

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS PRETENSADAS
MODELO T.13

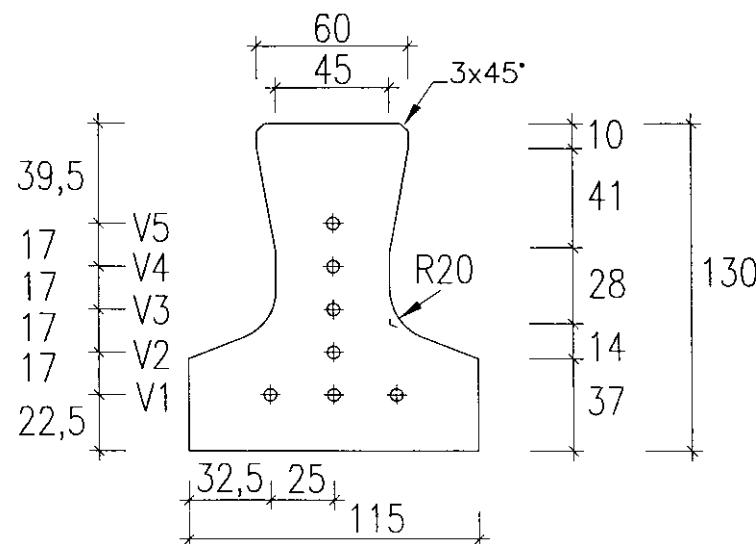
PREFABRICADOS NAVARRO , S.A.

Ctra. Alicante-Cartagena, km 18
03190 PILAR DE LA HORADADA (Alicante)

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja n° 1 de 34

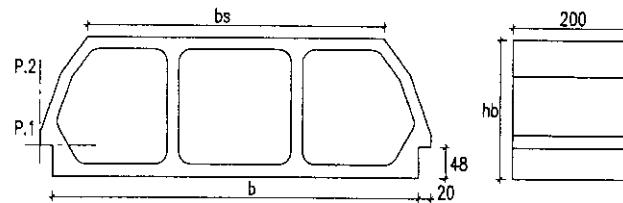
1.- VIGUETA T.13



PESO (kN/ml) : 0.23

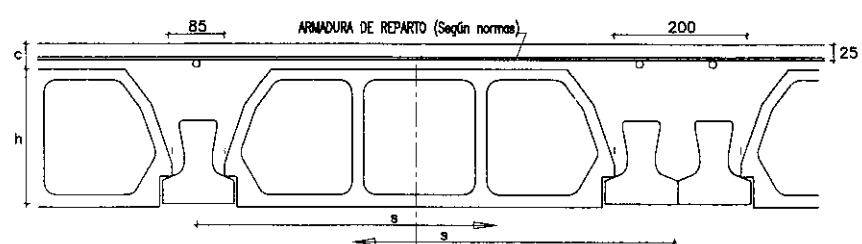
Cotas en mm

2.- BLOQUES ALIGERANTES



Código	Cotas y coordenadas en mm					PESO (N/ud.)		
	hb	b	bs	P.1	P.2	Cerámico	Hormigón	Poliest.
B10* 71	102	585	475	0; 20		66	129	1
B13* 71	132	585	475	0; 20		72	140	2
B20* 71	202	585	475	0; 20	33; 76	85	165	3
B22* 71	222	585	475	0; 20	33; 93	89	172	3
B25* 71	252	585	475	0; 20	33; 126	95	183	3
B26* 71	262	585	475	0; 20	33; 146	97	186	3
B27* 71	272	585	475	0; 20	33; 156	99	190	3
B30* 71	302	585	480	0; 20		105	201	4

3.- FORJADOS



TIPO DE FORJADO (h + c) * s [/D]	BLOQUE	HORMIGON IN SITU litros/m2	PESO (kN/m2)		
			Cerámico	Hormigón	Poliest.
(10+ 7)* 71.	B10* 71	74	2.57	3.01	2.11
(10+ 7)* 82.5D	B10* 71	76	2.77	3.17	2.38
(13+ 4)* 71.	B13* 71	51	2.05	2.53	
(13+ 4)* 82.5D	B13* 71	56	2.33	2.75	
(13+ 5)* 71.	B13* 71	61	2.28	2.77	1.79
(13+ 5)* 82.5D	B13* 71	66	2.57	2.99	2.15

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TIPO DE FORJADO (h + c) * s [/D]	BLOQUE	HORMIGON IN SITU litros/m2	PESO (kN/m2)		
			Cerámico	Hormigón	Poliest.
(20+ 4)* 71.	B20* 71	67	2.53	3.09	
(20+ 4)* 82.5D	B20* 71	80	2.98	3.46	
(20+ 5)* 71.	B20* 71	77	2.77	3.33	2.20
(20+ 5)* 82.5D	B20* 71	90	3.23	3.71	2.73
(22+ 4)* 71.	B22* 71	71	2.65	3.24	
(22+ 4)* 82.5D	B22* 71	86	3.15	3.66	
(22+ 5)* 71.	B22* 71	81	2.89	3.47	2.28
(22+ 5)* 82.5D	B22* 71	96	3.39	3.89	2.86
(25+ 4)* 71.	B25* 71	76	2.80	3.42	
(25+ 4)* 82.5D	B25* 71	94	3.38	3.92	
(25+ 5)* 71.	B25* 71	86	3.04	3.67	2.39
(25+ 5)* 82.5D	B25* 71	104	3.62	4.16	3.06
(26+ 4)* 71.	B26* 71	76	2.83	3.46	
(26+ 4)* 82.5D	B26* 71	96	3.44	3.98	
(26+ 5)* 71.	B26* 71	86	3.07	3.70	2.41
(26+ 5)* 82.5D	B26* 71	106	3.68	4.23	3.11
(27+ 4)* 71.	B27* 71	78	2.88	3.53	
(27+ 4)* 82.5D	B27* 71	99	3.52	4.07	
(27+ 5)* 71.	B27* 71	88	3.13	3.76	2.45
(27+ 5)* 82.5D	B27* 71	109	3.75	4.31	3.18
(30+ 4)* 71.	B30* 71	89	3.19	3.86	
(30+ 4)* 82.5D	B30* 71	112	3.87	4.46	
(30+ 5)* 71.	B30* 71	99	3.42	4.10	2.72
(30+ 5)* 82.5D	B30* 71	122	4.12	4.70	3.51

4.- MATERIALES Y CONTROL

CONTROL(1)

HORM. VIGUETA 1 a 6 : HP-40/P/12/IIa fck = 40.0 N/mm², Gamma.c = 1.50

HORMIGON IN SITU : HA-25/B/16/IIa fck = 25.0 N/mm², Gamma.c = 1.50 NORMAL

ACERO ARMADURA ACTIVA : Y 1860 C II fpk = 1658 N/mm², Gamma.s = 1.15,

ACERO REFUERZO SUPERIOR : B400S fyk = 400 N/mm², Gamma.s = 1.15, NORMAL

ACERO REFUERZO SUPERIOR : B500S fyk = 500 N/mm², Gamma.s = 1.15, NORMAL

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5.- ARMADO, TENSIONES, PERDIDAS Y VALORES RESISTENTES DE LA VIGUETA T.13 (2)

ARMADURA	ALTURA V (mm)	TIPOS DE VIGUETA					
		1	2	3	4	5	6
INFERIOR V1	22.50		2φ5	2φ5	2φ5	3φ5	3φ5
V2	39.50	1φ5		1φ5	1φ5	1φ5	1φ5
V3	56.50				1φ5		1φ5
SUPERIOR V4	73.50	1φ5				1φ5	1φ5
V5	90.50		1φ5	1φ5	1φ5	1φ5	1φ5
TENSION INICIAL (N/mm ²)		1324	1324	1324	1324	1324	1324
Armadura inferior		1324	1324	1324	1324	1324	1324
Armadura superior		1324	1324	1324	1324	1324	1324
PERDIDAS FINALES (%)		18.1	21.1	23.8	25.6	27.7	28.6
Armadura inferior		19.1	19.9	21.8	25.2	26.8	29.3
Armadura superior							
MOMENTO FLECTOR (m·kN)							
SERVICIO: Sobre sopandas		1.8	1.6	1.7	2.1	1.9	1.4
SERVICIO: En vano		1.1	2.5	3.3	3.2	3.1	2.7
ULTIMO: Sobre sopandas		2.8	2.8	3.0	3.5	3.9	4.0
ULTIMO: En vano		3.1	4.9	5.5	5.3	5.7	5.4
ESFUERZO CORTANTE (kN)		6.4	9.1	10.0	11.0	13.1	13.8
RIGIDEZ EI (m ² MN)		0.4	0.5	0.5	0.5	0.5	0.5
MODULO RESIST.W1,s (cm ³)		268	282	284	283	290	290
FUERZA PRET. Pi (kN)		48.72	71.88	94.28	116.3	138.0	159.4
EXCENTRICIDAD e,s (mm)		3.1	7.4	8.5	6.1	6.9	5.4
CLASE EXP. AMB. RECUBR.		IIIa*	IIa*	IIa*	IIa*	IIa*	IIa*

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6. - NOTAS

- (1) Los materiales colocados en obra se controlarán (recepción y ejecución) según los cap. 16 y 17 de la EHE-08, con el nivel indicado y bajo la dirección de la Dirección Facultativa. En los forjados con capa de compresión de 50 mm, tipo $(h+5)*s$, el árido del hormigón de la obra podrá ser de tamaño máximo D = 20 mm
- (2) Los valores resistentes se refieren a: los momentos flectores de 'servicio' y últimos a comparar según 59.2 EHE-08; justificado con ensayos el esfuerzo cortante podrá aumentarse; la rigidez EI, la fuerza de pretensado Pi y la excentricidad del elemento simple e,s intervienen en el cálculo de la contraflecha: $y_i = P_i * e,s * L_2 / (8 * EI)$. La Clase de exposición ambiental se deduce de las tablas de recubrimientos mínimos de 37.2.4.1 EHE-08. Se ha considerado una vida útil de 50 años, pero las indicadas con asterisco* cumplen hasta 100 años. Para ambientes más agresivos se completará con el revestimiento adecuado; el hormigón debe cumplir con la tabla 37.3.2.a EHE-08.
- (3) Los momentos flectores y los cortantes y rasantes producidos por las cargas mayoradas con el coef. Gamma.f, serán menores que los valores últimos Mu y Vu.
- (4) El esfuerzo cortante último Vu, corresponde, en la 1ª columna de la flexión positiva, a 11.2 y 3 del MC-78 y en la 2ª columna, a 44.2.3.2.1.2 EHE-08. En flexión negativa corresponden a bo, ancho mínimo en la altura 3/4d, y en la 2ª columna, al perímetro crítico de contacto entre hormigones. Los valores en la columna 'bo' corresponden al tipo de viga 1 (el menos armado) y son superiores en los tipos de viga más armados (por una mayor tensión media $\sigma'cd$); estos valores se detallan en la memoria técnica del producto, pero el valor de cortante que se aplicará no será nunca superior al de la columna 'Perim.'
- (5) El esfuerzo rasante último Vd, se ha calculado según 47.1-2 EHE-08 con $\beta = 0,8$
- (6) Los valores indicados se han calculado según 50.2.2.2 EHE-08, pero homogeneizados. Para estimar las deformaciones se aplicará este mismo apartado y el siguiente de la EHE-08, limitándose las flechas según CTE DB-SE 4.3.3.1 o los Comentarios de EHE-08 apart. 50.1.
- A 28 días. Para otra edad se multiplicarán por los factores:
- | Edad | 7 días | 14 días | 21 días | 3 meses | 6 meses | 1 año | >5 años |
|--------------------|--------|---------|---------|---------|---------|-------|---------|
| Rigidez total | 0,94 | 0,98 | 0,99 | 1,03 | 1,05 | 1,06 | 1,07 |
| Momento fisuración | 0,82 | 0,92 | 0,87 | 1,08 | 1,11 | 1,13 | 1,16 |
- (7) Los momentos de la combinación frecuente sin mayorar ($G.f = 1$), serán menores que los momentos límite de servicio. Mo' se refiere al límite en que las armaduras activas están en zona comprimida, a comparar con la combinación cuasi-permanente de acciones. El momento FISUR. es el de fisuración ($< M_{fis} 0,2 \text{ mm}$).
- (8) La relación x/d es la profundidad de la fibra neutra respecto al canto útil. A considerar cuando el análisis se haya efectuado según 19.2.3 y 21.º EHE-08.
- (9) Sin macizar, en el refuerzo superior negativo sólo se utilizarán los elementos hasta el tipo indicado, no limitado por la capacidad mecánica del hormigón.
- (10) Wk es la abertura característica de fisura, según 49.2.4 EHE-08, debida a un momento solicitante $M_u/1,4$. La abertura que provocan las acciones (combinación cuasi-permanente) es proporcional a los momentos hasta un mínimo de 0,4 Wk. Según 5.1.1.2 EHE-08, los límites de Wk son: $s \leq 0,4 \text{ mm}$ en Clase de exp. ambiental I, $s \leq 0,3$ en Clase IIa y IIb, $s \leq 0,2$ en Clase IIIb, IV, F y Qa, y $0,1$ en Clase IIIc, Qb y Qc. En el caso de un recubrimiento armadura superior de 30 mm se reducirá M_u en $5,5/d$ y EI_{fis} en $10/d$ ($d = \text{canto útil en mm}$).
- (11) Al construir sin cimbrar, al evaluar el momento solicitante para compararlo con el momento (E.L.S.), se multiplicará el peso propio del forjado por la relación a, (módulo resistente -fibra inferior- de la sección compuesta dividido por el de la sección simple: $W_{1,c} / W_{1,s}$); las solicitudes se estudian por fases 1º peso propio, 2º resto de cargas, considerando la fluencia.
- (12) La excentricidad de la fuerza de pretensado en el elemento compuesto es la suma de la del elemento simple e,s (Apart. 5) más el incremento indicado.

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FLEXION POSITIVA (por m)											
TIPO DE FORJADO (h + c) * s	TIPO DE VIGUETA	MOMENTO	ESFUERZO CORTANTE ULTIMO		ESFUERZO	MOMENTO DE	RIGIDEZ		MOMENTOS E.L.S.		
		ULTIMO Mu	MC-78	EHE-08	RASANTE Md<Mo	PI SURACION Sección tipos	FISURACION (hormigón in situ) Mf	TOTAL FISURADA E·Ih	E·If	FISUR. Mo' DE SERVICIO	
		m·kN/m	Md<Mo	Md>Mo						DESCOMP.	
		1+Mo/Md=2									
		m·kN/m	kN/m	kN/m	kN/m	m·kN/m	m2·MN/m			m·kN/m	
		(3)	(4)	(4)	(5)	(6)	(6)			(7)	
(10+ 7)	T.13-1	9.5	16.7	17.1	33.0	6.3	4.0	3.6	7.8	5.2	3.7
* 71.	-2	15.5	19.0	21.3	35.8	6.5	4.1	3.7	12.3	9.5	8.0
	-3	20.8	19.6	23.0	34.4	6.5	4.2	3.8	15.2	13.0	10.9
	-4	25.3	20.3	24.4	33.0	6.6	4.2	3.8	17.1	15.1	12.6
	-5	30.0	22.2	25.7	34.8	6.7	4.3	3.9	20.0	18.6	15.5
	-6	34.3	22.9	24.6	33.3	6.7	4.3	3.9	21.8	20.7	17.3

	FLEXION NEGATIVA (por m)																			
REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERT. FISURA						B500 MOMENTO ULTIMO-ABERT. FISURA						ESF.	CORTANTE	ESF.	MOMENTO	RIGIDEZ			
	Sección tipo			Sección maciza			Sección tipo			Sección maciza							TOTAL FIS.			
	Mu	Rel.	Vig.	Wk	Mu	Rel.	Wk	Mu	Rel.	Vig.	Wk	Mu	Vu	Vr,u	Mf	E·Ih	E·If			
	x/d			lím.	x/d			x/d				x/d				m·kN/m	m2·MN/m			
	m·kN/m	mm	m·kN/m	mm	m·kN/m	mm	m·kN/m	mm	m·kN/m	mm	kN/m	kN/m	(4)	(5)	(6)	(6)				
	(3)	(8)	(9)	(10)	(3)	(8)	(10)													
1φ10	4.3	.12	6	.07	4.5	.01	.07	5.3	.15	6	.09	5.5	.01	.09	17.4	25.1	34.0	8.8	4.0	0.4
2φ 8	5.5	.15	6	.07	5.8	.01	.07	6.7	.19	6	.09	7.1	.01	.09	17.5	25.3	34.2	8.9	4.0	0.5
1φ12	6.0	.17	6	.08	6.4	.01	.08	8.8	.21	6	.10	7.9	.02	.10	17.2	24.9	33.7	8.9	4.0	0.5
1φ 8+1φ10	6.8	.19	6	.07	7.3	.01	.08	10.0	.24	6	.09	9.1	.02	.10	17.6	25.2	34.1	8.9	4.0	0.5
2φ10	9.8	.24	6	.07	8.9	.02	.07	11.9	.29	6	.11	11.0	.02	.09	18.4	25.1	34.0	8.9	4.0	0.6
1φ10+1φ12	11.6	.29	6	.09	10.7	.02	.08	14.0	.36	6	.14	13.3	.03	.10	19.2	25.0	33.8	9.0	4.0	0.7
1φ16	11.9	.31	6	.11	11.1	.02	.08	14.3	.39	6	.17	13.7	.03	.11	19.2	24.6	33.3	8.9	4.0	0.7
2φ12	13.4	.34	6	.10	12.6	.02	.08	15.9	.45	6	.15	15.6	.03	.10	20.0	24.9	33.7	9.0	4.0	0.8
1φ10+1φ16	15.7	.45	6	.14	15.3	.03	.10	19.0	.52	4	.19	22.7	.04	.12	20.0	25.5	33.5	9.0	4.0	0.9
1φ12+1φ16	17.1	.52	6	.14	17.1	.03	.09	21.3	.53	2	.20	25.4	.04	.11	20.0	26.5	33.4	9.1	4.0	0.9
3φ12	18.5	.54	5	.12	22.4	.04	.08	23.4	.52	1	.17	27.6	.05	.10	20.2	27.4	33.7	9.1	4.0	1.0
2φ16	21.1	.60	3	.15	25.9	.04	.08	24.6	.66	1	.20	31.9	.05	.11	19.9	28.7	33.3	9.1	4.0	1.1
4φ12	24.5	.57	1	.13	29.5	.05	.08	0.0	.00	0.0	0.0	36.2	.06	.10	20.2	30.1	33.7	9.3	4.0	1.2
2φ16+1φ12	25.7	.67	1	.15	32.9	.06	.09	0.0	.00	0.0	0.0	40.4	.07	.11	20.0	30.8	33.4	9.3	4.0	1.3
2φ10+2φ16	0.0	.00	.00	35.7	.06	.10	0.0	.00	0.0	0.0	43.7	.08	.12	20.0	30.9	33.5	9.4	4.1	1.3	
3φ16	0.0	.00	.00	38.0	.07	.08	0.0	.00	0.0	0.0	46.5	.08	.11	19.9	30.7	33.3	9.4	4.1	1.4	
6φ12	0.0	.00	.00	43.1	.07	.08	0.0	.00	0.0	0.0	52.6	.09	.10	20.2	31.2	33.7	9.6	4.1	1.5	
4φ16	0.0	.00	.00	49.5	.09	.08	0.0	.00	0.0	0.0	60.2	.11	.11	19.9	30.7	33.3	9.6	4.1	1.6	

