

post-tensioning slabs

MK4
Innovative Solutions





Introduction

The Post-Tensioning Slabs for the building industry have been used with success in many countries since the 70's. Nonetheless, in spite of being a tested technique with a high number of finished jobs and very common in many countries, it has a reduced acceptance in others where it is reserved exclusively to single buildings.

Other types of prestressing in building have been introduced and are accepted in the construction business in many countries. The use of prefabricated prestressing parts, like the hollow core slabs, the prefab-slab, small beams or even piles, is common in our buildings, as well as the post-tensioning of beams and retaining walls supported with post-tensioning ground anchors.

Nowadays, the cast in-situ construction of slabs using post-tensioning systems, is an alternative that should be seriously considered. The increasing cost of materials, construction equipment, labor and transport demands the maximum optimization of resources. It also involves the use of high quality techniques, save material costs and are fast in execution.

The Post-Tensioning method lightens the structure, allows the reduction of the slab thickness and allows to release the formwork in record time and it even guaranties a higher durability.

MeKano4 System for Post-Tensioning Slabs

MeKano4, the International company, designs, produces and installs Post-Tensioning Systems created specially for buildings, which have been used in projects as varied as:

- | | | |
|--------------------|-----------------|-------------------|
| ■ Office Buildings | ■ Schools | ■ Parking Lots |
| ■ Hospitals | ■ Theaters | ■ Silos |
| ■ Hotels | ■ Churches | ■ Slabs on Ground |
| ■ Housing | ■ Sport Centers | ■ Settling Tanks |

The MeKano4 System for Post-Tensioning slabs is characterized basically by the following:

- Preliminary study of reinforcement, strand and concrete quantities and slab thickness
- Supply of Post-Tensioning materials according to the requirements of the client
- Possibilities to offer design of the slab
- Technical assistance during the design phase and during the execution works
- Wide range of live ends, dead ends and couplers
- Use of bonded and unbonded tendons in metallic or plastic duct
- Anticorrosion protection by the injection of cement grout, grease or wax
- Light equipment of unitary stressing jacks with automatic wedge setting
- Special designs for jobs and singular details
- Supply of specialized technicians and equipment for the Post-Tensioning works

Quality

MeKano4 has adopted quality as one of its core values toward his clients. The Quality System according to the ISO 9001:2000 Standard implemented in MeKano4 has been certified by the DNV company and it includes the design, fabrication, supply and installation of the full range of anchorages set, as well as all the complementary elements, strand pushing equipment, stressing and grouting equipment.

The Quality System adopted in MeKano4 covers the complete execution of the Post-Tensioning works in all kind of structures.



POST-TENSIONING SLAB – ONE WAY SLAB

Sector Type (1) – Corner with same Spans

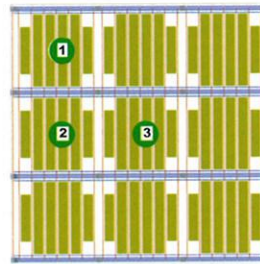
SPAN	LOAD: SW + 5 kN/m ²			LOAD: SW + 10 kN/m ²			LOAD: SW + 20 kN/m ²		
(m)	Thickness (cm)	Reinforcement (Kg/m ²)	PT Strands (Kg/m ²)	Thickness (cm)	Reinforcement (Kg/m ²)	PT Strands (Kg/m ²)	Thickness (cm)	Reinforcement (Kg/m ²)	PT Strands (Kg/m ²)
5	20	7,0	2,4	25	9,0	3,5	30	12,0	4,7
7	25	8,0	2,4	30	11,0	3,5	35	13,0	4,7
10	30	9,0	3,5	35	12,0	4,7	40	14,0	5,9
13	35	11,0	4,7	40	13,0	5,9	45	15,0	7,1
15	40	15,0	5,9	45	16,0	7,1	50	18,0	7,1

