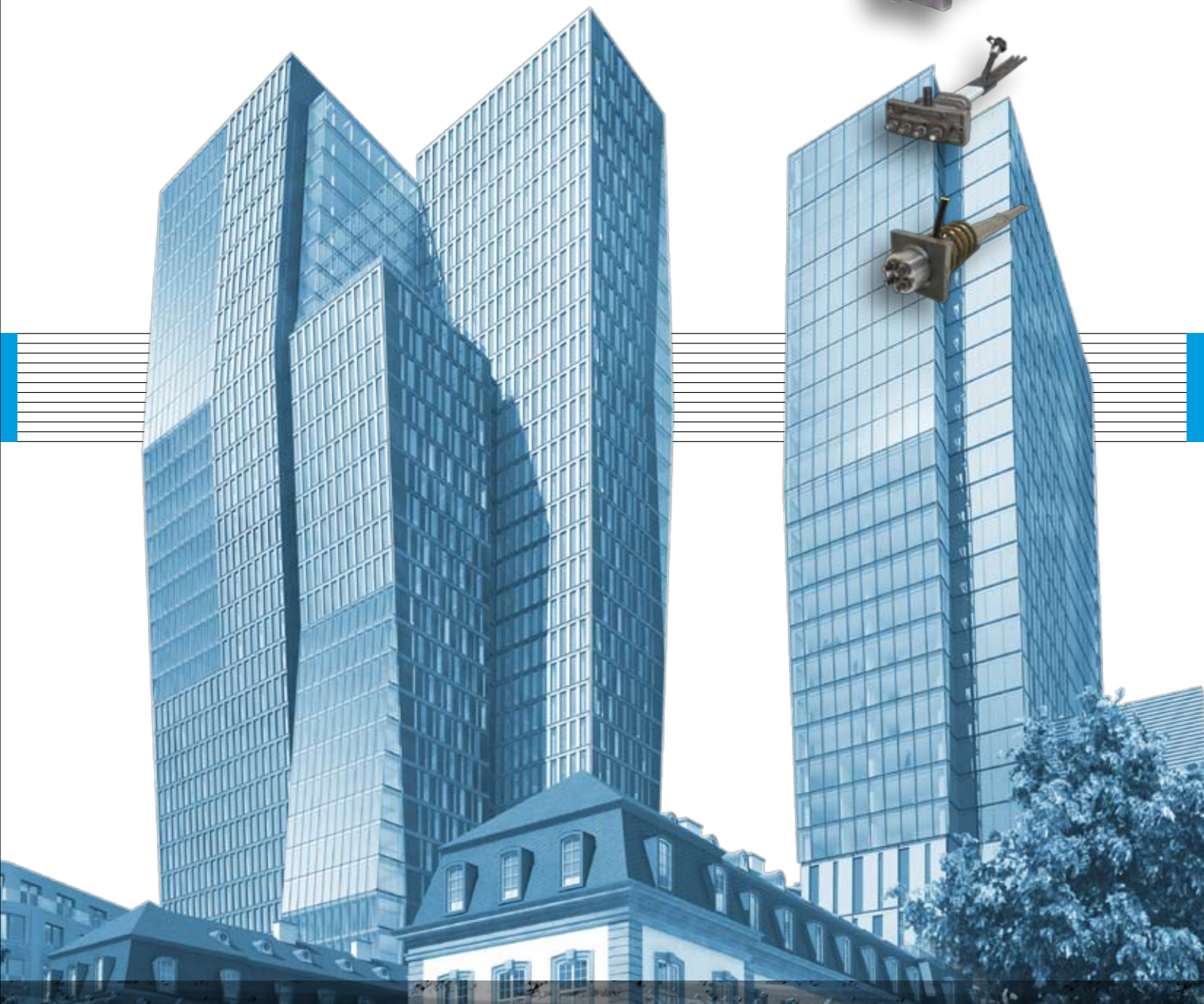


**BBV POST-TENSIONING SYSTEMS.  
DEVELOPED FOR THE HIGH DEMANDS  
OF YOUR STRUCTURE.**

**BBV  
SYSTEMS**

# **BBV FLATSLAB POST-TENSIONING SYSTEMS**



## 01 **UNBONDED STRAND POST-TENSIONING SYSTEM BBV L1P** **GERMAN APPROVAL Z-13.2-132**

The recently developed BBV Unbonded Strand P.T. System (BBV L1P) has been successfully tested in accordance with the stringent ETAG013 (European Technical Approval Guideline) and approved by the German DIBt (German Institute for Construction Technology). The BBV L1P anchor consists of a cast-iron anchor body with wedge and PE-duct. It can be used without any spiral or stirrup reinforcement and thus provides a most economical