RELACION q o RELACION $w_{l,c} / w_{l,s}$ (11) : 2.58

INCREMENTO EXCENTRICIDAD (e.c.e.s), mm (12) : 69.6

ESEUERZO CORTANTE ULTIMO Vu. Sección maciza. kN/m : 96.2

Esfuerzo rasante último vu. Sección maciza. kN/m : 63,7

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FLEXION POSITIVA (por m)

TIPO DE FORJADO (h + c) * s	TIPO DE VIGUETA	MOMENTO ULTIMO Mu	ESFUERZO CORTANTE ULTIMO		ESFUERZO RASANTE Sección tipo	MOMENTO DE FISURACION (hormigón in situ) Mf	RIGIDEZ		MOMENTOS E.L.S.		
			MC-78	EHE-08			Md<Mo	Md>Mo	E·Ih	E·If	FISUR.
			m·kN/m				KN/m		kN/m		Mo'
(10+7)*82.5D	T.13-1	16.1	27.3	28.2	46.6	10.2	5.8	5.4	12.6	8.9	5.9
	-2	26.1	31.1	35.5	50.5	10.5	5.9	5.5	19.7	15.6	12.8
	-3	34.8	32.3	35.9	48.6	10.6	6.0	5.6	24.6	21.5	17.6
	-4	41.8	33.5	34.4	46.6	10.7	6.0	5.6	27.4	24.7	20.2
	-5	49.3	36.7	36.2	49.0	10.9	6.1	5.7	32.4	30.6	25.1
	-6	55.3	37.9	34.7	47.0	10.9	6.2	5.8	35.2	34.0	27.9

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERT. FISURA				B500 MOMENTO ULTIMO-ABERT. FISURA				ESF. CORTANTE bo	ESF. RAS.	MOMENTO FISUR.	RIGIDEZ TOTAL FIS.	
	Sección tipo		Sección maciza		Sección tipo		Sección maciza						
	Mu	Rel. Vig. Wk	Mu	Rel. Wk	Mu	Rel. Vig. Wk	Mu	Rel. Wk	x/d	Vu			
	m·kN/m	mm	m·kN/m	mm	m·kN/m	mm	m·kN/m	mm	m·kN/m	kN/m	m·kN/m	m2·MN/m	
	(3)	(8)	(9)	(10)	(3)	(8)	(10)			(4)	(5)	(6)	(7)
1φ10	0.0	.00	.00	0.0	.00	.00	0.0	.00	.00	28.7	35.4	47.9	10.9
2φ 8	0.0	.00	.00	0.0	.00	.00	6.0	.09	6.09	6.2	.01	.09	28.9
1φ12	5.4	.09	6.08	5.5	.01	.08	6.6	.11	6.10	6.8	.01	.10	28.5
1φ 8+1φ10	6.1	.10	6.08	6.3	.01	.08	7.6	.12	6.10	7.8	.01	.10	28.8
2φ10	7.4	.12	6.07	7.7	.01	.07	10.9	.15	6.09	9.5	.02	.09	28.7
1φ10+1φ12	8.9	.14	6.08	9.3	.02	.08	13.1	.18	6.10	11.5	.02	.10	28.6
1φ16	11.0	.15	6.08	9.5	.02	.08	13.4	.19	6.11	11.8	.02	.11	28.0
2φ12	12.4	.17	6.08	10.9	.02	.08	15.2	.21	6.13	13.5	.03	.10	28.5
1φ10+1φ16	14.9	.21	6.11	13.3	.03	.10	18.2	.27	6.18	19.7	.03	.12	29.6
1φ12+1φ16	16.6	.24	6.13	14.8	.03	.09	20.1	.30	6.19	22.0	.04	.11	30.4
3φ12	17.9	.26	6.11	19.4	.03	.08	21.7	.32	6.16	23.9	.04	.10	31.2
2φ16	20.5	.31	6.14	22.5	.04	.08	24.6	.39	6.20	27.7	.05	.11	32.1
4φ12	23.0	.34	6.12	25.5	.04	.08	27.5	.44	6.17	31.4	.05	.10	33.2
2φ16+1φ12	25.3	.40	6.15	28.6	.05	.09	29.9	.51	6.20	35.1	.06	.11	32.9
2φ10+2φ16	27.1	.44	6.15	31.0	.05	.10	32.2	.53	5.20	38.0	.07	.12	33.0
3φ16	28.5	.48	6.15	33.0	.06	.08	34.4	.55	4.20	40.5	.07	.11	32.8
6φ12	31.6	.54	6.13	37.5	.06	.08	39.3	.56	2.17	45.9	.08	.10	33.2
4φ16	36.1	.59	4.15	43.2	.08	.08	43.6	.63	1.20	52.7	.09	.11	32.8

RELACION a o RELACION W_{1,c} / W_{1,s} (11) : 2.42

INCREMENTO EXCENTRICIDAD (e,c-e,s), mm (12) : 58.6

ESFUERZO CORTANTE ULTIMO Vu, Sección maciza, kN/m : 96.2

ESFUERZO RASANTE ULTIMO Vu, Sección maciza, kN/m : 74.5

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS PRETENSADAS
MODELO T.13

PREFABRICADOS NAVARRO , S.A.

Ctra. Alicante-Cartagena, km 18
03190 PILAR DE LA HORADADA (Alicante)

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja nº 7 de 34

FLEXION POSITIVA (por m)

TIPO DE FORJADO (h + c) * s	TIPO DE VIGUETA	MOMENTO ULTIMO Mu	ESFUERZO CORTANTE ULTIMO		ESFUERZO RASANTE Sección tipo	MOMENTO DE FISURACION (hormigón in situ) Mf	RIGIDEZ		MOMENTOS E.L.S.		
			MC-78	EHE-08 Md<Mo 1+Mo/Md=2			E·Ih	E·If	FISUR. Mo'	DESCOMP. DE SERVICIO	
			m·kN/m	kN/m			m·kN/m	(6)	m·kN/m	(7)	
(13+ 4)* 71.	T.13-1	9.5	16.7	17.1	31.2	6.0	3.9	3.6	7.9	5.3	3.7
	-2	15.5	19.0	21.3	33.8	6.2	4.0	3.7	12.3	9.5	8.0
	-3	20.8	19.6	23.0	32.5	6.2	4.1	3.8	15.3	13.1	11.0
	-4	25.3	20.3	23.0	31.2	6.3	4.1	3.8	17.1	15.1	12.6
	-5	30.0	22.2	24.3	32.8	6.4	4.2	3.9	20.0	18.6	15.5
	-6	34.3	22.9	23.2	31.5	6.4	4.2	3.9	21.8	20.7	17.3

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERT. FISURA				B500 MOMENTO ULTIMO-ABERT. FISURA				ESF. CORTANTE bo Perim. Vu	ESF. RAS. Vu,u	MOMENTO FISUR. Mf	RIGIDEZ TOTAL FIS. E·Ih E·If				
	Sección tipo		Sección maciza		Sección tipo		Sección maciza									
	Mu	Rel. Vig. Wk	Mu	Rel. Wk	Mu	Rel. Vig. Wk	Mu	Rel. Wk								
	x/d	lím.	x/d	lím.	x/d	lím.	x/d	lím.								
	m·kN/m	mm	m·kN/m	mm	m·kN/m	mm	m·kN/m	mm	kN/m	kN/m	kN/m	m2·MN/m				
	(3)	(8)	(9)	(10)	(3)	(8)	(9)	(10)	(4)	(5)	(6)	(6)				
1φ10	4.3	.12	6 .07	4.5 .01 .07	5.3 .15	6 .09	5.5 .01	.09	17.4	23.7	32.1	8.9	3.9 0.4			
2φ 8	5.5	.15	6 .07	5.8 .01 .07	6.7 .19	6 .09	7.1 .01	.09	17.5	23.9	32.3	9.0	3.9 0.5			
1φ12	6.0	.17	6 .08	6.4 .01 .08	8.8 .21	6 .10	7.9 .02	.10	17.2	23.5	31.9	9.0	3.9 0.5			
1φ 8+1φ10	6.8	.19	6 .07	7.3 .01 .08	10.0 .24	6 .09	9.1 .02	.10	17.6	23.8	32.2	9.0	3.9 0.5			
2φ10	9.8	.24	6 .07	8.9 .02 .07	11.9 .29	6 .11	11.0 .02	.09	18.4	23.7	32.1	9.0	3.9 0.6			
1φ10+1φ12	11.6	.29	6 .09	10.7 .02 .08	14.0 .36	6 .14	13.3 .03	.10	19.2	23.6	32.0	9.1	3.9 0.7			
1φ16	11.9	.31	6 .11	11.1 .02 .08	14.3 .39	6 .17	13.7 .03	.11	19.2	23.2	31.4	9.0	3.9 0.7			
2φ12	13.4	.34	6 .10	12.6 .02 .08	15.9 .45	6 .15	15.6 .03	.10	20.0	23.5	31.9	9.1	3.9 0.8			
1φ10+1φ16	15.7	.45	6 .14	15.3 .03 .10	19.0 .52	4 .19	22.7 .04	.12	20.0	24.6	31.6	9.1	3.9 0.9			
1φ12+1φ16	17.1	.52	6 .14	17.1 .03 .09	21.3 .53	2 .20	25.4 .04	.11	20.0	25.5	31.6	9.2	3.9 0.9			
3φ12	18.5	.54	5 .12	22.4 .04 .08	23.4 .52	1 .17	27.6 .05	.10	20.2	26.4	31.9	9.3	3.9 1.0			
2φ16	21.1	.60	3 .15	25.9 .04 .08	24.5 .66	1 .19	31.9 .05	.11	19.9	27.6	31.4	9.3	3.9 1.1			
4φ12	24.5	.57	1 .13	29.5 .05 .08	0.0 .00	.00	36.2 .06	.10	20.2	29.0	31.9	9.4	3.9 1.2			
2φ16+1φ12	25.6	.68	1 .15	32.9 .06 .09	0.0 .00	.00	40.4 .07	.11	20.0	29.1	31.5	9.4	3.9 1.3			
2φ10+2φ16	0.0	.00	.00	35.7 .06 .10	0.0 .00	.00	43.7 .08	.12	20.0	29.2	31.6	9.5	3.9 1.3			
3φ16	0.0	.00	.00	38.0 .07 .08	0.0 .00	.00	46.5 .08	.11	19.9	29.0	31.4	9.5	3.9 1.4			
6φ12	0.0	.00	.00	43.1 .07 .08	0.0 .00	.00	52.6 .09	.10	20.2	29.4	31.9	9.7	4.0 1.5			
4φ16	0.0	.00	.00	49.5 .09 .08	0.0 .00	.00	60.2 .11	.11	19.9	29.0	31.4	9.7	4.0 1.6			

RELACION a o RELACION W1,c / W1,s (11) : 2.58

INCREMENTO EXCENTRICIDAD (e,c-e,s), mm (12) : 68.6

ESFUERZO CORTANTE ULTIMO Vu, Sección maciza, kN/m : 96.2

ESFUERZO RASANTE ULTIMO Vu, Sección maciza, kN/m : 63.7

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS PRETENSADAS
MODELO T.13

PREFABRICADOS NAVARRO , S.A.

Ctra. Alicante-Cartagena, km 18
03190 PILAR DE LA HORADADA (Alicante)

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja n° 8 de 34

FLEXION POSITIVA (por m)											
TIPO DE FORJADO (h + c) + s	TIPO DE VIGUETA	MOMENTO	ESFUERZO CORTANTE ULTIMO		ESFUERZO	MOMENTO DE	RIGIDEZ		MOMENTOS E.L.S.		
		ULTIMO Mu	MC-78	EHE-08	RASANTE Md<Mo	FISURACION Sección tipos	(hormigón in situ) Mf	E-Ih	E-If	FISUR.	Mo' DESCOMP. DE SERVICIO
		m·kN/m	Md<Mo	Md>Mo							
		1+Mo/Md=2									
		kN/m									
		m·kN/m									
		(3)	(4)	(4)	(5)	(6)	(6)	(6)	(6)	(7)	
(13+ 4)	T.13-1	16.1	27.3	28.2	45.0	10.2	5.7	5.3	12.7	8.9	5.9
* 82.5D	-2	26.1	31.1	35.5	48.8	10.5	5.8	5.5	19.7	15.7	12.8
	-3	34.8	32.3	34.6	46.9	10.6	5.9	5.5	24.7	21.5	17.6
	-4	41.8	33.5	33.2	45.0	10.7	5.9	5.6	27.4	24.8	20.3
	-5	49.3	36.7	35.0	47.4	10.8	6.0	5.7	32.4	30.8	25.1
	-6	55.3	37.9	33.5	45.4	10.9	6.1	5.7	35.2	34.2	27.9

	FLEXION NEGATIVA (por m)																		
REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERT. FISURA				B500 MOMENTO ULTIMO-ABERT. FISURA				ESF. CORTANTE		ESF.		MOMENTO	RIGIDEZ	TOTAL FIS.				
	Sección tipo		Sección maciza		Sección tipo		Sección maciza		bo	Perim.	RAS.	FISUR.							
	Mu	Rel.	Vig.	Wk	Mu	Rel.	Wk	Mu	Rel.	Vig.	Wk	Vu	Vr,u	Mf	E·lh	E·If			
	x/d			lím.	x/d			x/d							m·kN/m	m2·MN/m			
	m·kN/m	mm	m·kN/m	mm	m·kN/m	mm	m·kN/m	mm	m·kN/m	mm	kN/m	kN/m	kN/m	m·kN/m	(3)	(4)	(5)	(6)	(6)
	(3)	(8)	(9)	(10)	(3)	(8)	(10)								(3)	(4)	(5)	(6)	(6)
1φ10	0.0	.00	.00		0.0	.00	.00	0.0	.00	.00		28.7	34.2	46.3	10.6	5.6	0.4		
2φ 8	0.0	.00	.00		0.0	.00	.00	6.0	.09	6.09		28.9	34.4	46.6	10.7	5.6	0.5		
1φ12	5.4	.09	6	.08	5.5	.01	.08	6.6	.11	6.10		28.5	34.0	46.0	10.7	5.6	0.5		
1φ 8+1φ10	6.1	.10	6	.08	6.3	.01	.08	7.6	.12	6.10		28.8	34.3	46.4	10.7	5.6	0.5		
2φ10	7.4	.12	6	.07	7.7	.01	.07	10.9	.15	6.09		28.7	34.2	46.3	10.8	5.7	0.6		
1φ10+1φ12	8.9	.14	6	.08	9.3	.02	.08	13.1	.18	6.10		28.6	34.1	46.1	10.8	5.7	0.7		
1φ16	11.0	.15	6	.08	9.5	.02	.08	13.4	.19	6.12		28.0	33.5	45.3	10.8	5.7	0.7		
2φ12	12.4	.17	6	.08	10.9	.02	.08	15.2	.21	6.13		28.5	34.0	46.0	10.9	5.7	0.8		
1φ10+1φ16	14.9	.21	6	.12	13.3	.03	.10	18.2	.27	6.18		29.6	33.7	45.6	11.0	5.7	0.9		
1φ12+1φ16	16.6	.24	6	.13	14.8	.03	.09	20.1	.30	6.19		30.4	33.6	45.6	11.0	5.7	1.0		
3φ12	17.9	.26	6	.11	19.4	.03	.08	21.7	.32	6.16		31.2	34.0	46.0	11.1	5.7	1.1		
2φ16	20.5	.31	6	.14	22.5	.04	.08	24.6	.39	6.20		32.1	33.5	45.3	11.1	5.7	1.1		
4φ12	23.0	.34	6	.13	25.5	.04	.08	27.5	.44	6.17		33.2	35.2	46.0	11.3	5.8	1.3		
2φ16+1φ12	25.3	.40	6	.15	28.6	.05	.09	29.9	.51	6.20		32.9	36.5	45.5	11.3	5.8	1.4		
2φ10+2φ16	27.1	.44	6	.15	31.0	.05	.10	32.2	.53	5.20		33.0	37.6	45.6	11.4	5.8	1.5		
3φ16	28.5	.48	6	.15	33.0	.06	.08	34.4	.55	4.20		32.8	38.4	45.3	11.5	5.8	1.5		
6φ12	31.6	.54	6	.13	37.5	.06	.08	39.3	.56	2.17		33.2	40.3	46.0	11.7	5.9	1.7		
4φ16	36.1	.59	4	.15	43.2	.08	.08	43.6	.63	1.20		32.8	41.8	45.3	11.8	5.9	1.8		

RELACION g / RELACION W_{1,C} / W_{1,S} (11) : 2.42

INCREMENTO EXCENTRICIDAD (e,c-e,s), mm (12) : 57.6

ESFUERZO CORTANTE ULTIMO V_u , Sección maciza, kN/m : 96.2

ESFUERZO RASANTE ULTIMO V_u , Sección maciza, kN/m : 74.5

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS PRETENSADAS
MODELO T. 13

PREFABRICADOS NAVARRO , S.A.

