Distance mounting

BLS-P

- BLS-P anchors can be used for distance mountings.



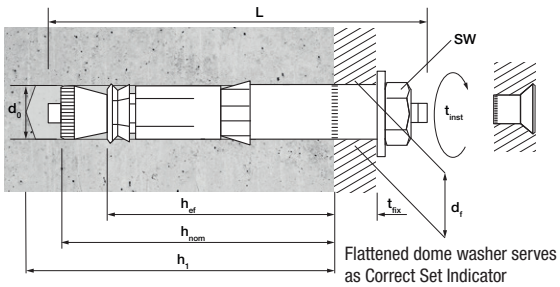
Liebig Superplus BLS range

Thread sizes

Thread Size	M8	M8	M12	M12	M16	M16
Type BLS	14/40	14/80	20/80	20/150	25/150	25/200

Spacing and edge distance

Effective embedment depth	h_{ef}	mm	40	80	80	150	150	200
Characteristic spacing[5)]	$s_{cr,N}$	mm	120	240	240	450	450	600
Minimum spacing	s_{min}	mm	100	80	150	150	150	180
Characteristic edge distance[5)]	$c_{cr,N}$	mm	60	120	120	225	225	300
Minimum edge distance	c_{min}	mm	60	50	100	80	100	100
Minimum member thickness	h_{min}	mm	100	160	160	300	300	400
Width across flats (A/F)	sw	mm	13	13	19	19	24	24



1) The permissible loads have been calculated using the partial safety factors for resistances stated in the ETA-approval and a partial safety factor for actions of $\gamma_F = 1.4$. The permissible loads are valid for unreinforced concrete and reinforced concrete with a rebar spacing s ≥ 15 cm and reinforced concrete with a rebar spacing s ≥ 10 cm if the rebar is 10 mm or smaller.
2) The permissible shear loads are based on a single anchor without influencing concrete edges. For shear loads applied close to an edge (c ≤ 10 h_{ef} or 60 d) concrete edge failure must be checked per ETAG 001, Annex C, design method A.
3) Concrete is considered non-cracked when the tensile stress within the concrete is $\sigma_L + \sigma_R \leq 0$. In the absence of detailed verification $\sigma_R = 3$ N/mm² can be assumed (σ_L equals the tensile stress within the concrete as a result of external loads, forces on anchors included).
4) The permissible bending moments are only valid for the threaded stud (e.g. in case of a distance mounting).
5) If spacings or edge distances become smaller than the characteristic values (i.e. $s \leq s_{cr,N}$ and/or $c \leq c_{cr,N}$) a calculation per ETAG 001, Annex C, design method A must be performed. For details, see ETA-04/0098.

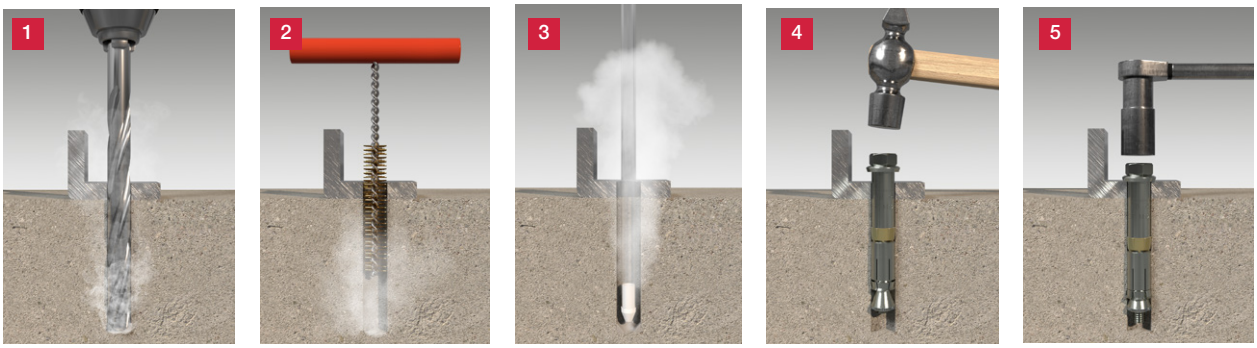
Approvals / certifications / applications

Description of document		Authority / laboratory	ID	Additional info
United Kingdom technical assessment	BBA	British Board of Agrement	UKTA-0836-22/6408	
European technical assessment	ETA CE	Centre Scientifique et Technique du Bâtiment	ETA-01-0011	ETAG 001-1 Option 1
Fire resistance		Centre Scientifique et Technique du Bâtiment	ETA-01-0011	EOTA TR 020 - Evaluation of anchorages in concrete concerning resistance to fire
Fire resistance		Centre Scientifique et Technique du Bâtiment	ETA-01-0011	EOTA TR 045 - Design of metal anchors for use in concrete under seismic actions

Liebig Superplus BLS range

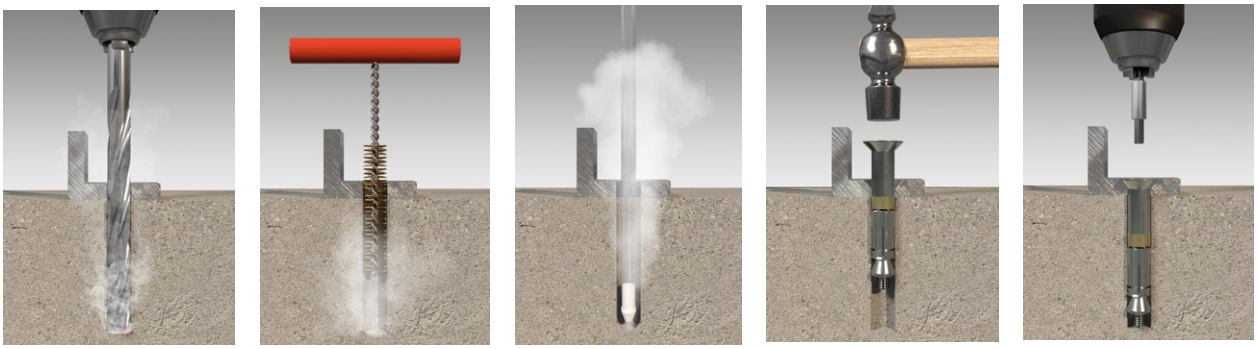
Installation instructions

BLS, BLS-A4, SD, SLS-A4



BLS-P

SKLS-A4



1 - Standard SDS drill procedure.

2 - Best practice dust removal - brush / pump.

3 - Repeat brush / pump procedure.

4 - Insert anchor.

5 - Apply specified torque. 2 x audible clicks will be heard from the torque wrench.

Watch our YouTube installation guides

Visit our YouTube channel to watch our clear and concise guides on Superplus installation. Scan the QR codes right or visit youtube.com/@ejotcouk and search for Superplus BLS.

PRODUCT ANIMATION

INSTALLATION VIDEO

EJOT UK Ltd, Hurricane Close, Sherburn-in-Elmet, Leeds LS25 6PB.

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