Sector Type (2) and (3) - Edge and Center with same Spans

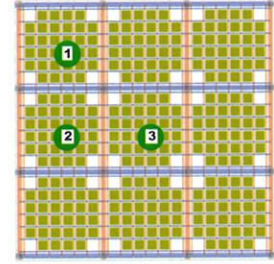
SPAN	LOAD: SW + 5 kN/m ²			LOAD: SW + 10 kN/m ²			LOAD: SW + 20 kN/m ²		
(m)	Thickness (cm)	Reinforcement (Kg/m ²)	PT Strands (Kg/m ²)	Thickness (cm)	Reinforcement (Kg/m ²)	PT Strands (Kg/m ²)	Thickness (cm)	Reinforcement (Kg/m ²)	PT Strands (Kg/m ²)
5	15	7,0	2,4	20	9,0	3,5	25	11,0	4,7
8	20	8,0	2,4	25	11,0	3,5	30	12,0	4,7
10	25	9,0	3,5	30	12,0	4,7	35	13,0	5,9
13	30	10,0	4,7	35	12,0	5,9	40	15,0	7,1
15	35	14,0	5,9	40	15,0	7,1	45	17,0	7,1

Note: In the chart of the one way slab the reinforcement of the beams is not included.

One Way



Two Ways



POST-TENSIONING SLAB - TWO WAY SLABS

Sector Type (1) - Corner with same Spans

SPAN	LOAD: SW + 5 kN/m ²			LOAD: SW + 10 kN/m ²			LOAD: SW + 20 kN/m ²		
(m)	Thickness (cm)	Reinforcement (Kg/m ²)	PT Strands (Kg/m ²)	Thickness (cm)	Reinforcement (Kg/m ²)	PT Strands (Kg/m ²)	Thickness (cm)	Reinforcement (Kg/m ²)	PT Strands (Kg/m ²)
5	18	10,0	4,8	24	13,0	7,0	29	14,0	9,4
8	24	13,0	4,8	28	16,0	7,0	33	16,0	9,4
10	28	16,0	7,0	32	19,0	9,4	37	19,0	11,8
13	32	19,0	9,4	36	21,0	11,8	41	22,0	14,2
15	36	22,0	11,8	40	24,0	14,2	45	25,0	14,2

Sector Type (2) - Edge with same Spans

SPAN	LOAD: SW + 5 kN/m ²			LOAD: SW + 10 kN/m ²			LOAD: SW + 20 kN/m ²		
(m)	Thickness (cm)	Reinforcement (Kg/m ²)	PT Strands (Kg/m ²)	Thickness (cm)	Reinforcement (Kg/m ²)	PT Strands (Kg/m ²)	Thickness (cm)	Reinforcement (Kg/m ²)	PT Strands (Kg/m ²)
5	17	10,0	4,8	20	13,0	7,0	23	14,0	9,4
8	22	12,0	4,8	24	15,0	7,0	27	15,0	9,4
10	26	15,0	7,0	28	18,0	9,4	31	18,0	11,8
13	30	18,0	9,4	33	20,0	11,8	38	21,0	14,2
15	34	21,0	11,8	37	23,0	14,2	42	24,0	14,2