Ctra. Alicante-Cartagena, km 18
03190 PILAR DE LA HORADADA (Alicante)

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja n° 9 de 34



FLEXION POSITIVA (por m)

TIPO DE FORJADO (h + c) * s	TIPO DE VIGUETA	MOMENTO	ESFUERZO CORTANTE ULTIMO		ESFUERZO	MOMENTO DE	RIGIDEZ		MOMENTOS E.L.S.			
		ULTIMO Mu	MC-78	EHE-08	RASANTE Md<Mo	FISURACION Sección tipo	TOTAL FISURADA (hormigón in situ) Mf	E·Ih	E·If	FISUR.	Mo'	DESCOMP.
		m·kN/m	m·kN/m	kN/m	kN/m	kN/m	m·kN/m	m ² ·MN/m		m·kN/m		
(13+5) * 71.	T.13-1	10.4	17.4	18.1	33.0	6.5	4.7	4.3	8.6	5.7	4.1	
	-2	16.8	19.9	22.8	36.1	6.7	4.8	4.4	13.5	10.4	8.8	
	-3	22.6	20.5	24.7	34.8	6.8	4.9	4.5	16.9	14.3	12.0	
	-4	27.4	21.1	24.5	33.2	6.8	4.9	4.5	18.8	16.5	13.9	
	-5	32.6	23.1	26.0	35.1	7.0	5.0	4.6	22.2	20.4	17.2	
	-6	37.3	23.7	24.9	33.8	7.0	5.0	4.6	24.2	22.7	19.2	

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERT. FISURA						B500 MOMENTO ULTIMO-ABERT. FISURA						ESF. CORTANTE bo Perim. Vu	ESF. RAS. Vr,u	MOMENTO FISUR. Mf	RIGIDEZ TOTAL FIS. E·lh E·lf				
	Sección tipo			Sección maciza			Sección tipo			Sección maciza										
	Mu	Rel.	Vig. Wk	Mu	Rel.	Wk	Mu	Rel.	Vig. Wk	Mu	Rel.	Wk								
	x/d	lím.		x/d			x/d	lím.		x/d										
	m·kN/m	mm		m·kN/m	mm		m·kN/m	mm		m·kN/m	mm		kN/m	kN/m	kN/m	m ² ·MN/m				
	(3)	(8)	(9)	(10)	(3)	(8)	(10)						(4)	(5)	(6)	(6)				
1φ10	4.6	.11	6	.07	4.8	.01	.07	5.7	.14	6	.09	6.0	.01	.09	18.6	25.4	34.4	10.1	4.6	0.5
2φ 8	5.9	.14	6	.07	6.2	.01	.07	7.2	.17	6	.09	7.6	.01	.09	18.8	25.6	34.6	10.1	4.6	0.5
1φ12	6.5	.16	6	.08	6.8	.01	.08	9.5	.20	6	.10	8.5	.01	.10	18.5	25.2	34.2	10.1	4.6	0.6
1φ 8+1φ10	7.4	.18	6	.07	7.8	.01	.08	10.8	.22	6	.09	9.7	.02	.10	18.7	25.5	34.5	10.2	4.6	0.6
2φ10	10.6	.22	6	.07	9.5	.02	.07	12.8	.27	6	.10	11.8	.02	.09	19.4	25.4	34.4	10.2	4.6	0.7
1φ10+1φ12	12.6	.27	6	.08	11.5	.02	.08	15.2	.34	6	.14	14.3	.02	.10	20.3	25.3	34.3	10.2	4.6	0.8
1φ16	12.9	.29	6	.10	11.9	.02	.09	15.5	.36	6	.17	14.7	.03	.11	20.3	24.9	33.7	10.2	4.6	0.8
2φ12	14.5	.32	6	.10	13.5	.02	.08	17.3	.42	6	.15	16.7	.03	.10	21.1	25.2	34.2	10.3	4.6	0.9
1φ10+1φ16	17.1	.42	6	.13	16.5	.03	.10	20.4	.52	5	.19	24.4	.04	.12	21.5	25.7	33.9	10.3	4.6	1.0
1φ12+1φ16	18.7	.48	6	.14	18.4	.03	.09	22.8	.54	3	.19	27.3	.04	.12	21.5	26.7	33.9	10.4	4.6	1.1
3φ12	20.0	.53	6	.12	24.0	.03	.08	24.8	.55	2	.16	29.7	.04	.10	21.7	27.6	34.2	10.5	4.7	1.2
2φ16	22.8	.58	4	.15	27.9	.04	.09	27.9	.61	1	.20	34.4	.05	.11	21.4	28.9	33.7	10.5	4.7	1.3
4φ12	26.0	.59	2	.13	31.7	.05	.08	0.0	.00	.00		39.0	.06	.10	21.7	30.4	34.2	10.6	4.7	1.4
2φ16+1φ12	28.8	.63	1	.15	35.5	.05	.09	0.0	.00	.00		43.5	.07	.11	21.4	31.2	33.8	10.6	4.7	1.5
2φ10+2φ16	29.2	.69	1	.15	38.4	.06	.10	0.0	.00	.00		47.1	.07	.12	21.5	31.3	33.9	10.7	4.7	1.6
3φ16	0.0	.00	.00		41.0	.06	.09	0.0	.00	.00		50.2	.08	.11	21.4	31.1	33.7	10.7	4.7	1.6
6φ12	0.0	.00	.00		46.4	.07	.08	0.0	.00	.00		56.7	.09	.10	21.7	31.5	34.2	11.0	4.7	1.8
4φ16	0.0	.00	.00		53.5	.08	.09	0.0	.00	.00		65.1	.10	.11	21.4	31.1	33.7	11.0	4.7	1.9

RELACION a o RELACION W_{1,c} / W_{1,s} (11) : 2.87

INCREMENTO EXCENTRICIDAD (e,c-e,s), mm (12) : 76.6

ESFUERZO CORTANTE ULTIMO V_u , Sección maciza, kN/m : 101.8

ESFUERZO RASANTE ULTIMO Vu, Sección maciza, kN/m : 68

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS PRETENSADAS
MODELO T.13

PREFABRICADOS NAVARRO , S.A.

Ctra. Alicante-Cartagena, km 18
03190 PILAR DE LA HORADADA (Alicante)

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja nº 10 de 34

		FLEXION POSITIVA (por m)									
TIPO DE FORJADO (h + c) * s	TIPO DE VIGUETA	MOMENTO	ESFUERZO CORTANTE ULTIMO		ESFUERZO	MOMENTO DE	RIGIDEZ		MOMENTOS E.L.S.		
		ULTIMO Mu	MC-78	EHE-08	RASANTE	FISURACION (hormigón in situ) Mf	E·Ih	E·If	FISUR.	Mo'	DESCOMP. DE SERVICIO
(13+ 5) * 82.5D	T.13-1	17.6	28.5	29.9	47.6	11.0	6.8	6.3	13.9	9.5	6.5
	-2	28.4	32.5	37.9	52.1	11.2	7.0	6.4	21.7	17.0	14.1
	-3	37.7	33.8	37.1	50.2	11.4	7.1	6.5	27.1	23.3	19.4
	-4	45.5	34.8	35.4	47.9	11.5	7.1	6.6	30.4	27.2	22.5
	-5	53.8	38.1	37.4	50.7	11.6	7.2	6.7	35.6	33.3	27.6
	-6	60.8	39.3	36.0	48.7	11.7	7.3	6.8	38.8	37.0	30.7
		FLEXION NEGATIVA (por m)									
REFUERZO SUPERIOR POR NERVIO	B400	MOMENTO ULTIMO-ABERT. FISURA	B500 MOMENTO ULTIMO-ABERT. FISURA		ESF. CORTANTE	ESF.	MOMENTO	RIGIDEZ			
	Sección tipo	Sección maciza	Sección tipo	Sección maciza	bo	Perim.	FISUR.	TOTAL FIS.	E·Ih	E·If	
	Mu	Rel. Vig. Wk	Mu	Rel. Wk	Mu	Rel. Wk	Vr,u	Mf			
	x/d	lím.	x/d	lím.	x/d	lím.	Vu				
	m·kN/m	mm	m·kN/m	mm	m·kN/m	mm	kN/m	m·kN/m	(4)	(5)	(6)
	(3)	(8)	(9)	(10)	(3)	(8)	(10)				
1φ10	0.0	.00	.00	0.0	.00	.00	0.0	.00	30.8	36.6	49.6
2φ 8	0.0	.00	.00	0.0	.00	.00	6.6	.01	31.0	36.9	50.0
1φ12	0.0	.00	.00	6.6	.01	.08	7.1	.10	6.10	7.3	.01
1φ 8+1φ10	6.6	.09	6.08	6.8	.01	.08	8.1	.11	6.10	8.4	.01
2φ10	8.0	.11	6.07	8.2	.01	.07	9.8	.14	6.09	10.2	.02
1φ10+1φ12	9.6	.14	6.08	9.9	.02	.08	14.1	.17	6.10	12.3	.02
1φ16	9.8	.14	6.09	10.3	.02	.09	14.5	.18	6.11	12.7	.02
2φ12	13.4	.16	6.08	11.7	.02	.08	16.4	.20	6.12	14.5	.02
1φ10+1φ16	16.1	.20	6.11	14.2	.02	.10	19.6	.25	6.18	21.1	.03
1φ12+1φ16	17.9	.22	6.12	15.9	.03	.09	21.7	.28	6.19	23.6	.03
3φ12	19.4	.24	6.11	20.8	.03	.08	23.5	.30	6.16	25.7	.04
2φ16	22.2	.29	6.14	24.2	.04	.09	26.7	.36	6.20	29.8	.04
4φ12	24.9	.32	6.12	27.5	.04	.08	29.9	.41	6.17	33.8	.05
2φ16+1φ12	27.4	.37	6.15	30.8	.05	.09	32.6	.47	6.20	37.8	.06
2φ10+2φ16	29.4	.41	6.15	33.3	.05	.10	34.8	.52	6.20	41.0	.06
3φ16	31.0	.44	6.15	35.6	.05	.09	36.9	.54	5.20	43.7	.07
6φ12	34.5	.50	6.13	40.4	.06	.08	42.8	.52	2.17	49.5	.07
4φ16	38.8	.59	5.15	46.6	.07	.09	48.7	.59	1.20	56.9	.09

RELACION a o RELACION W1,c / W1,s (11) : 2.67

INCREMENTO EXCENTRICIDAD (e,c-e,s), mm (12) : 65.6

ESFUERZO CORTANTE ULTIMO Vu, Sección maciza, kN/m : 101.8

ESFUERZO RASANTE ULTIMO Vu, Sección maciza, kN/m : 79.5

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS PRETENSADAS
MODELO T.13

PREFABRICADOS NAVARRO , S.A.

Ctra. Alicante-Cartagena, km 18
03190 PILAR DE LA HORADADA (Alicante)

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja nº 11 de 34

FLEXION POSITIVA (por m)

TIPO DE FORJADO (h + c) * s	TIPO DE VIGUETA	MOMENTO ULTIMO Mu	ESFUERZO CORTANTE ULTIMO		ESFUERZO RASANTE	MOMENTO DE FISURACION	RIGIDEZ		MOMENTOS E.L.S.		
			MC-78	EHE-08			E.Ih	E.If	FISUR.	Mo'	DESCOMP.
			Md<Mo	Md>Mo			Sección tipos	(hormigón in situ) Mf	m·kN/m	m·kN/m	
			1+Mo/Md=2								
			m·kN/m	kN/m			kN/m				
			(3)	(4)			(5)		(6)		
(20+ 4)* 71.	T.13-1	15.6	22.4	25.2	36.9	10.2	10.7	9.3	14.1	8.4	6.6
	-2	24.6	25.0	28.6	40.0	10.4	10.9	9.5	21.9	16.1	14.3
	-3	33.0	25.7	28.2	39.0	10.6	11.1	9.7	27.4	22.1	19.5
	-4	40.5	26.2	27.6	37.7	10.7	11.2	9.8	30.7	25.7	22.7
	-5	48.2	28.1	28.3	39.2	10.8	11.4	10.0	36.2	31.8	28.0
	-6	55.5	28.8	27.8	38.1	10.9	11.5	10.1	39.5	35.4	31.3

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERT. FISURA				B500 MOMENTO ULTIMO-ABERT. FISURA				ESF. CORTANTE bo	ESF. RAS. Vu	MOMENTO FISUR. Mf	RIGIDEZ TOTAL FIS. E·Ih E·If						
	Sección tipo		Sección maciza		Sección tipo		Sección maciza											
	Mu	Rel. Vig. Wk	Mu	Rel. Wk	Mu	Rel. Vig. Wk	Mu	Rel. Wk	x/d									
	m·kN/m	mm	m·kN/m	mm	m·kN/m	mm	m·kN/m	mm	m·kN/m	kN/m	kN/m	m·kN/m	m2·MN/m					
	(3)	(8)	(9)	(10)	(3)	(8)	(10)			(4)		(5)	(6)					
1φ10	0.0	.00	.00	0.0	.00	.00	8.1	.10	6 .10	8.4	.01	.10	26.0	28.0	38.6	16.6	10.6	0.9
2φ 8	8.4	.10	6 .08	8.6	.01	.08	10.3	.12	6 .10	10.7	.01	.10	26.1	28.1	38.8	16.7	10.6	1.1
1φ12	9.3	.11	6 .09	9.6	.01	.09	11.4	.14	6 .11	11.9	.01	.11	25.9	27.9	38.5	16.7	10.6	1.2
1φ 8+1φ10	10.5	.13	6 .08	11.0	.01	.09	12.9	.16	6 .10	13.7	.01	.11	26.1	28.0	38.7	16.8	10.6	1.3
2φ10	12.7	.16	6 .08	13.4	.01	.08	18.6	.20	6 .09	16.6	.02	.10	26.0	28.0	38.6	16.9	10.7	1.5
1φ10+1φ12	18.2	.19	6 .08	16.2	.01	.09	22.2	.24	6 .12	20.1	.02	.12	26.4	28.0	38.5	17.0	10.7	1.7
1φ16	18.8	.20	6 .10	16.8	.02	.10	22.9	.26	6 .16	20.9	.02	.12	26.5	27.8	38.1	17.0	10.7	1.7
2φ12	21.1	.23	6 .08	19.1	.02	.09	25.6	.30	6 .14	23.6	.02	.11	27.4	27.9	38.5	17.1	10.7	1.9
1φ10+1φ16	25.3	.30	6 .13	23.4	.02	.11	30.4	.39	6 .19	34.7	.03	.14	28.6	27.8	38.2	17.3	10.8	2.2
1φ12+1φ16	28.0	.34	6 .14	26.2	.02	.11	33.3	.44	6 .20	38.9	.03	.13	29.4	28.7	38.2	17.4	10.8	2.4
3φ12	30.0	.38	6 .12	34.1	.03	.09	35.6	.48	6 .16	42.1	.03	.11	30.1	29.5	38.5	17.5	10.8	2.5
2φ16	33.9	.46	6 .15	39.8	.03	.10	40.2	.55	5 .20	49.2	.04	.12	30.2	31.1	38.1	17.6	10.9	2.8
4φ12	37.5	.51	6 .13	45.1	.03	.09	45.5	.56	3 .17	55.6	.04	.11	30.4	32.5	38.5	17.9	11.0	3.1
2φ16+1φ12	40.7	.58	6 .15	50.7	.04	.10	51.6	.57	1 .20	62.5	.05	.13	30.2	33.8	38.2	18.1	11.0	3.3
2φ10+2φ16	44.5	.58	4 .15	54.9	.04	.11	53.8	.62	1 .20	67.7	.05	.14	30.3	34.8	38.2	18.3	11.0	3.5
3φ16	46.6	.62	4 .15	58.8	.05	.10	0.0	.00	.00	72.4	.06	.12	30.2	34.9	38.1	18.4	11.1	3.6
6φ12	54.1	.60	1 .13	66.5	.05	.09	0.0	.00	.00	81.7	.06	.11	30.4	35.1	38.5	18.8	11.2	4.0
4φ16	56.9	.70	1 .15	77.3	.06	.10	0.0	.00	.00	94.7	.08	.12	30.2	34.9	38.1	19.1	11.3	4.3

RELACION a o RELACION W1,c / W1,s (11) : 4.68

INCREMENTO EXCENTRICIDAD (e,c-e,s), mm (12) : 120.6

ESFUERZO CORTANTE ULTIMO Vu, Sección maciza, kN/m : 141.6

ESFUERZO RASANTE ULTIMO Vu, Sección maciza, kN/m : 93.9

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS PRETENSADAS
MODELO T.13

PREFABRICADOS NAVARRO , S.A.