solution. The current system range will soon be further extended to include up to nine strand anchors. European approval for the complete range will likewise be extended.

## 02 **UNBONDED STRAND POST-TENSIONING SYSTEM BBV Lo1-Lo5** **GERMAN APPROVAL Z-13.2-70**

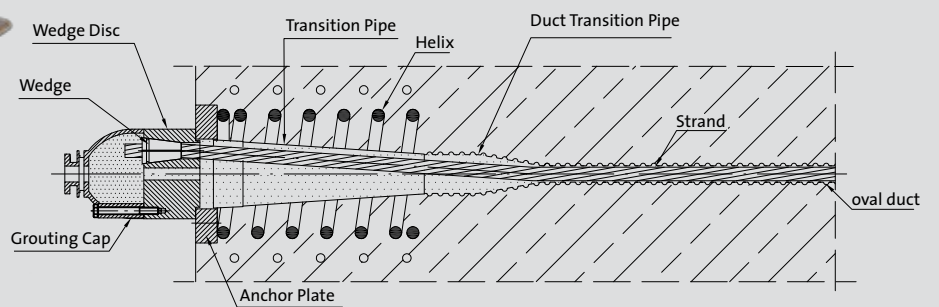
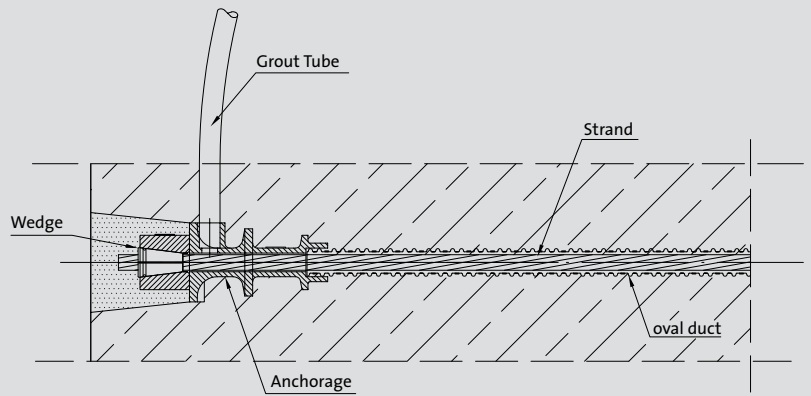
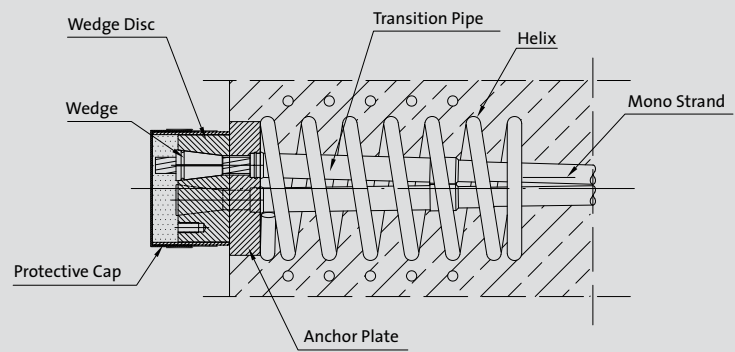
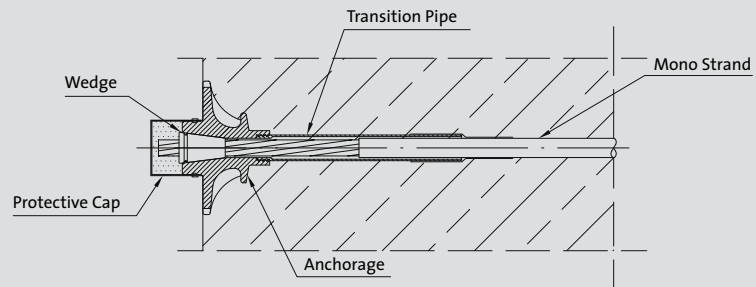
The BBV Unbonded Multi-Strand P.T. System (BBV Lo) includes BBV Lo1 through BBV Lo5, i.e. one to five numbers of strands of sheathed and greased seven-wire steel. Strand diameters are 0.60" or 0.62" of approved steel grade Y1770. German Technical Approval is available on request.