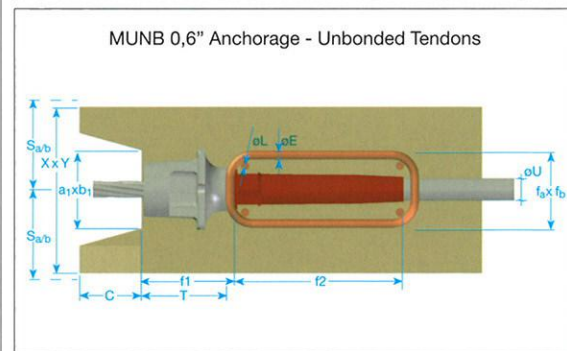
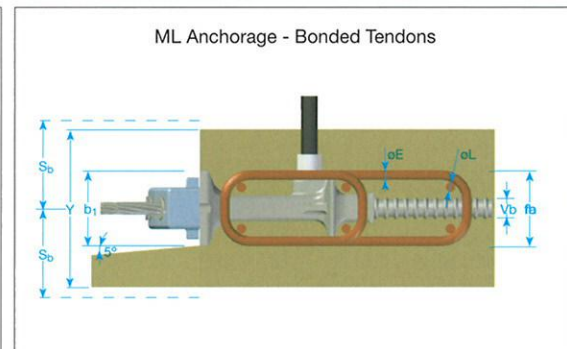
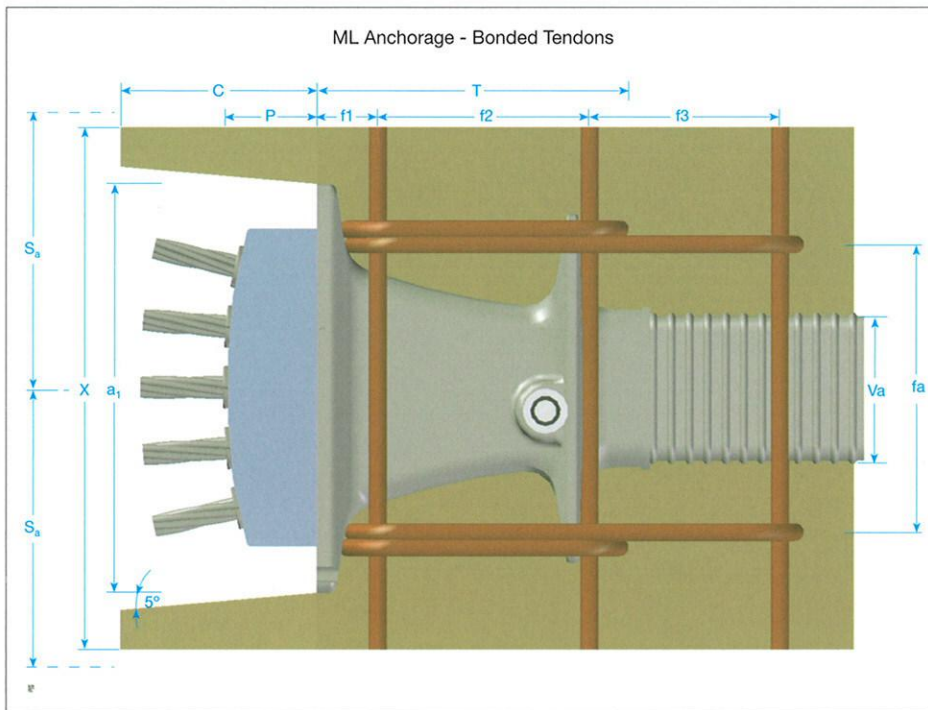
Sector Type (3) - Center with same Spans

SPAN	LOAD: SW + 5 kN/m ²			LOAD: SW + 10 kN/m ²			LOAD: SW + 20 kN/m ²		
(m)	Thickness (cm)	Reinforcement (Kg/m ²)	PT Strands (Kg/m ²)	Thickness (cm)	Reinforcement (Kg/m ²)	PT Strands (Kg/m ²)	Thickness (cm)	Reinforcement (Kg/m ²)	PT Strands (Kg/m ²)
5	16	10,0	4,8	19	12,0	7,0	21	12,0	9,4
8	20	11,0	4,8	22	14,0	7,0	25	14,0	9,4
10	25	14,0	7,0	26	17,0	9,4	29	17,0	11,8
13	29	17,0	9,4	31	19,0	11,8	35	20,0	14,2
15	32	20,0	11,8	35	22,0	14,2	40	23,0	14,2

Note: The quantities on all these charts are intended to give an approximate range of the amounts.
MeKano4,S.A. thanks Luis Bozzo Estructuras y Proyectos, S.L. for the production of these tables.