Ctra. Alicante-Cartagena, km 18
03190 PILAR DE LA HORADADA (Alicante)

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja nº 12 de 34

FLEXION POSITIVA (por m)

TIPO DE FORJADO (h + c) * s	TIPO DE VIGUETA	MOMENTO ULTIMO Mu	ESFUERZO CORTANTE ULTIMO		ESFUERZO RASANTE Sección tipo	MOMENTO DE FISURACION (hormigón in situ) Mf	RIGIDEZ		MOMENTOS E.L.S.		
			MC-78	EHE-08			TOTAL FISURADA	FISUR. Mo'	DECOMP.		
			Md<Mo	Md>Mo			E·Ih	E·If	DE SERVICIO		
			1+Mo/Md=2								
			m·kN/m	kN/m			m·kN/m	m2·MN/m			
			(3)	(4)			(5)	(6)			
(20+ 4) * 82.5D	T.13-1	26.5	44.7	43.2	58.5	16.9	15.4	13.6	22.8	14.0	10.7
	-2	41.8	49.5	45.4	63.5	17.2	15.7	13.9	35.6	26.5	23.1
	-3	55.7	50.6	44.7	61.8	17.4	15.9	14.1	44.4	36.3	31.7
	-4	67.9	51.4	43.7	59.7	17.6	16.0	14.3	49.7	42.2	36.8
	-5	80.5	54.8	44.9	62.2	17.8	16.3	14.5	58.5	52.1	45.3
	-6	92.2	55.8	44.1	60.5	18.0	16.4	14.6	63.8	58.0	50.5

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERT. FISURA				B500 MOMENTO ULTIMO-ABERT. FISURA				ESF. CORTANTE bo Perim. Vu	ESF. RAS. Vu,u	MOMENTO FISUR. Mf	RIGIDEZ TOTAL FIS. E·Ih E·If				
	Sección tipo		Sección maciza		Sección tipo		Sección maciza									
	Mu	Rel. Vig. Wk	Mu	Rel. Wk	Mu	Rel. Vig. Wk	Mu	Rel. Wk								
	x/d	lim.	x/d	lim.	x/d	lim.	x/d	lim.								
	m·kN/m	mm	m·kN/m	mm	m·kN/m	mm	m·kN/m	mm	kN/m	kN/m	m·kN/m	m2·MN/m				
	(3)	(8)	(9)	(10)	(3)	(8)	(10)		(4)	(5)	(6)	(6)				
iφ10	0.0	.00	.00	0.0	.00	.00	0.0	.00	50.1	44.4	61.3	19.6				
2φ 8	0.0	.00	.00	0.0	.00	.00	0.0	.00	50.3	44.6	61.6	19.7				
1φ12	0.0	.00	.00	0.0	.00	.00	0.0	.00	49.9	44.3	61.0	19.8				
1φ 8+1φ10	0.0	.00	.00	0.0	.00	.00	0.0	.00	50.2	44.5	61.4	19.9				
2φ10	0.0	.00	.00	0.0	.00	.00	13.9	.10	50.1	44.4	61.3	20.0				
1φ10+1φ12	0.0	.00	.00	14.3	.01	.09	16.8	.12	17.4	.02	50.0	44.4				
1φ16	14.1	.10	6 .10	14.5	.01	.10	20.8	.13	18.0	.02	49.5	44.0				
2φ12	15.9	.11	6 .09	16.5	.01	.09	23.5	.14	20.4	.02	49.9	44.3				
1φ10+1φ16	23.2	.14	6 .10	20.2	.02	.11	28.5	.18	25.0	.02	49.7	44.1				
1φ12+1φ16	25.9	.16	6 .11	22.6	.02	.11	31.7	.20	33.6	.03	49.7	44.1				
3φ12	28.0	.17	6 .10	24.5	.02	.09	34.2	.21	36.4	.03	49.9	44.3				
2φ16	32.4	.20	6 .14	34.4	.03	.10	39.4	.26	42.5	.03	49.5	44.0				
4φ12	36.4	.23	6 .12	39.0	.03	.09	44.2	.29	48.1	.04	50.8	44.3				
2φ16+1φ12	40.5	.26	6 .15	43.9	.03	.10	48.9	.34	54.1	.04	52.1	44.1				
2φ10+2φ16	43.6	.29	6 .15	47.6	.04	.11	52.5	.37	58.6	.05	53.2	45.0				
3φ16	46.4	.32	6 .16	50.9	.04	.10	55.6	.40	62.8	.05	54.1	46.1				
6φ12	51.8	.36	6 .13	57.6	.04	.09	61.7	.45	70.9	.06	56.0	48.1				
4φ16	53.7	.43	6 .16	67.0	.05	.10	69.3	.53	82.3	.07	58.1	50.7				

RELACION a o RELACION Wl,c / Wl,s (11) : 4.38

INCREMENTO EXCENTRICIDAD (e,c·e,s), mm (12) : 104.6

ESFUERZO CORTANTE ULTIMO Vu, Sección maciza, kN/m : 141.6

ESFUERZO RASANTE ULTIMO Vu, Sección maciza, kN/m : 109.8

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS PRETENSADAS
MODELO T.13

PREFABRICADOS NAVARRO , S.A.

Ctra. Alicante-Cartagena, km 18
03190 PILAR DE LA HORADADA (Alicante)

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja nº 13 de 34

FLEXION POSITIVA (por m)

TIPO DE FORJADO (h + c) * s	TIPO DE VIGUETA	MOMENTO ULTIMO Mu	ESFUERZO CORTANTE ULTIMO		ESFUERZO RASANTE Sección tipo	MOMENTO DE FISURACION (hormigón in situ) Mf	RIGIDEZ		MOMENTOS E.L.S.			
			MC-78	EHE-08			TOTAL FISURADA	E·Ih	E·If	FISUR.	Mo'	DESCOMP.
			Md<Mo	Md>Mo			m·kN/m	kN/m	kN/m	m·kN/m	m·MN/m	
(20+ 5) * 71.	T.13-1	16.5	23.3	26.1	38.7	10.9	12.3	10.5	15.0	8.8	7.0	
		-2	25.9	25.8	29.5	41.9	11.1	12.5	10.7	23.5	17.1	15.3
		-3	34.7	26.5	29.0	40.8	11.3	12.7	10.9	29.2	23.4	20.8
		-4	42.6	27.0	28.4	39.5	11.4	12.8	11.0	32.7	27.2	24.2
		-5	50.8	28.9	29.1	41.1	11.6	13.0	11.2	38.6	33.6	29.9
		-6	58.5	29.5	28.6	40.0	11.7	13.1	11.4	42.1	37.5	33.3

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERT. FISURA				B500 MOMENTO ULTIMO-ABERT. FISURA				ESF. CORTANTE bo	ESF. RAS.	MOMENTO FISUR.	RIGIDEZ TOTAL FIS. E·Ih E·If						
	Sección tipo		Sección maciza		Sección tipo		Sección maciza											
	Mu	Rel. Vig. Wk	Mu	Rel. Wk	Mu	Rel. Vig. Wk	Mu	Rel. Wk	Vu									
	m·kN/m	mm	m·kN/m	mm	m·kN/m	mm	m·kN/m	mm	kN/m	kN/m	kN/m	m·kN/m	m2·MN/m					
	(3)	(8)	(9)	(10)	(3)	(8)	(9)	(10)		(4)	(5)	(6)	(6)					
1φ10	0.0	.00	.00	0.0	.00	.00	8.5	.09	6 .11	8.8	.01	.11	27.0	28.9	40.5	18.6	12.1	1.0
2φ 8	8.8	.10	6 .08	9.0	.01	.08	10.8	.12	6 .10	11.2	.01	.10	27.1	28.9	40.7	18.7	12.2	1.2
1φ12	9.7	.11	6 .09	10.1	.01	.09	12.0	.14	6 .11	12.5	.01	.11	26.9	28.8	40.3	18.8	12.2	1.3
1φ 8+1φ10	11.1	.12	6 .08	11.5	.01	.09	13.6	.15	6 .10	14.3	.01	.12	27.0	28.9	40.5	18.8	12.2	1.5
2φ10	13.3	.15	6 .08	14.0	.01	.09	19.6	.19	6 .10	17.4	.01	.11	27.0	28.9	40.5	18.9	12.2	1.7
1φ10+1φ12	19.2	.18	6 .08	17.0	.01	.10	23.4	.23	6 .11	21.1	.02	.12	27.2	28.8	40.4	19.1	12.2	1.9
1φ16	19.8	.20	6 .10	17.7	.01	.10	24.1	.25	6 .14	21.9	.02	.12	27.3	28.6	39.9	19.0	12.2	1.9
2φ12	22.3	.22	6 .08	20.0	.02	.09	27.0	.28	6 .13	24.8	.02	.11	28.2	28.8	40.3	19.2	12.3	2.2
1φ10+1φ16	26.7	.28	6 .12	24.5	.02	.11	32.1	.37	6 .18	36.4	.03	.14	29.5	28.7	40.1	19.3	12.3	2.5
1φ12+1φ16	29.5	.33	6 .13	27.5	.02	.11	35.2	.42	6 .19	40.8	.03	.13	30.3	29.3	40.0	19.5	12.4	2.7
3φ12	31.7	.36	6 .11	35.7	.03	.09	37.7	.46	6 .16	44.2	.03	.11	30.9	30.1	40.3	19.6	12.4	2.9
2φ16	35.9	.44	6 .14	41.8	.03	.10	42.3	.54	6 .20	51.6	.04	.12	31.4	31.8	39.9	19.7	12.4	3.1
4φ12	39.7	.49	6 .12	47.3	.03	.09	47.8	.55	4 .17	58.4	.04	.11	31.6	33.2	40.3	20.0	12.5	3.5
2φ16+1φ12	43.3	.55	6 .15	53.2	.04	.10	53.4	.58	2 .20	65.6	.05	.13	31.4	34.5	40.0	20.2	12.6	3.7
2φ10+2φ16	46.0	.59	6 .15	57.7	.04	.11	58.1	.59	1 .20	71.1	.05	.14	31.5	35.5	40.1	20.4	12.6	3.9
3φ16	49.6	.59	4 .15	61.8	.04	.10	59.2	.63	1 .20	76.1	.06	.12	31.4	36.1	39.9	20.5	12.6	4.1
6φ12	56.0	.61	2 .13	69.8	.05	.09	0.0	.00	.00	85.8	.06	.11	31.6	36.4	40.3	20.9	12.8	4.5
4φ16	62.8	.67	1 .15	81.2	.06	.10	0.0	.00	.00	99.6	.07	.12	31.4	36.1	39.9	21.2	12.9	4.9

RELACION a o RELACION W1,c / W1,s (11) : 4.98

INCREMENTO EXCENTRICIDAD (e,c-e,s), mm (12) : 130.6

ESFUERZO CORTANTE ULTIMO Vu, Sección maciza, kN/m : 146

ESFUERZO RASANTE ULTIMO Vu, Sección maciza, kN/m : 98.2

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS PRETENSADAS
MODELO T.13

PREFABRICADOS NAVARRO , S.A.

Ctra. Alicante-Cartagena, km 18
03190 PILAR DE LA HORADADA (Alicante)

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja nº 14 de 34

FLEXION POSITIVA (por m)

TIPO DE FORJADO (h + c) * s	TIPO DE VIGUETA	MOMENTO ULTIMO Mu	ESFUERZO CORTANTE ULTIMO		ESFUERZO RASANTE	MOMENTO DE FISURACION Sección tipo	RIGIDEZ		MOMENTOS E.L.S.		
			MC-78	EHE-08			E·Ih	E·If	FISUR.	Mo'	DESCOMP.
			Md<Mo	Md>Mo			in situ	Mf	m·kN/m	m2·MN/m	m·kN/m
(20+ 5) * 82.5D	T.13-1	28.0	46.4	44.5	61.4	18.1	17.8	15.5	24.5	14.8	11.5
	-2	44.0	51.2	46.7	66.4	18.4	18.1	15.8	38.3	28.3	24.9
	-3	58.7	52.2	46.0	64.7	18.6	18.3	16.1	47.7	38.8	34.1
	-4	71.7	53.0	45.1	62.7	18.8	18.5	16.3	53.2	44.8	39.3
	-5	85.0	56.4	46.2	65.1	19.0	18.7	16.5	62.6	55.2	48.5
	-6	97.4	57.4	45.4	63.4	19.2	18.9	16.7	68.7	62.0	54.4

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERT. FISURA				B500 MOMENTO ULTIMO-ABERT. FISURA				ESF. CORTANTE bo	ESF. RAS.	MOMENTO FISUR.	RIGIDEZ TOTAL FIS. E·Ih E·If			
	Sección tipo		Sección maciza		Sección tipo		Sección maciza								
	Mu	Rel. Vig. Wk	Mu	Rel. Wk	Mu	Rel. Vig. Wk	Mu	Rel. Wk	x/d						
	m·kN/m	mm	m·kN/m	mm	m·kN/m	mm	m·kN/m	mm	m·kN/m	kN/m	m·kN/m	m2·MN/m	(6)		
	(3)	(8)	(9)	(10)	(3)	(8)	(10)			(4)	(5)		(6)		
1φ10	0.0	.00	.00	0.0	.00	.00	0.0	.00	.00	51.9	45.8	64.2	22.1		
2φ 8	0.0	.00	.00	0.0	.00	.00	0.0	.00	.00	52.1	45.9	64.5	22.3		
1φ12	0.0	.00	.00	0.0	.00	.00	0.0	.00	.00	51.7	45.6	63.9	22.3		
1φ 8 +1φ10	0.0	.00	.00	0.0	.00	.00	0.0	.00	.00	52.0	45.8	64.3	22.4		
2φ10	0.0	.00	.00	0.0	.00	.00	14.6	.09	6 .11	51.9	45.8	64.2	22.5		
1φ10+1φ12	0.0	.00	.00	15.0	.01	.10	17.6	.11	6 .12	18.2	.02	12	51.8		
1φ16	14.8	.10	6 .10	15.2	.01	.10	18.2	.12	6 .12	18.9	.02	.12	51.4		
2φ12	16.7	.11	6 .09	17.3	.01	.09	24.7	.14	6 .11	21.4	.02	.11	51.7		
1φ10+1φ16	24.4	.14	6 .10	21.2	.02	.11	29.9	.17	6 .15	26.2	.02	.14	51.5		
1φ12+1φ16	27.2	.15	6 .09	23.7	.02	.11	33.3	.19	6 .17	29.4	.02	.13	51.5		
3φ12	29.4	.16	6 .09	25.7	.02	.09	36.0	.20	6 .15	38.2	.03	.11	51.7		
2φ16	34.1	.20	6 .13	36.1	.03	.10	41.5	.24	6 .20	44.6	.03	.12	51.4		
4φ12	38.3	.22	6 .12	40.9	.03	.09	46.5	.28	6 .17	50.5	.04	.11	52.2		
2φ16+1φ12	42.7	.25	6 .15	46.0	.03	.10	51.6	.32	6 .20	56.8	.04	.13	53.6		
2φ10+2φ16	46.0	.28	6 .15	49.9	.04	.11	55.4	.35	6 .21	61.6	.04	.14	54.8		
3φ16	48.9	.30	6 .15	53.5	.04	.10	58.7	.38	6 .21	66.0	.05	.12	55.6		
6φ12	54.6	.34	6 .13	60.5	.04	.09	65.3	.43	6 .17	74.5	.05	.11	57.6		
4φ16	62.1	.41	6 .16	70.5	.05	.10	73.5	.51	6 .20	86.6	.06	.12	59.7		

RELACION a o RELACION W_{1,c} / W_{1,s} (11) : 4.72

INCREMENTO EXCENTRICIDAD (e,c-e,s), mm (12) : 113.6

ESFUERZO CORTANTE ULTIMO Vu, Sección maciza, kN/m : 146

ESFUERZO RASANTE ULTIMO Vu, Sección maciza, kN/m : 114.9

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS PRETENSADAS
MODELO T.13

PREFABRICADOS NAVARRO , S.A.

Ctra. Alicante-Cartagena, km 18
03190 PILAR DE LA HORADADA (Alicante)

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja nº 15 de 34



FLEXION POSITIVA (por m)

TIPO DE FORJADO (h + c) * s	TIPO DE VIGUETA	MOMENTO	ESFUERZO CORTANTE ULTIMO		ESFUERZO	MOMENTO DE	RIGIDEZ		MOMENTOS E.L.S.		
		ULTIMO	MC-78	EHE-08	RASANTE	FISURACION	TOTAL FISURADA	FISUR.	Mo'	DESCOMP.	
		Mu	Md<Mo	Md>Mo	Sección tipo	(hormigón in situ) Mf	E·Ih	E·If	DE SERVICIO		
		m·kN/m	kN/m	kN/m	kN/m	m·kN/m	m ² ·MN/m		m·kN/m		
		(3)	(4)	(4)	(5)	(6)	(6)		(7)		
(22+ 4)* 71.	T.13-1	17.3	24.1	27.0	38.2	11.5	13.5	11.5	16.0	9.4	7.5
	-2	27.2	26.6	28.5	41.1	11.8	13.7	11.7	24.9	18.1	16.2
	-3	36.5	27.3	28.1	40.1	11.9	13.9	11.9	31.1	24.8	22.2
	-4	44.8	27.8	27.5	38.9	12.0	14.0	12.1	34.9	28.9	25.8
	-5	53.4	29.6	28.2	40.4	12.2	14.2	12.3	41.1	35.6	31.8
	-6	61.6	30.3	27.7	39.4	12.3	14.3	12.4	44.9	39.8	35.5

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERT. FISURA						B500 MOMENTO ULTIMO-ABERT. FISURA						ESF. CORTANTE		ESF.	MOMENTO	RIGIDEZ			
	Sección tipo			Sección maciza			Sección tipo			Sección maciza			bo	Perim.	RAS.	FISUR.	TOTAL FIS.			
	Mu	Rel.	Vig.	Wk	Mu	Rel.	Wk	Mu	Rel.	Vig.	Wk	Mu	x/d	Vx,u	Mf	E·Ih	E·If			
	m·kN/m			mm	m·kN/m			m·kN/m			mm	m·kN/m		kN/m	m·kN/m	m2·MN/m				
	(3)	(8)	(9)	(10)	(3)	(8)	(10)							(4)	(5)	(6)	(6)			
1φ10	0.0	.00	.00		0.0	.00	.00	8.9	.09	6	.11	9.2	.01	.11	27.9	27.9	39.8	19.0	13.3	1.1
2φ 8	9.2	.09	6	.08	9.5	.01	.08	11.3	.11	6	.10	11.8	.01	.10	28.0	28.0	40.0	19.2	13.3	1.3
1φ12	10.2	.10	6	.09	10.5	.01	.09	12.5	.13	6	.11	13.1	.01	.11	27.8	27.9	39.7	19.2	13.3	1.4
1φ 8+1φ10	11.6	.12	6	.09	12.1	.01	.10	14.3	.15	6	.11	15.0	.01	.12	27.9	28.0	39.9	19.3	13.3	1.6
2φ10	14.0	.14	6	.08	14.7	.01	.09	20.5	.18	6	.10	18.2	.01	.11	27.9	27.9	39.8	19.4	13.4	1.8
1φ10+1φ12	20.1	.18	6	.08	17.8	.01	.10	24.6	.22	6	.12	22.1	.02	.12	27.9	27.9	39.7	19.5	13.4	2.1
1φ16	20.8	.19	6	.10	18.5	.01	.10	25.4	.24	6	.15	22.9	.02	.12	28.0	27.7	39.3	19.5	13.4	2.1
2φ12	23.4	.21	6	.08	20.9	.02	.09	28.4	.27	6	.14	26.0	.02	.11	28.9	27.9	39.7	19.7	13.5	2.4
1φ10+1φ16	28.1	.27	6	.12	25.7	.02	.12	33.8	.36	6	.19	31.8	.02	.15	30.3	27.8	39.5	19.9	13.5	2.7
1φ12+1φ16	31.0	.31	6	.14	28.8	.02	.11	37.2	.41	6	.20	42.7	.03	.14	31.1	28.7	39.4	20.0	13.5	2.9
3φ12	33.3	.34	6	.12	31.2	.02	.09	39.7	.44	6	.16	46.3	.03	.11	31.8	29.5	39.7	20.2	13.6	3.1
2φ16	37.9	.42	6	.15	43.8	.03	.10	44.7	.52	6	.20	54.1	.04	.12	32.6	31.1	39.3	20.3	13.7	3.5
4φ12	41.9	.47	6	.13	49.5	.03	.09	50.5	.53	4	.17	61.1	.04	.11	32.8	32.5	39.7	20.7	13.8	3.8
2φ16+1φ12	45.8	.53	6	.15	55.8	.04	.11	56.4	.56	2	.20	68.8	.05	.13	32.6	33.8	39.4	20.8	13.8	4.1
2φ10+2φ16	48.6	.57	6	.15	60.5	.04	.12	61.4	.57	1	.20	74.5	.05	.15	32.7	34.8	39.5	21.1	13.9	4.3
3φ16	51.6	.60	5	.15	64.8	.04	.10	64.1	.61	1	.20	79.8	.05	.12	32.6	35.2	39.3	21.2	13.9	4.5
6φ12	59.2	.59	2	.13	73.2	.05	.09	0.0	.00			90.0	.06	.11	32.8	35.4	39.7	21.7	14.1	5.0
4φ16	67.3	.65	1	.15	85.2	.06	.10	0.0	.00			104.5	.07	.12	32.6	35.2	39.3	22.1	14.2	5.4

RELACION q o RELACION W_{1,C} / W_{1,S} (11) : 5.31

INCREMENTO EXCENTRICIDAD (e.c-e.s), mm (12) : 135.6

ESEUERZO CORTANTE ULTIMO Vn. Sección maciza, kN/m : 150.4

ESFUERZO RASANTE ULTIMO Vu. Sección maciza, kN/m : 102.5

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS PRETENSADAS
MODELO T.13

PREFABRICADOS NAVARRO , S.A.