## 03 **BONDED STRAND POST-TENSIONING SYSTEM BBV FLAT ANCHOR L3/4 AND L4/5** **TESTED ACC. TO ETAG**

The BBV Flat Anchor System consists of flat cast-iron anchor bodies that may be used with either of two different flat cast-iron anchor heads designed for three (or four) nos. 0.62" strands or four (or five) nos. 0.5" strands of steel grade Y1860. The anchor has been successfully tested in accordance with the stringent ETAG 013 (European Technical Approval Guideline). The system is used with flat oval duct.

## 04 **BONDED STRAND POST-TENSIONING SYSTEM BBV L3 - L27** **GERMAN APPROVAL Z-13.1-114** **EUROPEAN APPROVAL ETA-05/0202**

The BBV Bonded Strand Post-Tensioning System ranging from three up to twenty seven number of individual strands has been successfully tested and approved in accordance with the stringent ETAG 013 (European Technical Approval Guideline - Approval No. ETA-05/0202). The system is approved for strand diameters 15.2 and 15.7 mm as well as both strand grades of Y1770 and Y1860. It is usually used with round duct. However, for application in flat slabs tendons with three nos. or four nos. strands may alternatively be installed with flat oval duct.



		BBV L1P	
Strand Number		1	1
Strand Grade	[MPa]	Y 1770	Y 1860
Strand Diameter	[mm]	15.2/15.7	15.2/15.7
Ultimate Force	[kN]	248/266	260/279
Dimensions Anchor Body	[mm]	130 x 80	130 x 80
Min. Centre-/Edge Distances	[mm]	no stirrup reinforcement: 130 x 200 / 85 x 120 with 3 nos. stirrups dia. 8 mm: 110 x 170 / 45+cc x 75+cc*	
$f_{cmj,cube} = 23$ MPa			

\*cc: concrete cover

		BBV Lo1	BBV Lo2	BBV Lo3	BBV Lo4	BBV Lo5
Strand Number		1	2	3	4	5
Strand Grade	[MPa]	Y 1770	Y 1770	Y 1770	Y 1770	Y 1770
Strand Diameter	[mm]	15.2/15.7	15.2/15.7	15.2/15.7	15.2/15.7	15.2/15.7
Ultimate Force	[kN]	248/266	496/531	743/797	991/1,062	1,239/1,328
Dimensions Anchor Plate	[mm]	100 x 90	105 x 135	130 x 170	150 x 195	160 x 250
<b>Min. Centre Distances</b>						
$f_{cmj,cube} = 26$ MPa	[mm]	155	170x220	185x290	215x325	245x380
$f_{cmj,cube} = 34$ MPa	[mm]	140	150x210	175x270	185x295	215x350
$f_{cmj,cube} = 42$ MPa	[mm]	125	130x200	160x245	180x270	200x315
<b>Min. Edge Distances</b>						
$f_{cmj,cube} = 26$ MPa	[mm]	100	105x130	115x165	130x185	145x210
$f_{cmj,cube} = 34$ MPa	[mm]	90	95x125	110x155	115x170	130x195
$f_{cmj,cube} = 42$ MPa	[mm]	85	85x120	100x145	110x155	120x175