MK4 Slab Anchorages Properties

PROPERTIES				APPLICATION				DIMENSIONS						
Type	N° Strands	Strand Type Y1860 S7	Bearing Area cm ²	Unbonded Tendon	Bonded Tendon	Live End	Dead End	C (mm)	P (mm)	a1 (mm)	b1 (mm)	T (mm)	Va / ØU (mm)	Vb (mm)
MUNB 0,6"	1	15,2 or 16 mm	85	■		■	■	55	-	135	73	79	20	-
MF 4/0,6"	4	15,2 or 16 mm	275	■	■	■		120	68	236	125	155	75	20
ML 4/0,6"	4	15,2 or 16 mm	330		■	■		120	55	220	100	215	75	20
ML 5/0,6"	5	15,2 or 16 mm	380		■	■		120	65	270	90	210	95	20
MPSB 4/0,6"	4	15,2 or 16 mm	310	■	■		■	120	15	280	110	900	75	20
MPSB 5/0,6"	5	15,2 or 16 mm	385	■	■		■	120	15	350	110	1200	95	20
ML 4/0,5"	4	13 mm	215		■	■		120	45	180	90	180	75	20
ML 5/0,5"	5	13 mm	330		■	■		120	60	220	100	215	75	20
MPSB 4/0,5"	4	13 mm	205	■	■		■	120	15	230	90	750	72	18
MPSB 5/0,5"	5	13 mm	255	■	■		■	120	15	285	90	1000	72	18



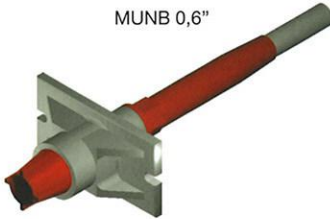
Reinforcement Steel

DISTANCE TO EDGE				DISTANCE BETWEEN ANCHORAGES				BURSTING REINFORCEMENT - EXAMPLE						
Type	Fo max. (kN)	Sa (mm)	Sb (mm)	X (mm)	Y (mm)	a (mm)	b (mm)	ØE (mm)	ØL (mm)	fa (mm)	fb (mm)	f1 (mm)	f2 (mm)	f3 (mm)
MUNB 0,6"	209	120	75	180	125	203	110	8	8	110	62	95	140	-
MF 4/0,6"	837	200	115	310	215	354	189	10	10	240	100	45	125	125
ML 4/0,6"	837	190	120	285	180	330	150	12	12	240	90	50	125	125
ML 5/0,6"	1.047	220	120	350	155	405	135	12	12	260	90	50	125	125
MPSB 4/0,6"	837	230	100	370	185	420	165	12	12	260	80	50	125	125
MPSB 5/0,6"	1.047	280	100	460	185	525	165	12	12	330	80	50	125	125
ML 4/0,5"	558	155	90	235	155	270	135	10	10	240	80	50	125	125
ML 5/0,5"	698	190	120	285	180	330	150	12	12	240	90	50	125	125
MPSB 4/0,5"L	558	190	85	300	155	345	135	10	10	210	80	50	125	125
MPSB 5/0,5"L	698	230	85	370	155	428	135	12	12	275	80	50	125	125

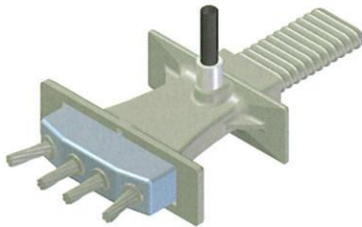
Notes: (a/a₁) = (b/b₁) = 1,5 rates have been considered

If the rates (a/a₁) or (b/b₁) change, the concrete strength is different to 28 N/mm² or the gap between anchorages is different, the bursting reinforcement in the table is not valid and should be calculated again. This chart is for guidance only and it will be the designer's responsibility to determine the appropriate reinforcement in each project.

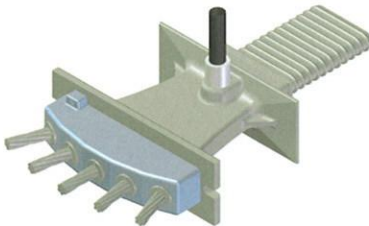
MUNB 0,6"



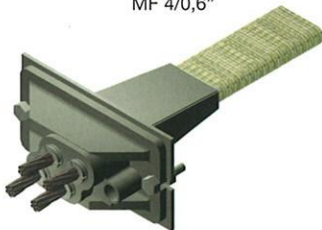
ML 4/0,5" - ML 4/0,6"



ML 5/0,5" - ML 5/0,6"



MF 4/0,6"



Strand Properties

STRAND GRADE 1860 MPa LOW RELAXATION ACCORDING TO EN10138-3 EURO NORM

NOMINAL DIAMETER (mm)	NOMINAL AREA (mm ²)	NOMINAL MASS (g/m)	MINIMUM BREAKING LOAD Fpk (kN)	E. YIELD (kN)	STRESSING LOAD ⁽¹⁾ Fo (kN)
15,2	140	1095	260	224	195
16	150	1170	279	240	209,3
13	100	781	186	160	139,5