Ctra. Alicante-Cartagena, km 18
03190 PILAR DE LA HORADADA (Alicante)

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja nº 16 de 34

FLEXION POSITIVA (por m)											
TIPO DE FORJADO (h + c) * s	TIPO DE VIGUETA	MOMENTO ULTIMO Mu	ESFUERZO CORTANTE ULTIMO		ESFUERZO RASANTE Md < Mo 1+Mo/Md=2	MOMENTO DE FISURACION (hormigón in situ) Mf	RIGIDEZ		MOMENTOS E.L.S.		
			MC-78	EHE-08			E·Ih	E·If	FISUR. DE SERVICIO		
			Md < Mo	Md > Mo			m·kN/m	m·MN/m	m·kN/m		
			m·kN/m	kN/m	kN/m	kN/m	m·kN/m	m·MN/m	m·kN/m		
			(3)	(4)	(4)	(5)	(6)	(6)	(7)		
(22+4)	T.13-1	29.5	48.1	44.4	62.3	19.1	19.4	16.9	26.0	15.6	12.2
* 82.SD	-2	46.3	52.8	46.5	67.1	19.5	19.7	17.2	40.6	29.9	26.4
	-3	61.7	53.8	45.8	65.5	19.7	20.0	17.5	50.6	40.9	36.1
	-4	75.4	54.6	44.9	63.5	19.9	20.1	17.6	56.3	47.3	41.7
	-5	89.5	57.9	46.0	65.9	20.1	20.4	17.9	66.3	58.3	51.3
	-6	102.6	59.0	45.2	64.2	20.3	20.5	18.1	72.7	65.3	57.5

FLEXION NEGATIVA (por m)																				
REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERT. FISURA						B500 MOMENTO ULTIMO-ABERT. FISURA						ESF. CORTANTE bo Perim. Vu	ESF. RAS.	MOMENTO FISUR.	RIGIDEZ TOTAL FIS. E·Ih E·If				
	Sección tipo			Sección maciza			Sección tipo			Sección maciza										
	Mu	Rel.	Vig.	Wk	Mu	Rel.	Wk	Mu	Rel.	Vig.	Wk	Mu	Rel.	Wk	Vu					
	x/d	lím.			x/d			x/d	lím.			x/d			Vr,u					
	m·kN/m	mm	m·kN/m	mm	m·kN/m	mm	m·kN/m	mm	m·kN/m	mm	m·kN/m	mm	kN/m	kN/m	kN/m	m·kN/m	m ² ·MN/m			
	(3)	(8)	(9)	(10)	(3)	(8)	(10)							(4)	(5)	(6)	(6)			
1φ10	0.0	.00	.00		0.0	.00	.00	0.0	.00	.00		0.0	.00	.00	53.6	45.6	65.0	22.6	19.2	1.1
2φ 8	0.0	.00	.00		0.0	.00	.00	0.0	.00	.00		0.0	.00	.00	53.8	45.7	65.3	22.7	19.2	1.3
1φ12	0.0	.00	.00		0.0	.00	.00	0.0	.00	.00		0.0	.00	.00	53.5	45.5	64.7	22.7	19.2	1.4
1φ 8+1φ10	0.0	.00	.00		0.0	.00	.00	0.0	.00	.00		0.0	.00	.00	53.7	45.6	65.1	22.8	19.3	1.5
2φ10	0.0	.00	.00		0.0	.00	.00	15.3	.09	6 .11		15.7	.01	.11	53.6	45.6	65.0	23.0	19.3	1.8
1φ10+1φ12	0.0	.00	.00		15.7	.01	.10	18.5	.11	6 .12		19.0	.01	.12	53.5	45.5	64.8	23.1	19.4	2.0
1φ16	0.0	.00	.00		19.0	.01	.10	19.1	.12	6 .12		19.8	.02	.12	53.1	45.2	64.1	23.1	19.4	2.1
2φ12	17.5	.10	6 .09		18.1	.01	.09	25.9	.13	6 .11		22.4	.02	.11	53.5	45.5	64.7	23.3	19.5	2.3
1φ10+1φ16	25.6	.13	6 .10		22.1	.02	.12	31.4	.16	6 .16		27.4	.02	.15	53.3	45.3	64.4	23.5	19.5	2.7
1φ12+1φ16	28.5	.15	6 .10		24.8	.02	.11	35.0	.18	6 .18		30.7	.02	.14	53.2	45.3	64.3	23.6	19.6	3.0
3φ12	30.9	.16	6 .09		26.9	.02	.09	37.8	.19	6 .16		40.0	.03	.11	53.5	45.5	64.7	23.8	19.7	3.2
2φ16	35.8	.19	6 .14		31.5	.02	.10	43.6	.23	6 .20		46.8	.03	.12	53.1	45.2	64.1	24.0	19.8	3.5
4φ12	40.2	.21	6 .12		42.8	.03	.09	48.9	.26	6 .17		52.9	.03	.11	53.6	45.5	64.7	24.3	19.9	4.0
2φ16+1φ12	44.9	.24	6 .15		48.2	.03	.11	54.4	.31	6 .21		59.5	.04	.13	55.1	45.2	64.3	24.5	20.0	4.3
2φ10+2φ16	48.4	.26	6 .15		52.3	.03	.12	58.4	.34	6 .21		64.5	.04	.15	56.2	45.8	64.4	24.7	20.1	4.6
3φ16	51.5	.29	6 .16		56.0	.04	.10	61.9	.37	6 .21		69.1	.05	.12	57.1	46.9	64.1	24.9	20.2	4.8
6φ12	57.5	.32	6 .13		63.4	.04	.09	68.9	.41	6 .17		78.1	.05	.11	59.1	49.0	64.7	25.4	20.4	5.3
4φ16	65.5	.39	6 .16		73.9	.05	.10	77.7	.49	6 .21		90.8	.06	.12	61.3	51.6	64.1	25.8	20.6	5.9

RELACION α o RELACION $W_1, C / W_1, S$ (11) :

INCREMENTO EXCENTRICIDAD (e.c-e.s), mm (12) : 117.6

ESEUERZO CORTANTE ULTIMO VII Sección maciza. KN/m : 150.4

ESFUERZO BASANTE ULTIMO V: Sección maciza KN/m : 119.9

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS PRETENSADAS
MODELO T.13

PREFABRICADOS NAVARRO , S.A.

Ctra. Alicante-Cartagena, km 18
03190 PILAR DE LA HORADADA (Alicante)

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja nº 17 de 34

FLEXION POSITIVA (por m)

TIPO DE FORJADO (h + c) * s	TIPO DE VIGUETA	MOMENTO ULTIMO Mu	ESFUERZO CORTANTE ULTIMO		ESFUERZO RASANTE Sección tipo	MOMENTO DE FISURACION (hormigón in situ) Mf	RIGIDEZ		MOMENTOS E.L.S.		
			MC-78	EHE-08			TOTAL FISURADA	FISUR. E·Ih	FISUR. E·If	FISUR. Mo'	DE SERVICIO
			Md<Mo	Md>Mo			m·kN/m	kN/m	m·kN/m	m·kN/m	
(22+ 5) * 71.	T.13-1	18.2	24.9	27.9	39.9	12.3	15.3	12.8	16.9	9.8	8.0
		-2	28.5	27.3	29.3	42.9	12.5	15.6	13.1	26.4	19.1
		-3	38.2	28.0	28.8	41.9	12.7	15.8	13.4	33.0	26.2
		-4	47.0	28.6	28.3	40.7	12.8	16.0	13.5	37.0	30.5
		-5	56.0	30.4	29.0	42.1	13.0	16.2	13.8	43.4	37.4
		-6	64.6	31.1	28.5	41.1	13.1	16.3	13.9	47.7	42.0

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERT. FISURA				B500 MOMENTO ULTIMO-ABERT. FISURA				ESF. CORTANTE bo Perim. Vu	ESF. RAS. Vr,u	MOMENTO FISUR. Mf	RIGIDEZ TOTAL FIS. E·Ih E·If						
	Sección tipo		Sección maciza		Sección tipo		Sección maciza											
	Mu	Rel. Vig. Wk	Mu	Rel. Wk	Mu	Rel. Vig. Wk	Mu	Rel. Wk										
	x/d	lím.	x/d	lím.	x/d	lím.	x/d	lím.										
	m·kN/m	mm	m·kN/m	mm	m·kN/m	mm	m·kN/m	mm	kN/m	kN/m	m·kN/m	m2·MN/m						
	(3)	(8)	(9)	(10)	(3)	(8)	(9)	(10)	(4)	(5)	(6)	(6)						
1φ10	0.0	.00	.00	0.0	.00	.00	9.3	.09	6 .11	9.6	.01	.11	28.8	28.7	41.6	21.4	15.1	1.3
2φ 8	9.6	.09	6 .08	9.9	.01	.08	11.8	.11	6 .10	12.3	.01	.10	28.9	28.8	41.7	21.5	15.1	1.5
1φ12	10.6	.10	6 .09	11.0	.01	.09	13.1	.12	6 .12	13.7	.01	.12	28.7	28.6	41.4	21.5	15.1	1.6
1φ 8+1φ10	12.1	.11	6 .09	12.6	.01	.10	14.9	.14	6 .11	15.6	.01	.12	28.9	28.7	41.6	21.6	15.2	1.8
2φ10	14.6	.14	6 .08	15.3	.01	.09	21.5	.17	6 .10	19.0	.01	.11	28.8	28.7	41.6	21.7	15.2	2.0
1φ10+1φ12	17.5	.17	6 .08	18.6	.01	.10	25.7	.21	6 .10	23.1	.02	.12	28.8	28.7	41.5	21.9	15.2	2.3
1φ16	21.8	.18	6 .10	19.3	.01	.10	26.6	.23	6 .13	23.9	.02	.13	28.8	28.5	41.0	21.9	15.2	2.4
2φ12	24.5	.20	6 .08	21.9	.02	.09	29.8	.26	6 .13	27.1	.02	.12	29.7	28.6	41.4	22.0	15.3	2.6
1φ10+1φ16	29.5	.26	6 .11	26.8	.02	.12	35.5	.34	6 .18	33.2	.02	.15	31.1	28.5	41.2	22.2	15.3	3.0
1φ12+1φ16	32.6	.30	6 .13	30.0	.02	.11	39.1	.39	6 .19	44.6	.03	.14	31.9	29.2	41.2	22.4	15.4	3.3
3φ12	35.0	.33	6 .11	32.6	.02	.09	41.8	.42	6 .16	48.4	.03	.12	32.6	30.0	41.4	22.5	15.5	3.5
2φ16	39.8	.40	6 .14	45.7	.03	.10	47.2	.50	6 .20	56.5	.03	.13	33.7	31.7	41.0	22.7	15.5	3.8
4φ12	44.1	.45	6 .12	51.7	.03	.09	52.5	.53	5 .17	63.9	.04	.12	34.0	33.0	41.4	23.0	15.6	4.2
2φ16+1φ12	48.3	.51	6 .15	58.3	.04	.11	58.6	.56	3 .20	71.9	.04	.13	33.8	34.4	41.1	23.2	15.7	4.5
2φ10+2φ16	51.4	.55	6 .15	63.2	.04	.12	63.3	.58	2 .20	77.9	.05	.15	33.9	35.4	41.2	23.5	15.7	4.8
3φ16	54.0	.58	6 .15	67.7	.04	.10	68.0	.59	1 .20	83.5	.05	.13	33.8	36.2	41.0	23.6	15.8	5.0
6φ12	60.9	.60	4 .13	76.5	.05	.09	70.0	.65	1 .17	94.1	.06	.12	34.0	36.6	41.4	24.1	16.0	5.5
4φ16	71.3	.62	1 .15	89.1	.05	.10	0.0	.00	.00	109.4	.07	.13	33.8	36.4	41.0	24.5	16.0	6.0

RELACION α o RELACION $W_1,c / W_1,s$ (11) : 5.64

INCREMENTO EXCENTRICIDAD ($e_c - e_s$), mm (12) : 146.6

ESFUERZO CORTANTE ULTIMO V_u , Sección maciza, kN/m : 154.7

ESFUERZO RASANTE ULTIMO V_u , Sección maciza, kN/m : 106.8

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS PRETENSADAS
MODELO T.13

PREFABRICADOS NAVARRO , S.A

Ctra. Alicante-Cartagena, km 18
03190 PILAR DE LA HORADADA (Alicante)

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja n° 18 de 34

		FLEXION POSITIVA (por m)									
TIPO DE FORJADO (h + c) * s	TIPO DE VIGUETA	MOMENTO	ESFUERZO CORTANTE ULTIMO		ESFUERZO	MOMENTO DE	RIGIDEZ		MOMENTOS E.L.S.		
		ULTIMO Mu	MC-78	EHE-08	RASANTE Sección tipo	FISURACION (hormigón in situ) Mf	E·Ih	E·If	FISUR. Mo'	DESCOMP. DE SERVICIO	
		m·kN/m	Md<Mo	Md>Mo	kN/m	m·kN/m	m2·MN/m	m2·MN/m	m·kN/m		
		(3)	(4)	(4)	(5)	(6)	(6)	(6)			(7)
* 82.5D	T.13-1	31.0	49.7	45.6	65.1	20.4	22.1	19.0	27.8	16.4	13.0
	-2	48.5	54.3	47.8	69.9	20.7	22.5	19.4	43.3	31.7	28.1
	-3	64.6	55.4	47.1	68.3	21.0	22.8	19.7	54.0	43.4	38.5
	-4	79.1	56.2	46.2	66.3	21.1	23.0	20.0	60.5	50.4	44.8
	-5	94.0	59.5	47.2	68.7	21.4	23.3	20.3	70.8	61.8	54.8
	-6	107.8	60.5	46.5	67.0	21.6	23.5	20.5	77.7	69.3	61.4

	FLEXION NEGATIVA (por m)																			
REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERT. FISURA						B500 MOMENTO ULTIMO-ABERT. FISURA						ESF. CORTANTE	ESF.	MOMENTO	RIGIDEZ				
	Sección tipo			Sección maciza			Sección tipo			Sección maciza										
	Mu	Rel.	Vig.	Wk	Mu	Rel.	Wk	Mu	Rel.	Vig.	Wk	Mu	Rel.	Vk	RAS.	FISUR.				
	x/d			lím.	x/d			x/d				x/d			Vr,u	Mf	E·In E·If			
	m·kN/m			mm	m·kN/m			m·kN/m				m·kN/m		mm	kN/m	m·kN/m	m2·MN/m			
	(3)	(8)	(9)	(10)	(3)	(8)	(10)							(4)	(5)	(6)	(6)			
1φ10	0.0	.00	.00		0.0	.00	.00	0.0	.00	.00	.00	0.0	.00	.00	55.4	46.8	67.8	25.4	21.9	1.2
2φ 8	0.0	.00	.00		0.0	.00	.00	0.0	.00	.00	.00	0.0	.00	.00	55.5	47.0	68.1	25.5	21.9	1.4
1φ12	0.0	.00	.00		0.0	.00	.00	0.0	.00	.00	.00	0.0	.00	.00	55.2	46.7	67.5	25.5	21.9	1.5
1φ 8+1φ10	0.0	.00	.00		0.0	.00	.00	0.0	.00	.00	.00	0.0	.00	.00	55.4	46.9	67.9	25.6	22.0	1.7
2φ10	0.0	.00	.00		0.0	.00	.00	0.0	.00	.00	.00	0.0	.00	.00	55.4	46.8	67.8	25.8	22.0	2.0
1φ10+1φ12	0.0	.00	.00		0.0	.00	.00	19.3	.10	6 .12		19.9	.01	.12	55.3	46.8	67.6	25.9	22.1	2.3
1φ16	0.0	.00	.00		19.9	.01	.10	20.0	.11	6 .13		20.6	.01	.13	54.9	46.5	67.0	25.9	22.1	2.3
2φ12	18.3	.10	6 .09		18.9	.01	.09	27.1	.12	6 .11		23.4	.02	.12	55.2	46.7	67.5	26.1	22.2	2.6
1φ10+1φ16	26.8	.12	6 .10		23.1	.02	.12	32.9	.15	6 .15		28.7	.02	.15	55.0	46.6	67.2	26.3	22.3	3.0
1φ12+1φ16	29.9	.14	6 .10		25.9	.02	.11	36.6	.17	6 .17		32.1	.02	.14	55.0	46.5	67.2	26.5	22.3	3.3
3φ12	32.3	.15	6 .08		28.1	.02	.09	39.6	.19	6 .15		34.8	.02	.12	55.2	46.7	67.5	26.6	22.4	3.5
2φ16	37.5	.18	6 .13		32.9	.02	.10	45.8	.22	6 .20		48.9	.03	.13	54.9	46.5	67.0	26.8	22.5	3.9
4φ12	42.2	.20	6 .11		44.7	.03	.09	51.3	.25	6 .17		55.3	.03	.12	55.2	46.7	67.5	27.2	22.7	4.4
2φ16+1φ12	47.1	.23	6 .15		50.4	.03	.11	57.1	.29	6 .21		62.3	.04	.13	56.5	46.5	67.1	27.4	22.8	4.8
2φ10+2φ16	50.8	.25	6 .15		54.7	.03	.12	61.3	.32	6 .21		67.5	.04	.15	57.7	46.7	67.2	27.6	22.9	5.1
3φ16	54.0	.28	6 .15		58.6	.04	.10	65.1	.35	6 .21		72.3	.04	.13	58.6	47.8	67.0	27.8	22.9	5.3
6φ12	60.4	.31	6 .13		66.2	.04	.09	72.4	.39	6 .17		81.6	.05	.12	60.6	49.9	67.5	28.3	23.2	5.9
4φ16	69.0	.38	6 .16		77.3	.05	.10	82.0	.47	6 .20		95.1	.06	.13	62.8	52.6	67.0	28.7	23.4	6.5

RELACION $a \circ$ RELACION $W_1,c / W_1,s$ (11) : 5.34

INCREMENTO EXCENTRICIDAD (e,c-e,s), mm (12) : 127.6

ESFUERZO CORTANTE ULTIMO V_u , Sección maciza, kN/m : 154.7

ESFUERZO RASANTE ULTIMO V_u , Sección maciza, kN/m : 125

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS PRETENSADAS
MODELO T.13

PREFABRICADOS NAVARRO , S.A.