		BBV Flat Anchor L3/4		BBV Flat Anchor L4/5	
Strand Number		3	4	4	5
Strand Grade	[MPa]	Y 1860	Y 1860	Y 1860	Y 1860
Strand Diameter	[mm]	15.7	12.5	15.7	12.5
Ultimate Force	[kN]	837	744	1,116	930
Dimensions Anchor Body	[mm]	210 x 80	210 x 80	230 x 80	230 x 80
Min. Centre-/Edge Distances	[mm]	350x120/195x80 $f_{cmj,cube} = 32$ MPa	350x120/195x80 $f_{cmj,cube} = 28.7$ MPa		
Oval Duct Inner Dimensions	[mm]	60x21	60x21	80x21	80x21

		BBV L3		BBV L4	
Strand Number		3	3	4	4
Strand Grade	[MPa]	Y 1770	Y 1860	Y 1770	Y 1860
Strand Diameter	[mm]	15.2/15.7	15.2/15.7	15.2/15.7	15.2/15.7
Ultimate Force	[kN]	743/797	781/837	991/1,062	1,042/1,116
Dimensions Anchor Plate	[mm]	160 x 140	160 x 140	180 x 160	180 x 160
<b>Min. Centre-/Edge Distances</b>					
$f_{cmj,cube} = 30$ MPa	[mm]	215x190/130x115	215x190/130x115	245x220/145x130	245x220/145x130
$f_{cmj,cube} = 34$ MPa	[mm]	200x175/120x110	200x175/120x110	230x205/135x125	230x205/135x125
$f_{cmj,cube} = 40$ MPa	[mm]	185x160/115x100	185x160/115x100	215x185/130x115	215x185/130x115
$f_{cmj,cube} = 45$ MPa	[mm]	170x150/105x95	170x150/105x95	200x175/120x110	200x175/120x110
Oval Duct Inner Dimensions	[mm]	60x21	60x21	80x21	80x21

# BENEFITS OF POST-TENSIONED FLAT SLABS

- Improved aesthetical and economical design through greater design flexibility
- Reduced floor thickness
  - Reduced storey height leading to reduced overall building height or additional storeys
  - Savings in vertical transportation, electrical and plumbing systems
  - Savings in excavation or façade cost
  - Reduced total weight of the structure
  - Reduced foundation loads
- Fewer columns
  - Longer clear spans
  - Increased architectural flexibility
  - Reduced total weight of the structure
  - Reduced foundation loads
- Controlled slab deflection
- Crack-free construction
- Rapid construction cycles
- Elimination of joints
- Improved Durability leading to reduced maintenance cost

## REFERENCES



**Hamad Medical City**  
Doha, Qatar



**Allianz Arena**  
Munich, Germany



**IKB Bank**  
Luxembourg



**Floreasca Business Park**  
Bucharest, Romania



**Hauptbahnhof**  
Mannheim, Germany



**Galaxy Bürogebäude**  
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**Nouvel Hopital Civil**  
Strasbourg, France



**Mutter-Kind-Zentrum**  
Linz, Austria



**PalaisQuartier**  
Frankfurt on the Main, Germany



Technology Center  
Linz, Austria



**BBV Systems GmbH**  
Industriestraße 98  
67240 Bobenheim-Roxheim  
Germany  
Phone: +49 (0) 6239 9981-0  
Fax: +49 (0) 6239 9981-39  
info@bbv-systems.com  
[www.bbv-systems.com](http://www.bbv-systems.com)

**BBV Systems Sp. z o.o.**  
ul. Siennicka 25  
80-758 Gdańsk  
Poland  
Phone: +48 (0) 58 30067-93  
Fax: +48 (0) 58 30067-91  
info.pl@bbv-systems.com  
[www.bbv-systems.com](http://www.bbv-systems.com)

**BBV Systems Co., Ltd.**  
6th Floor, MD Tower  
No. 1, Bangna-Trad Road, Soi 25  
Bangna, Bangkok 10260  
Thailand  
Phone: +66 (0) 2769 5699  
Fax: +66 (0) 2769 5690  
info@bbv-systems.co.th  
[www.bbv-systems.com](http://www.bbv-systems.com)

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