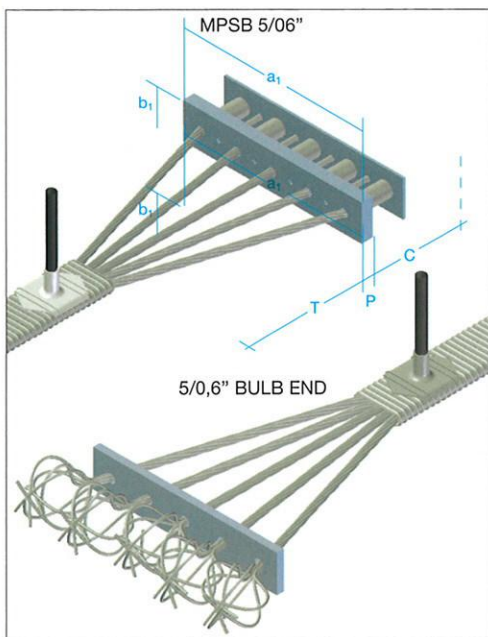
Note (1): 75% Fpk according to EURO NORM

Note (2): All types of strand can be supplied for bonded and unbonded tendons.

Tendon Properties

UNBONDED		ANCHORAGES		STRAND Ø 16 mm. Y 1860 S 7		
Type	N° of Strands	Live Ends	Dead Ends	Stressing Force Fo (kN)	Nominal Area Ap (mm²)	Nominal Mass (Kg/m)
1/0,6"	1	MUNB 1/0,6"	MUNB 1/0,6"	209,3	150	1,3
2/0,6"	2	MF 4/0,6"	MPSB 4/0,6"	418,6	300	2,6
3/0,6"	3	MF 4/0,6"	MPSB 4/0,6"	627,9	450	3,9
4/0,6"	4	MF 4/0,6"	MPSB 4/0,6"	837,2	600	5,2
BONDED 0,6"		ANCHORAGES		STRAND Ø 16 mm. Y 1860 S 7		
Type	N° of Strands	Live Ends	Dead Ends	Stressing Force Fo (kN)	Nominal Area Ap (mm²)	Nominal Mass (Kg/m)
2/0,6"	2	ML 4/0,6"	MPSB 4/0,6"	419	300	2,3
3/0,6"	3	ML 4/0,6"	MPSB 4/0,6"	628	450	3,5
4/0,6"	4	ML 4/0,6"	MPSB 4/0,6"	837	600	4,7
5/0,6"	5	ML 5/0,6"	MPSB 5/0,6"	1.047	750	5,9
BONDED 0,5"		ANCHORAGES		STRAND Ø 13 mm. Y 1860 S 7		
Type	N° of Strands	Live Ends	Dead Ends	Stressing Force Fo (kN)	Nominal Area Ap (mm²)	Nominal Mass (Kg/m)
2/0,5"	2	ML 4/0,5"	MPSB 4/0,5"	279	200	1,6
3/0,5"	3	ML 4/0,5"	MPSB 4/0,5"	419	300	2,3
4/0,5"	4	ML 4/0,5"	MPSB 4/0,5"	558	400	3,1
5/0,5"	5	ML 5/0,5"	MPSB 5/0,5"	698	500	3,9
FRICTION RATES				μ (rad·1)		k (m·1)
Bonded Tendons		Range		0,18 – 0,26		0,0006 – 0,0033
		Usual Calculation Rate		0,22		0,0025
Unbonded Tendons		Range		0,05 – 0,07		0,0003 – 0,0007
		Usual Calculation Rate		0,07		0,0007

MeKano4,S.A. has all rights reserved to erase or change any information shown in this catalogue, at any time and without notice.





MeKano4, S.A.

www.mekano4.com

HEADQUARTERS

Can Pantiquet, 47
08100 Mollet del Vallés
Barcelona, Spain

Tel. +34 902 153 533
Fax +34 935 706 003

mk4@mekano4.com