Ctra. Alicante-Cartagena, km 18
03190 PILAR DE LA HORADADA (Alicante)

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja nº 19 de 34

FLEXION POSITIVA (por m)

TIPO DE FORJADO (h + c) * s	TIPO DE VIGUETA	MOMENTO ULTIMO Mu	ESFUERZO CORTANTE ULTIMO		ESFUERZO RASANTE Sección tipo	MOMENTO DE FISURACION (hormigón in situ) Mf	RIGIDEZ		MOMENTOS E.L.S.			
			MC-78	EHE-08			TOTAL FISURADA	E·Ih	E·If	FISUR.	Mo'	DESCOMP.
			Md<Mo	Md>Mo			m·kN/m	(5)	(6)	m·kN/m	(7)	
(25+ 4)* 71.	T.13-1	19.9	26.5	27.4	40.3	13.7	18.2	15.2	19.0	10.8	8.9	
		-2	31.2	28.8	28.6	43.0	13.9	18.5	15.6	29.6	21.2	19.2
		-3	41.7	29.5	28.2	42.1	14.1	18.8	15.8	36.9	29.1	26.3
		-4	51.3	30.1	27.7	41.0	14.2	19.0	16.0	41.2	33.7	30.5
		-5	61.2	31.9	28.3	42.4	14.4	19.2	16.3	48.5	41.5	37.5
		-6	70.7	32.5	27.9	41.4	14.5	19.4	16.5	53.2	46.6	42.1

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERT. FISURA				B500 MOMENTO ULTIMO-ABERT. FISURA				ESF. CORTANTE bo Perim. Vu	ESF. RAS. Vu	MOMENTO FISUR. Mf	RIGIDEZ TOTAL FIS. E·Ih E·If						
	Sección tipo		Sección maciza		Sección tipo		Sección maciza											
	Mu	Rel. Vig. Wk	Mu	Rel. Wk	Mu	Rel. Vig. Wk	Mu	Rel. Wk										
	x/d	lím.	x/d	lím.	x/d	lím.	x/d	lím.										
	m·kN/m	mm	m·kN/m	mm	m·kN/m	mm	m·kN/m	mm	KN/m	KN/m	m·kN/m	m2·MN/m						
	(3)	(8)	(9)	(10)	(3)	(8)	(10)		(4)	(5)	(6)	(e)						
1φ10	0.0	.00	.00	0.0	.00	.00	10.1	.08	6 .11	10.4	.01	.11	30.6	28.1	41.8	23.0	18.0	1.4
2φ 8	10.4	.08	6 .08	10.7	.01	.08	12.9	.10	6 .10	13.3	.01	.10	30.7	28.2	42.0	23.1	18.0	1.7
1φ12	11.6	.09	6 .10	11.9	.01	.10	14.3	.11	6 .12	14.8	.01	.12	30.5	28.0	41.7	23.1	18.0	1.9
1φ 8+1φ10	13.2	.10	6 .09	13.7	.01	.10	16.2	.13	6 .11	17.0	.01	.13	30.7	28.1	41.9	23.2	18.1	2.1
2φ10	15.9	.13	6 .08	16.6	.01	.09	23.4	.16	6 .10	20.6	.01	.11	30.6	28.1	41.8	23.4	18.1	2.4
1φ10+1φ12	19.1	.16	6 .09	20.2	.01	.10	28.1	.19	6 .11	25.0	.02	.13	30.6	28.0	41.7	23.6	18.2	2.7
1φ16	23.8	.16	6 .10	21.0	.01	.10	29.0	.21	6 .14	26.0	.02	.13	30.4	27.9	41.4	23.5	18.2	2.8
2φ12	26.7	.18	6 .08	23.7	.01	.10	32.6	.24	6 .14	29.4	.02	.12	31.2	28.0	41.7	23.7	18.3	3.1
1φ12+1φ16	32.2	.24	6 .12	29.1	.02	.12	39.0	.31	6 .19	36.1	.02	.15	32.6	27.9	41.5	24.0	18.4	3.6
1φ12+1φ16	35.7	.28	6 .13	32.6	.02	.12	42.9	.36	6 .20	40.4	.02	.14	33.5	28.8	41.5	24.2	18.4	3.9
3φ12	38.3	.30	6 .11	35.4	.02	.10	46.0	.39	6 .17	52.5	.03	.12	34.2	29.6	41.7	24.4	18.5	4.1
2φ16	43.8	.37	6 .15	49.7	.03	.10	52.0	.46	6 .20	61.5	.03	.13	35.4	31.2	41.4	24.6	18.6	4.6
4φ12	48.6	.42	6 .13	56.2	.03	.10	57.4	.51	6 .17	69.5	.04	.12	36.3	32.6	41.7	25.0	18.7	5.0
2φ16+1φ12	53.3	.48	6 .15	63.4	.03	.11	64.2	.54	4 .20	78.2	.04	.14	36.2	33.9	41.4	25.2	18.8	5.4
2φ10+2φ16	56.8	.51	6 .15	68.7	.04	.12	68.8	.57	3 .20	84.8	.04	.15	36.2	34.9	41.5	25.5	18.9	5.8
3φ16	59.8	.55	6 .15	73.7	.04	.10	73.5	.59	2 .20	90.8	.05	.13	36.1	35.7	41.4	25.7	19.0	6.0
6φ12	67.4	.57	4 .13	83.2	.04	.10	80.9	.61	1 .17	102.4	.05	.12	36.3	36.1	41.7	26.3	19.2	6.6
4φ16	77.0	.63	2 .16	97.0	.05	.10	0.0	.00	.00	119.3	.06	.13	36.1	35.9	41.4	26.8	19.4	7.2

RELACION a o RELACION W1,c / W1,s (11) : 6.29

INCREMENTO EXCENTRICIDAD (e,c-e,s), mm (12) : 158.6

ESFUERZO CORTANTE ULTIMO Vu, Sección maciza, kN/m : 163.2

ESFUERZO RASANTE ULTIMO Vu, Sección maciza, kN/m : 115.5

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS PRETENSADAS
MODELO T.13

PREFABRICADOS NAVARRO , S.A.

Ctra. Alicante-Cartagena, km 18
03190 PILAR DE LA HORADADA (Alicante)

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja nº 20 de 34

FLEXION POSITIVA (por m)

TIPO DE FORJADO (h + c) * s	TIPO DE VIGUETA	MOMENTO ULTIMO Mu	ESFUERZO CORTANTE ULTIMO		ESFUERZO RASANTE	MOMENTO DE FISURACION Sección tipo	RIGIDEZ		MOMENTOS E.L.S.		
			MC-78	EHE-08 Md<Mo 1+Mo/Md=2			(hormigón in situ) Mf	E·Ih	E·If	FISUR. DE SERVICIO	Mo' DESCOMP.
		m·kN/m	kN/m	kN/m	kN/m	m·kN/m	m2·MN/m	m2·MN/m	m·kN/m		
(25+ 4)* 82.5D	T.13-1	34.0	52.9	46.3	68.1	22.7	26.4	22.4	30.8	17.9	14.5
	-2	53.0	57.4	48.4	72.7	23.0	26.8	22.9	48.0	34.9	31.2
	-3	70.6	58.5	47.7	71.2	23.3	27.1	23.2	59.8	47.7	42.7
	-4	86.6	59.3	46.9	69.3	23.5	27.3	23.5	66.9	55.4	49.5
	-5	102.9	62.5	47.9	71.6	23.8	27.6	23.8	78.7	68.2	61.0
	-6	118.3	63.5	47.2	70.0	24.0	27.9	24.1	86.3	76.5	68.3

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERT. FISURA				B500 MOMENTO ULTIMO-ABERT. FISURA				ESF. CORTANTE bo Perim. Vu	ESF. RAS. Vu	MOMENTO FISUR. Mf	RIGIDEZ TOTAL FIS. E·Ih E·If				
	Sección tipo		Sección maciza		Sección tipo		Sección maciza									
	Mu	Rel. Vig. Wk	Mu	Rel. Wk	Mu	Rel. Vig. Wk	Mu	Rel. Wk								
	x/d	lím.	x/d	lím.	x/d	lím.	x/d	lím.								
	m·kN/m	mm	m·kN/m	mm	m·kN/m	mm	m·kN/m	mm	KN/m	KN/m	m·kN/m	m2·MN/m				
	(3)	(8)	(9)	(10)	(3)	(8)	(9)	(10)	(4)	(5)	(6)	(6)				
1φ10	0.0	.00	.00	0.0	.00	.00	0.0	.00	58.8	47.5	70.7	27.3	26.1 1.4			
2φ 8	0.0	.00	.00	0.0	.00	.00	0.0	.00	59.0	47.6	71.0	27.4	26.2 1.6			
1φ12	0.0	.00	.00	0.0	.00	.00	0.0	.00	58.6	47.4	70.4	27.5	26.2 1.8			
1φ 8+1φ10	0.0	.00	.00	0.0	.00	.00	0.0	.00	58.9	47.5	70.8	27.6	26.2 2.0			
2φ10	0.0	.00	.00	0.0	.00	.00	0.0	.00	58.8	47.5	70.7	27.7	26.3 2.3			
1φ10+1φ12	0.0	.00	.00	0.0	.00	.00	21.0	.10	58.7	47.4	70.5	27.9	26.4 2.7			
1φ16	0.0	.00	.00	21.6	.01	.10	21.8	.10	58.3	47.1	69.9	27.9	26.4 2.7			
2φ12	0.0	.00	.00	22.4	.01	.10	29.5	.11	58.6	47.4	70.4	28.1	26.5 3.0			
iφ10-iφ16	29.1	.11	6 .11	25.1	.02	.12	35.8	.14	58.5	47.2	70.1	28.3	26.6 3.5			
1φ12+iφ16	32.5	.13	6 .10	28.1	.02	.12	39.9	.16	58.4	47.2	70.1	28.5	26.7 3.9			
3φ12	35.2	.14	6 .09	30.5	.02	.10	43.1	.17	58.6	47.4	70.4	28.7	26.8 4.2			
2φ16	40.9	.16	6 .13	35.8	.02	.10	50.0	.21	58.3	47.1	69.9	29.0	27.0 4.7			
4φ12	46.0	.18	6 .12	40.5	.02	.10	56.1	.23	58.6	47.4	70.4	29.4	27.2 5.2			
2φ16+1φ12	51.5	.21	6 .15	54.8	.03	.11	62.5	.27	59.3	47.2	70.0	29.6	27.3 5.6			
2φ10+2φ16	55.5	.23	6 .15	59.4	.03	.12	67.2	.30	60.5	47.2	70.1	29.9	27.4 6.0			
3φ16	59.1	.25	6 .16	63.7	.03	.10	71.5	.32	61.5	48.2	69.9	30.1	27.5 6.3			
6φ12	66.1	.29	6 .13	72.0	.04	.10	79.6	.36	63.5	50.3	70.4	30.7	27.9 7.0			
4φ16	75.8	.35	6 .16	84.1	.04	.10	90.4	.43	65.9	53.1	69.9	31.3	28.1 7.8			

RELACION c o RELACION Wl,c / Wl,s (11) : 5.93

INCREMENTO EXCENTRICIDAD (e,c-e,s), mm (12) : 138.6

ESFUERZO CORTANTE ULTIMO Vu, Sección maciza, kN/m : 163.2

ESFUERZO RASANTE ULTIMO Vu, Sección maciza, kN/m : 135.1

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS PRETENSADAS
MODELO T.13

PREFABRICADOS NAVARRO , S.A.

Ctra. Alicante-Cartagena, km 18
03190 PILAR DE LA HORADADA (Alicante)

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja nº 21 de 34

FLEXION POSITIVA (por m)																	
TIPO DE FORJADO (h + c) * s	TIPO DE VIGUETA	MOMENTO ULTIMO Mu	ESFUERZO CORTANTE ULTIMO		ESFUERZO RASANTE	MOMENTO DE FISURACION Sección tipo	RIGIDEZ		MOMENTOS E.L.S.								
			MC-78	EHE-08 Md<Mo 1+Mo/Md=2			(hormigón in situ) Mf	E·Ih	E·If	FISUR. Mo'	DESCOMP. DE SERVICIO						
(25+ 5) * 71.	T.13-1	26.8	27.2	28.1	41.9	14.5	20.6	16.9	20.0	11.2	9.4						
	-2	32.5	29.6	29.3	44.6	14.8	20.9	17.2	31.1	22.3	20.3						
	-3	43.4	30.3	28.9	43.7	14.9	21.2	17.5	38.9	30.5	27.7						
	-4	53.5	30.9	28.4	42.6	15.1	21.4	17.8	43.4	35.3	32.1						
	-5	63.8	32.6	29.0	44.0	15.3	21.7	18.1	51.1	43.5	39.6						
	-6	73.7	33.2	28.6	43.0	15.4	21.9	18.3	56.1	48.8	44.4						
FLEXION NEGATIVA (por m)																	
REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERT. FISURA			B500 MOMENTO ULTIMO-ABERT. FISURA			ESF. CORTANTE		ESF.	MOMENTO	RIGIDEZ						
	Sección tipo	Sección maciza		Sección tipo	Sección maciza		bo	Perim.	RAS.	FISUR.	TOTAL FIS.						
	Mu	Rel. Vig. Wk	Mu	Rel. Vig. Wk	Mu	Rel. Vig. Wk	Mu	Rel. Wk	Vr,u	Mf	E·Ih E·If						
	x/d	lím.	x/d	x/d	x/d	lím.	x/d										
	m·kN/m	mm	m·kN/m	mm	m·kN/m	mm	m·kN/m	mm	kN/m	m·kN/m	m2·MN/m						
	(3)	(8)	(9)	(10)	(3)	(8)	(10)		(4)	(5)	(6)						
1φ10	0.0	.00	.00	0.0	.00	.00	10.5	.08	6 .12	10.8	.01 .12	31.5	28.8	43.4	25.7	20.3	1.6
2φ 8	0.0	.00	.00	10.8	.01	.08	13.4	.10	6 .10	13.8	.01 .10	31.6	28.9	43.6	25.9	20.3	1.9
1φ12	12.0	.09	6 .10	12.4	.01	.10	14.8	.11	6 .12	15.4	.01 .12	31.5	28.7	43.3	25.9	20.3	2.1
1φ 8+1φ10	13.7	.10	6 .09	14.2	.01	.10	16.9	.12	6 .11	17.6	.01 .13	31.6	28.8	43.5	26.0	20.4	2.3
2φ10	16.5	.12	6 .08	17.2	.01	.09	20.3	.15	6 .10	21.4	.01 .12	31.5	28.8	43.4	26.2	20.4	2.6
1φ10+1φ12	19.9	.15	6 .09	21.0	.01	.11	29.3	.19	6 .11	26.0	.01 .13	31.5	28.7	43.4	26.4	20.5	3.0
1φ16	20.6	.16	6 .10	21.8	.01	.11	30.3	.20	6 .13	27.0	.02 .13	31.3	28.6	43.0	26.3	20.5	3.1
2φ12	27.8	.18	6 .08	24.7	.01	.10	34.0	.23	6 .12	30.6	.02 .12	32.0	28.7	43.3	26.5	20.6	3.4
1φ10+1φ16	33.6	.23	6 .10	30.2	.02	.13	40.7	.30	6 .18	37.5	.02 .16	33.4	28.6	43.1	26.8	20.6	3.9
1φ12+1φ16	37.2	.27	6 .12	33.9	.02	.12	44.8	.35	6 .19	42.0	.02 .15	34.3	29.3	43.1	27.0	20.7	4.2
3φ12	40.0	.29	6 .11	36.7	.02	.10	48.0	.37	6 .16	54.6	.03 .12	35.0	30.1	43.3	27.2	20.8	4.5
2φ16	45.8	.36	6 .14	43.1	.02	.11	54.5	.45	6 .20	63.9	.03 .13	36.2	31.7	43.0	27.4	20.9	5.0
4φ12	50.8	.40	6 .12	58.4	.03	.10	60.2	.50	6 .17	72.2	.03 .12	37.4	33.1	43.3	27.8	21.0	5.5
2φ16+1φ12	55.9	.46	6 .15	65.9	.03	.11	66.3	.55	5 .20	81.4	.04 .14	37.3	34.5	43.0	28.0	21.1	6.0
2φ10+2φ16	59.6	.49	6 .15	71.5	.03	.13	71.6	.56	4 .20	88.2	.04 .16	37.4	35.5	43.1	28.3	21.2	6.3
3φ16	62.7	.53	6 .15	76.6	.04	.11	77.2	.57	2 .20	94.5	.05 .13	37.3	36.3	43.0	28.5	21.3	6.6
6φ12	68.9	.58	6 .13	86.5	.04	.10	86.6	.59	1 .17	106.6	.05 .12	37.5	37.2	43.3	29.1	21.5	7.2
4φ16	80.9	.60	2 .15	101.0	.05	.11	87.2	.71	1 .20	124.2	.06 .13	37.3	37.0	43.0	29.6	21.7	7.9

RELACION a o RELACION W1,c / W1,s (11) : 6.64

INCREMENTO EXCENTRICIDAD (e,c-e,s), mm (12) : 169.6

ESFUERZO CORTANTE ULTIMO Vu, Sección maciza, kN/m : 167.4

ESFUERZO RASANTE ULTIMO Vu, Sección maciza, kN/m : 119.8

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS PRETENSADAS
MODELO T.13

PREFABRICADOS NAVARRO , S.A.

Ctra. Alicante-Cartagena, km 18
03190 PILAR DE LA HORADADA (Alicante)

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja nº 22 de 34

		FLEXION POSITIVA (por m)							
TIPO DE FORJADO (h + c) * s	TIPO DE VIGUETA	MOMENTO ULTIMO Mu	ESFUERZO CORTANTE ULTIMO MC-78 Md<Mo 1+Mo/Md=2	ESFUERZO RASANTE EHE-08 Md>Mo	MOMENTO DE FISURACION Sección tipo hormigón in situ) Mf	RIGIDEZ TOTAL FISURADA E·Ih E·If	MOMENTOS E.L.S. FISUR. Mo' DESCOMP. DE SERVICIO		
		m·kN/m	kN/m	kN/m	kN/m	m2·MN/m	m·kN/m		
		(3)	(4)	(4)	(5)	(6)	(7)		
(25+ 5) * 82.5D	T.13-1	35.5	54.4	47.5	70.8	24.0	29.9 25.1	32.6 18.7 15.3	
	-2	55.3	58.9	49.5	75.5	24.4	30.3 25.6	51.0 36.9 33.2	
	-3	73.6	60.0	48.9	73.9	24.7	30.7 26.0	63.6 50.5 45.4	
	-4	90.4	60.8	48.0	72.0	24.9	30.9 26.3	70.9 58.3 52.5	
	-5	107.4	63.9	49.0	74.3	25.2	31.3 26.7	83.4 71.8 64.6	
	-6	123.5	65.0	48.3	72.7	25.4	31.6 27.0	91.5 80.5 72.4	

FLEXION NEGATIVA (por m)												
REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERT. FISURA				B500 MOMENTO ULTIMO-ABERT. FISURA				ESF. CORTANTE bo Perim. Vu	ESF. RAS. Vr,u	MOMENTO FISUR. Mf	RIGIDEZ TOTAL FIS. E·Ih E·If
	Sección tipo	Sección maciza	Sección tipo	Sección maciza	Sección tipo	Sección maciza	Sección tipo	Sección maciza	bo	Perim.	Vu	
	Mu Rel. Vig. Wk x/d lím.	Mu Rel. Wk x/d	Mu Rel. Vig. Wk x/d lím.	Mu Rel. Wk x/d	Mu Rel. Vig. Wk x/d lím.	Mu Rel. Wk x/d	Mu Rel. Vig. Wk x/d lím.	Mu Rel. Wk x/d	kN/m	kN/m	kN/m	
	m·kN/m	mm	m·kN/m	mm	m·kN/m	mm	m·kN/m	mm	(4)	(5)	(6)	(6)
	(3)	(8)	(9)	(10)	(3)	(8)	(10)					
1φ10	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	60.5	48.7	73.4	30.5 29.5 1.5
2φ 8	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	60.7	48.8	73.7	30.7 29.6 1.9
1φ12	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	60.4	48.5	73.2	30.7 29.6 2.0
1φ 8+1φ10	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	60.6	48.7	73.5	30.8 29.7 2.2
2φ10	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	60.5	48.7	73.4	31.0 29.7 2.5
1φ10+1φ12	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	21.8 .09 6 .13	22.4 .01 .13	22.4 .01 .13	60.4	48.6	73.3	31.2	29.8	3.0
1φ16	0.0 .00 .00	22.4 .01 .11	22.6 .10 6 .13	23.3 .01 .13	23.3 .01 .13	60.0	48.3	72.6	31.2	29.8	3.0	
2φ12	0.0 .00 .00	23.3 .01 .10	25.5 .11 6 .12	26.4 .01 .12	60.4	48.5	73.2	31.4	29.9	3.3		
1φ10+1φ16	25.3 .11 6 .11	26.1 .01 .13	37.3 .14 6 .13	32.3 .02 .16	60.2	48.4	72.8	31.6	30.1	3.9		
1φ12+1φ16	33.9 .12 6 .10	29.3 .02 .12	41.6 .15 6 .16	36.3 .02 .15	60.1	48.4	72.8	31.8	30.2	4.3		
3φ12	36.6 .13 6 .08	31.7 .02 .10	44.9 .17 6 .14	39.3 .02 .12	60.4	48.5	73.2	32.0	30.3	4.6		
2φ16	42.6 .16 6 .12	37.2 .02 .11	52.1 .20 6 .19	55.2 .03 .13	60.0	48.3	72.6	32.3	30.4	5.1		
4φ12	47.9 .18 6 .11	42.0 .02 .10	58.5 .22 6 .17	62.4 .03 .12	60.4	48.5	73.2	32.7	30.6	5.7		
2φ16+1φ12	53.6 .20 6 .14	57.0 .03 .11	65.2 .26 6 .21	70.4 .03 .14	60.7	48.4	72.7	33.0	30.7	6.2		
2φ10+2φ16	57.9 .22 6 .15	61.8 .03 .13	70.2 .29 6 .21	76.3 .04 .16	61.9	48.4	72.8	33.2	30.9	6.6		
3φ16	61.7 .24 6 .15	66.3 .03 .11	74.6 .31 6 .21	81.8 .04 .13	62.9	49.0	72.6	33.4	31.0	6.9		
6φ12	69.0 .28 6 .13	74.9 .04 .10	83.2 .35 6 .17	92.4 .04 .12	65.0	51.2	73.2	34.0	31.3	7.7		
4φ16	79.2 .33 6 .16	87.5 .04 .11	94.7 .42 6 .21	107.8 .05 .13	67.4	54.0	72.6	34.6	31.6	8.5		

RELACION a o RELACION W1,c / W1,s (11) : 6.29

INCREMENTO EXCENTRICIDAD (e,c-e,s), mm (12) : 149.6

ESFUERZO CORTANTE ULTIMO Vu, Sección maciza, kN/m : 167.4

ESFUERZO RASANTE ULTIMO Vu, Sección maciza, kN/m : 140.1

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS PRETENSADAS
MODELO T.13

PREFABRICADOS NAVARRO , S.A.

Ctra. Alicante-Cartagena, km 18
03190 PILAR DE LA HORADADA (Alicante)

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja nº 23 de 34

FLEXION POSITIVA (por m)

TIPO DE FORJADO (h + c) * s	TIPO DE VIGUETA	MOMENTO ULTIMO Mu	ESFUERZO CORTANTE ULTIMO		ESFUERZO RASANTE Sección tipo	MOMENTO DE FISURACION (hormigón in situ) Mf	RIGIDEZ		MOMENTOS E.L.S.			
			MC-78	EHE-08			TOTAL FISURADA	E·Ih	E·If	FISUR.	Mo ⁺	DESCOMP.
			Md<Mo	Md>Mo			m·kN/m	kN/m	kN/m	m·kN/m	m·kN/m	
(26+ 4) * 71.	T.13-1	20.8	27.2	28.1	41.9	14.3	20.0	16.6	19.9	11.2	9.4	
		-2	32.5	29.6	44.6	14.6	20.3	17.0	31.0	22.2	20.2	
		-3	43.4	30.3	43.7	14.8	20.6	17.2	38.7	30.4	27.6	
		-4	53.5	30.9	42.6	14.9	20.8	17.5	43.4	35.4	32.1	
		-5	63.8	32.6	44.0	15.1	21.0	17.8	51.1	43.6	39.6	
		-6	73.7	33.2	43.0	15.2	21.2	18.0	56.1	48.9	44.4	

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERT. FISURA				B500 MOMENTO ULTIMO-ABERT. FISURA				ESF. CORTANTE bo Perim. Vu	ESF. RAS. Vu	MOMENTO FISUR. Mf	RIGIDEZ TOTAL FIS. E·Ih E·If						
	Sección tipo		Sección maciza		Sección tipo		Sección maciza											
	Mu	Rel. Vig. Wk	Mu	Rel. Wk	Mu	Rel. Vig. Wk	Mu	Rel. Wk										
	x/d	lím.	x/d	lím.	x/d	lím.	x/d	lím.										
	m·kN/m	mm	m·kN/m	mm	m·kN/m	mm	m·kN/m	mm	kN/m	kN/m	m·kN/m	m2·MN/m						
	(3)	(8)	(9)	(10)	(3)	(8)	(10)		(4)	(5)	(6)	(6)						
1φ10	0.0	.00	.00	0.0	.00	.00	10.5	.08	6 .12	10.8	.01	.12	31.5	28.8	43.4	24.3	19.7	1.5
2φ 8	0.0	.00	.00	10.8	.01	.08	13.4	.10	6 .10	13.8	.01	.10	31.6	28.9	43.6	24.4	19.8	1.9
1φ12	12.0	.09	6 .10	12.4	.01	.10	14.8	.11	6 .12	15.4	.01	.12	31.5	28.7	43.3	24.5	19.8	2.0
1φ 8+1φ10	13.7	.10	6 .09	14.2	.01	.10	16.9	.12	6 .11	17.6	.01	.13	31.6	28.8	43.5	24.6	19.8	2.2
2φ10	16.5	.12	6 .08	17.2	.01	.09	24.4	.15	6 .10	21.4	.01	.12	31.5	28.8	43.4	24.8	19.9	2.6
1φ10+1φ12	19.9	.15	6 .09	21.0	.01	.11	29.3	.19	6 .11	26.0	.01	.13	31.5	28.7	43.4	24.9	20.0	3.0
1φ16	24.8	.16	6 .10	21.8	.01	.11	30.3	.20	6 .14	27.0	.02	.13	31.3	28.6	43.0	24.9	20.0	3.0
2φ12	27.8	.18	6 .08	24.7	.01	.10	34.0	.23	6 .13	30.6	.02	.12	32.0	28.7	43.3	25.1	20.0	3.4
1φ10+1φ16	33.6	.23	6 .12	30.2	.02	.13	40.7	.30	6 .19	37.5	.02	.16	33.4	28.6	43.1	25.4	20.1	3.9
1φ12+1φ16	37.2	.27	6 .13	33.9	.02	.12	44.8	.35	6 .20	42.0	.02	.15	34.3	29.3	43.1	25.6	20.2	4.2
3φ12	40.0	.29	6 .11	36.7	.02	.10	48.0	.38	6 .17	54.6	.03	.12	35.0	30.1	43.3	25.8	20.3	4.5
2φ16	45.8	.36	6 .15	43.1	.02	.11	54.5	.45	6 .20	63.9	.03	.13	36.2	31.7	43.0	26.1	20.4	5.5
4φ12	50.8	.40	6 .13	58.4	.03	.10	60.1	.50	6 .17	72.2	.03	.12	37.4	33.1	43.3	26.5	20.5	5.9
2φ16+1φ12	55.9	.46	6 .15	65.9	.03	.11	66.3	.55	5 .20	81.4	.04	.14	37.3	34.5	43.0	26.7	20.6	5.9
2φ10+2φ16	59.5	.50	6 .15	71.5	.03	.13	72.2	.56	3 .20	88.2	.04	.16	37.4	35.5	43.1	27.0	20.7	6.3
3φ16	62.7	.54	6 .15	76.6	.04	.11	77.1	.57	2 .20	94.5	.05	.13	37.3	36.3	43.0	27.2	20.8	6.5
6φ12	69.5	.58	5 .13	86.5	.04	.10	86.4	.60	1 .17	106.6	.05	.12	37.5	37.2	43.3	27.9	21.0	7.2
4φ16	80.8	.61	2 .16	101.0	.05	.11	0.0	.00	.00	124.2	.06	.13	37.3	37.0	43.0	28.4	21.2	7.8

RELACION a o RELACION W1,c / W1,s (11) : 6.63

INCREMENTO EXCENTRICIDAD (e,c-e,s), mm (12) : 166.6

ESFUERZO CORTANTE ULTIMO Vu, Sección maciza, kN/m : 167.4

ESFUERZO RASANTE ULTIMO Vu, Sección maciza, kN/m : 119.8

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS PRETENSADAS
MODELO T.13

PREFABRICADOS NAVARRO , S.A.

Ctra. Alicante-Cartagena, km 18
03190 PILAR DE LA HORADADA (Alicante)

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja nº 24 de 34

FLEXION POSITIVA (por m)

TIPO DE FORJADO (h + c) * s	TIPO DE VIGUETA	MOMENTO ULTIMO Mu	ESFUERZO CORTANTE ULTIMO		ESFUERZO RASANTE	MOMENTO DE FISURACION	RIGIDEZ		MOMENTOS E.L.S.			
			MC-78	EHE-08			(hormigón in situ) Mf	E·Ih	E·If	FISUR.	Mo'	DESCOMP.
			1+Mo/Md=2									
			m·kN/m	kN/m			kN/m			m·kN/m		
			(3)	(4)			(5)			(6)		
(26+ 4)* 82.5D	T.13-1	35.5	54.4	47.5	70.8	23.9	29.0	24.5	32.5	18.7	15.2	
	-2	55.3	58.9	49.5	75.5	24.2	29.4	24.9	50.5	36.5	32.8	
	-3	73.6	60.0	48.9	73.9	24.5	29.8	25.3	62.9	50.0	44.9	
	-4	90.4	60.8	48.0	72.0	24.7	30.0	25.6	70.4	58.0	52.1	
	-5	107.4	63.9	49.0	74.3	25.0	30.4	26.0	82.8	71.4	64.1	
	-6	123.5	65.0	48.3	72.7	25.2	30.6	26.2	90.7	80.0	71.8	

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERT. FISURA				B500 MOMENTO ULTIMO-ABERT. FISURA				ESF. CORTANTE bo	ESF. RAS. Perim. Vu	MOMENTO FISUR. Vr,u	RIGIDEZ TOTAL FIS. E·Ih E·If				
	Sección tipo		Sección maciza		Sección tipo		Sección maciza									
	Mu	Rel. Vig. Wk	Mu	Rel. Wk	Mu	Rel. Vig. Wk	Mu	Rel. Wk								
	x/d	lím.	x/d	lím.	x/d	lím.	x/d	lím.								
	m·kN/m	mm	m·kN/m	mm	m·kN/m	mm	m·kN/m	mm	kN/m	kN/m	kN/m	m2·MN/m				
	(3)	(8)	(9)	(10)	(3)	(8)	(10)		(4)	(5)	(6)	(6)				
1φ10	0.0	.00	.00	0.0	.00	.00	0.0	.00	60.5	48.7	73.4	28.9	28.7 1.5			
2φ 8	0.0	.00	.00	0.0	.00	.00	0.0	.00	60.7	48.8	73.7	29.0	28.7 1.8			
1φ12	0.0	.00	.00	0.0	.00	.00	0.0	.00	60.4	48.5	73.2	29.1	28.8 1.9			
1φ 8+1φ10	0.0	.00	.00	0.0	.00	.00	0.0	.00	60.6	48.7	73.5	29.2	28.8 2.1			
2φ10	0.0	.00	.00	0.0	.00	.00	0.0	.00	60.5	48.7	73.4	29.3	28.9 2.5			
1φ10+1φ12	0.0	.00	.00	0.0	.00	21.8	.09	6 .13	22.4	.01	60.4	48.6	73.3 29.0 2.9			
1φ16	0.0	.00	.00	22.4	.01	.11	22.6	.10	6 .13	23.3	.01	.13	60.0 29.5 29.0 3.0			
2φ12	0.0	.00	.00	23.3	.01	.10	30.7	.11	6 .12	26.4	.01	.12	60.4 29.2 29.7 3.3			
1φ10+1φ16	30.3	.11	6 .11	26.1	.01	.13	37.3	.14	6 .15	32.3	.02	.16	60.2 29.3 30.0 3.8			
1φ12+1φ16	33.9	.12	6 .10	29.3	.02	.12	41.6	.15	6 .18	36.3	.02	.15	60.1 29.4 30.2 4.2			
3φ12	36.6	.13	6 .08	31.7	.02	.10	44.9	.17	6 .15	39.3	.02	.12	60.4 29.5 30.4 4.5			
2φ16	42.6	.16	6 .13	37.2	.02	.11	52.1	.20	6 .20	55.2	.03	.13	60.0 29.6 30.7 5.1			
4φ12	47.9	.18	6 .12	42.0	.02	.10	58.5	.22	6 .17	62.4	.03	.12	60.4 29.9 31.1 5.6			
2φ16+1φ12	53.6	.20	6 .15	57.0	.03	.11	65.2	.26	6 .21	70.4	.03	.14	60.7 31.4 30.0 6.1			
2φ10+2φ16	57.9	.22	6 .15	61.8	.03	.13	70.2	.29	6 .21	76.3	.04	.16	61.9 31.7 30.2 6.5			
3φ16	61.7	.24	6 .16	66.3	.03	.11	74.6	.31	6 .21	81.8	.04	.13	62.9 31.9 30.3 6.9			
6φ12	69.0	.28	6 .13	74.9	.04	.10	83.2	.35	6 .18	92.4	.04	.12	65.0 32.5 30.6 7.6			
4φ16	79.2	.33	6 .16	87.5	.04	.11	94.7	.42	6 .21	107.8	.05	.13	67.4 33.1 30.9 8.5			

RELACION a o RELACION W_{1,c} / W_{1,s} (11) : 6.24

INCREMENTO EXCENTRICIDAD (e,c-e,s), mm (12) : 145.6

ESFUERZO CORTANTE ULTIMO Vu, Sección maciza, kN/m : 167.4

ESFUERZO RASANTE ULTIMO Vu, Sección maciza, kN/m : 140.1

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS PRETENSADAS
MODELO T.13

PREFABRICADOS NAVARRO , S.A.

Ctra. Alicante-Cartagena, km 18
03190 PILAR DE LA HORADADA (Alicante)

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja nº 25 de 34

FLEXION POSITIVA (por m)

TIPO DE FORJADO (h + c) * s	TIPO DE VIGUETA	MOMENTO ULTIMO	ESFUERZO CORTANTE ULTIMO	ESFUERZO	MOMENTO DE	RIGIDEZ	MOMENTOS E.L.S.
		Mu m·kN/m (3)	MC-78 Md<Mo 1+Mo/Md=2	EHE-08 Md>Mo kN/m (4)	RASANTE Sección tipo kN/m (5)	FISURACION (hormigón in situ) Mf m·kN/m (6)	FISUR. Mo' DE SERVICIO m·kN/m (7)
(26+ 5) * 71.	T.13-1	21.7	28.0	28.8	43.5	15.2	22.5 11.7 9.8
	-2	33.8	30.3	30.0	46.3	15.5	22.9 23.3 21.3
	-3	45.2	31.0	29.6	45.3	15.7	23.2 19.1 29.1
	-4	55.7	31.6	29.1	44.2	15.8	23.4 19.3 33.8
	-5	66.4	33.3	29.7	45.6	16.0	23.7 19.7 41.5
	-6	76.7	33.9	29.3	44.6	16.2	23.9 19.9 46.6

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERT. FISURA				B500 MOMENTO ULTIMO-ABERT. FISURA				ESF. CORTANTE	ESF.	MOMENTO	RIGIDEZ	
	Sección tipo	Sección maciza	Sección tipo	Sección maciza	bo	Perim.	RAS.	FISUR.	TOTAL FIS.	Vr,u	Mf	E·Ih	E·If
	Mu x/d	Rel. Vig. Wk lím.	Mu x/d	Rel. Wk	Mu x/d	Rel. Vig. Wk lím.	Mu x/d	Rel. Wk	Vu				
	m·kN/m (3)	mm (8) (9) (10)	m·kN/m (3)	mm (8) (10)	m·kN/m (3)	mm (8)	m·kN/m (3)	mm (8)	kN/m (4)	m·kN/m (5)	m·kN/m (6)	m2·MN/m (6)	
1φ10	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	32.5 29.5	45.0	27.3	22.2	1.7
2φ 8	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	13.9 .09 6 .10	14.3 .01 .10	32.5 29.5	45.2	27.4	22.2	2.1		
1φ12	12.5 .09 6 .10	12.9 .01 .10	15.4 .11 6 .12	16.0 .01 .12	32.4 29.4	44.9	27.4	22.2	2.2				
1φ 8+1φ10	14.2 .10 6 .09	14.7 .01 .10	17.5 .12 6 .11	18.3 .01 .13	32.5 29.5	45.1	27.6	22.3	2.5				
2φ10	17.2 .12 6 .08	17.9 .01 .09	21.1 .15 6 .10	22.2 .01 .12	32.5 29.5	45.0	27.7	22.3	2.8				
1φ10+1φ12	20.7 .14 6 .09	21.7 .01 .11	30.4 .18 6 .11	27.0 .01 .13	32.4 29.4	45.0	27.9	22.4	3.3				
1φ16	21.5 .15 6 .11	22.6 .01 .11	31.5 .19 6 .13	28.0 .01 .13	32.2 29.3	44.6	27.9	22.4	3.3				
2φ12	28.9 .17 6 .08	25.6 .01 .10	35.3 .22 6 .12	31.7 .02 .12	32.7 29.4	44.9	28.1	22.5	3.7				
1φ10+1φ16	35.0 .22 6 .10	31.4 .02 .13	42.4 .29 6 .18	38.9 .02 .16	34.2 29.3	44.7	28.4	22.6	4.2				
1φ12+1φ16	38.8 .26 6 .12	35.2 .02 .12	46.8 .33 6 .19	43.6 .02 .15	35.1 29.7	44.7	28.6	22.6	4.6				
3φ12	41.7 .28 6 .11	38.1 .02 .10	50.1 .36 6 .16	56.7 .03 .12	35.8 30.6	44.9	28.8	22.7	4.9				
2φ16	47.8 .35 6 .14	44.7 .02 .11	57.0 .43 6 .20	66.4 .03 .13	37.0 32.3	44.6	29.0	22.8	5.4				
4φ12	53.0 .39 6 .12	60.6 .03 .10	62.9 .48 6 .17	75.0 .03 .12	38.3 33.6	44.9	29.5	23.0	6.0				
2φ16+1φ12	58.4 .45 6 .15	68.4 .03 .12	68.7 .54 6 .20	84.5 .04 .14	38.5 35.0	44.6	29.7	23.1	6.5				
2φ10+2φ16	62.3 .48 6 .15	74.2 .03 .13	74.9 .55 4 .20	91.6 .04 .16	38.5 36.0	44.7	30.0	23.2	6.9				
3φ16	65.7 .52 6 .15	79.6 .04 .11	79.5 .58 3 .20	98.2 .04 .13	38.4 36.9	44.6	30.2	23.2	7.2				
6φ12	72.1 .57 6 .13	89.9 .04 .10	90.6 .57 1 .17	110.8 .05 .12	38.7 38.3	44.9	30.8	23.5	7.8				
4φ16	83.3 .61 3 .15	105.0 .05 .11	92.6 .69 1 .20	129.1 .06 .13	38.4 38.1	44.6	31.4	23.7	8.6				

RELACION a o RELACION W1,c / W1,s (11) : 6.96

INCREMENTO EXCENTRICIDAD (e,c-e,s), mm (12) : 177.6

ESFUERZO CORTANTE ULTIMO Vu, Sección maciza, kN/m : 171.5

ESFUERZO RASANTE ULTIMO Vu, Sección maciza, kN/m : 124.1

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS PRETENSADAS
MODELO T.13

PREFABRICADOS NAVARRO , S.A.

Ctra. Alicante-Cartagena, km 18
03190 PILAR DE LA HORADADA (Alicante)

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja nº 26 de 34

FLEXION POSITIVA (por m)

TIPO DE FORJADO (h + c) * s	TIPO DE VIGUETA	MOMENTO ULTIMO Mu	ESFUERZO CORTANTE ULTIMO		ESFUERZO RASANTE Rasante	MOMENTO DE FISURACION Sección tipo (hormigón in situ) Mf	RIGIDEZ		MOMENTOS E.L.S.			
			MC-78	EHE-08			TOTAL FISURADA	E·Ih	E·If	FISUR.	Mo'	DESCOMP.
			Md<Mo	Md>Mo			m·kN/m	kN/m	kN/m	m·kN/m	m·kN/m	
(26+ 5) * 82.5D	T.13-1	37.0	56.0	48.7	73.6	25.3	32.7	27.3	34.3	19.6	16.1	
	-2	57.5	60.4	50.7	78.2	25.7	33.2	27.9	53.4	38.4	34.8	
	-3	76.6	61.4	50.0	76.6	26.0	33.6	28.3	66.9	52.9	47.7	
	-4	94.1	62.3	49.2	74.7	26.2	33.9	28.6	74.6	61.1	55.2	
	-5	111.9	65.4	50.2	77.0	26.5	34.3	29.1	87.7	75.2	67.9	
	-6	128.7	66.4	49.5	75.4	26.7	34.6	29.4	96.2	84.3	76.1	

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERT. FISURA				B500 MOMENTO ULTIMO-ABERT. FISURA				ESF. CORTANTE bo Perim. Vu	ESF. RAS. Vr,u	MOMENTO FISUR. Mf	RIGIDEZ TOTAL FIS. E·Ih E·If						
	Sección tipo		Sección maciza		Sección tipo		Sección maciza											
	Mu	Rel. Vig. Wk	Mu	Rel. Wk	Mu	Rel. Vig. Wk	Mu	Rel. Wk										
	x/d	lím.	x/d	lím.	x/d	lím.	x/d	lím.										
	m·kN/m	mm	m·kN/m	mm	m·kN/m	mm	m·kN/m	mm	kN/m	kN/m	kN/m	m2·MN/m						
	(3)	(8)	(9)	(10)	(3)	(8)	(10)		(4)	(5)	(6)	(6)						
1φ10	0.0	.00	.00	0.0	.00	.00	0.0	.00	62.2	49.8	76.1	32.3	32.3	1.7				
2φ 8	0.0	.00	.00	0.0	.00	.00	0.0	.00	62.4	49.9	76.4	32.5	32.4	2.0				
1φ12	0.0	.00	.00	0.0	.00	.00	0.0	.00	62.1	49.7	75.9	32.5	32.4	2.1				
1φ 8+1φ10	0.0	.00	.00	0.0	.00	.00	0.0	.00	62.3	49.9	76.3	32.6	32.5	2.4				
2φ10	0.0	.00	.00	0.0	.00	.00	0.0	.00	62.2	49.8	76.1	32.8	32.6	2.8				
1φ10+1φ12	0.0	.00	.00	0.0	.00	.00	22.7	.09	6 .13	23.3	.01	13	62.1	49.8	76.0	33.0	32.7	3.2
1φ16	0.0	.00	.00	23.3	.01	.11	23.5	.10	6 .13	24.2	.01	.13	61.7	49.5	75.3	33.0	32.7	3.3
2φ12	0.0	.00	.00	24.2	.01	.10	26.5	.11	6 .12	27.4	.01	.12	62.1	49.7	75.9	33.2	32.8	3.6
1φ10+1φ16	26.3	.11	6 .11	27.1	.01	.13	38.8	.13	6 .14	33.6	.02	.16	61.9	49.6	75.6	33.5	33.0	4.2
1φ12+1φ16	35.2	.12	6 .10	30.4	.02	.12	43.3	.15	6 .16	37.6	.02	.15	61.9	49.6	75.5	33.7	33.1	4.6
3φ12	38.0	.13	6 .08	32.9	.02	.10	46.7	.16	6 .14	40.8	.02	.12	62.1	49.7	75.9	33.9	33.2	4.9
2φ16	44.3	.15	6 .12	38.6	.02	.11	54.2	.19	6 .19	57.4	.03	.13	61.7	49.5	75.3	34.2	33.3	5.5
4φ12	49.8	.17	6 .11	43.6	.02	.10	60.8	.22	6 .17	64.8	.03	.12	62.1	49.7	75.9	34.6	33.5	6.2
2φ16+1φ12	55.8	.20	6 .14	59.1	.03	.12	67.9	.25	6 .21	73.1	.03	.14	62.1	49.5	75.5	34.9	33.7	6.7
2φ10+2φ16	60.2	.22	6 .15	64.1	.03	.13	73.1	.28	6 .21	79.3	.04	.16	63.3	49.6	75.6	35.2	33.9	7.2
3φ16	64.3	.24	6 .15	68.8	.03	.11	77.8	.30	6 .21	85.0	.04	.13	64.3	49.8	75.3	35.4	34.0	7.5
6φ12	71.9	.27	6 .13	77.7	.03	.10	86.7	.34	6 .17	95.9	.04	.12	66.4	52.0	75.9	36.0	34.3	8.3
4φ16	82.6	.32	6 .16	90.9	.04	.11	98.9	.40	6 .21	112.0	.05	.13	68.8	54.8	75.3	36.6	34.6	9.3

RELACION a o RELACION W1,c / W1,s (11) : 6.61

INCREMENTO EXCENTRICIDAD (e,c-e,s), mm (12) : 156.6

ESFUERZO CORTANTE ULTIMO Vu, Sección maciza, kN/m : 171.5

ESFUERZO RASANTE ULTIMO Vu, Sección maciza, kN/m : 145.2

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS PRETENSADAS
MODELO T.13

PREFABRICADOS NAVARRO , S.A.

Ctra. Alicante-Cartagena, km 18
03190 PILAR DE LA HORADADA (Alicante)

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja nº 27 de 34

FLEXION POSITIVA (por m)

TIPO DE FORJADO (h + c) * s	TIPO DE VIGUETA	MOMENTO ULTIMO Mu	ESFUERZO CORTANTE ULTIMO		ESFUERZO RASANTE	MOMENTO DE FISURACION (hormigón in situ) Mf	RIGIDEZ		MOMENTOS E.L.S.		
			MC-78	EHE-08 Md<Mo Md>Mo			Sección tipo	TOTAL FISURADA E·Ih E·If	FISUR. Mo' DESCOMP. DE SERVICIO		
			1+Mo/Md=2 kN/m	kN/m	kN/m	m·kN/m	m·kN/m	(6)	m·kN/m	(7)	
(27+ 4) * 71.	T.13-1	21.7	28.0	28.8	43.5	15.1	21.9	18.1	20.9	11.7	9.8
		-2	33.8	30.3	30.0	46.3	15.4	22.3	18.4	32.5	23.2
		-3	45.2	31.0	29.6	45.3	15.5	22.5	18.7	40.6	31.8
		-4	55.7	31.6	29.1	44.2	15.7	22.8	19.0	45.5	37.0
		-5	66.4	33.3	29.7	45.6	15.9	23.0	19.3	53.5	45.5
		-6	76.7	33.9	29.3	44.6	16.0	23.3	19.5	58.8	51.1

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERT. FISURA				B500 MOMENTO ULTIMO-ABERT. FISURA				ESF. CORTANTE		ESF. RAS.	MOMENTO FISUR.	RIGIDEZ TOTAL FIS.
	Sección tipo	Sección maciza	Sección tipo	Sección maciza	bo	Perim.	Vu	Vr,u	Mf	E·Ih	E·If		
	Mu Rel. Vig. Wk x/d lím.	Mu Rel. Wk x/d	Mu Rel. Vig. Wk x/d lím.	Mu Rel. Wk x/d	Mu Rel. Wk x/d	Mu Rel. Wk x/d	Mu Rel. Wk x/d	kN/m	m·kN/m	(4)	(5)	(6)	(6)
	(3)	(8)	(9)	(10)	(3)	(8)	(10)						
1φ10	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	32.5	29.5	45.0	25.7	21.6	1.7
2φ 8	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	13.9 .09 .6 .10	14.3 .01 .10	32.5	29.5	45.2	25.8	21.7	2.0	
1φ12	12.5 .09 .6 .10	12.9 .01 .10	15.4 .11 .6 .12	16.0 .01 .12	32.4	29.4	44.9	25.9	21.7	2.2			
1φ 8+1φ10	14.2 .10 .6 .09	14.7 .01 .10	17.5 .12 .6 .11	18.3 .01 .13	32.5	29.5	45.1	26.0	21.7	2.4			
2φ10	17.2 .12 .6 .08	17.9 .01 .09	25.4 .15 .6 .10	22.2 .01 .12	32.5	29.5	45.0	26.1	21.8	2.8			
1φ10+1φ12	20.7 .14 .6 .09	21.7 .01 .11	30.4 .18 .6 .11	27.0 .01 .13	32.4	29.4	45.0	26.4	21.9	3.2			
1φ16	25.7 .15 .6 .11	22.6 .01 .11	31.5 .19 .6 .13	28.0 .01 .13	32.2	29.3	44.6	26.3	21.9	3.3			
2φ12	28.9 .17 .6 .08	25.6 .01 .10	35.3 .22 .6 .13	31.7 .02 .12	32.7	29.4	44.9	26.6	22.0	3.6			
1φ10+1φ16	35.0 .22 .6 .12	31.4 .02 .13	42.4 .29 .6 .19	38.9 .02 .16	34.2	29.3	44.7	26.8	22.1	4.2			
1φ12+1φ16	38.8 .26 .6 .13	35.2 .02 .12	46.8 .33 .6 .20	43.6 .02 .15	35.1	29.7	44.7	27.0	22.1	4.6			
3φ12	41.7 .28 .6 .11	38.1 .02 .10	50.1 .36 .6 .17	56.7 .03 .12	35.8	30.6	44.9	27.3	22.2	4.9			
2φ16	47.8 .35 .6 .15	44.7 .02 .11	57.0 .43 .6 .20	66.4 .03 .13	37.0	32.3	44.6	27.6	22.3	5.4			
4φ12	53.0 .39 .6 .13	60.6 .03 .10	62.9 .48 .6 .17	75.0 .03 .12	38.3	33.6	44.9	28.0	22.5	6.0			
2φ16+1φ12	58.4 .45 .6 .15	68.4 .03 .12	68.7 .55 .6 .20	84.5 .04 .14	38.5	35.0	44.6	28.3	22.6	6.4			
2φ10+2φ16	62.3 .48 .6 .15	74.2 .03 .13	74.9 .55 .4 .20	91.6 .04 .16	38.5	36.0	44.7	28.6	22.7	6.8			
3φ16	65.6 .52 .6 .15	79.6 .04 .11	80.7 .55 .2 .21	98.2 .04 .13	38.4	36.9	44.6	28.8	22.8	7.1			
6φ12	72.1 .57 .6 .13	89.9 .04 .10	90.6 .58 .1 .17	110.8 .05 .12	38.7	38.3	44.9	29.5	23.1	7.8			
4φ16	83.3 .62 .3 .16	105.0 .05 .11	92.2 .70 .1 .20	129.1 .06 .13	38.4	38.1	44.6	30.1	23.3	8.5			

RELACION a o RELACION W1,c / W1,s (11) : 6.95

INCREMENTO EXCENTRICIDAD (e,c-e,s), mm (12) : 174.6

ESFUERZO CORTANTE ULTIMO Vu, Sección maciza, kN/m : 171.5

ESFUERZO RASANTE ULTIMO Vu, Sección maciza, kN/m : 124.1

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS PRETENSADAS
MODELO T.13

PREFABRICADOS NAVARRO , S.A.

Ctra. Alicante-Cartagena, km 18
03190 PILAR DE LA HORADADA (Alicante)

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja nº 28 de 34

		FLEXION POSITIVA (por m)										
TIPO DE FORJADO (h + c) * s	TIPO DE VIGUETA	MOMENTO ULTIMO Mu	ESFUERZO CORTANTE ULTIMO			ESFUERZO RASANTE	MOMENTO DE FISURACION	RIGIDEZ		MOMENTOS E.L.S.		
			MC-78	EHE-08	Md<Mo			Sección tipo	(hormigón in situ) Mf	E·Ih	E·If	FISUR.
(27+ 4)* 82.5D	T.13-1	37.0 -2 -3 -4 -5 -6	56.0	48.7	73.6	Rasante Sección tipo Md>Mo 1+Mo/Md=2 kN/m (4)	Fisuración hormigón in situ Mf m·kN/m (6)	RIGIDEZ		MOMENTOS E.L.S.		
			57.5	50.7	78.2			31.8	26.6	34.1	19.5	16.0
			76.6	50.0	76.6			32.2	27.1	53.0	38.2	34.5
			94.1	49.2	74.7			32.6	27.5	66.0	52.3	47.1
			111.9	50.2	77.0			33.3	28.2	86.9	74.7	67.3
			128.7	49.5	75.4			33.5	28.5	95.3	83.7	75.4
		FLEXION NEGATIVA (por m)										
REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERT. FISURA			B500 MOMENTO ULTIMO-ABERT. FISURA			ESF. CORTANTE		ESF.	MOMENTO	RIGIDEZ	
	Sección tipo	Sección maciza		Sección tipo	Sección maciza		bo	Perim.	RAS.	FISUR.	TOTAL FIS.	
	Mu Rel. Vig. Wk	Mu Rel. Wk	x/d lím.	Mu Rel. Vig. Wk	Mu Rel. Wk	x/d lím.	Vu		Vr,u	Mf	E·Ih E·If	
	m·kN/m	mm	m·kN/m	mm	m·kN/m	mm	kN/m	kN/m	kN/m	m·kN/m	m2·MN/m	
	(3)	(8)	(9)	(10)	(3)	(8)	(10)	(4)	(5)	(6)	(6)	
1φ10	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	62.2	49.8	76.1	30.5	31.4 1.6	
2φ 8	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	62.4	49.9	76.4	30.7	31.5 1.9	
1φ12	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	62.1	49.7	75.9	30.7	31.5 2.1	
1φ 8+1φ10	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	62.3	49.9	76.3	30.8	31.6 2.3	
2φ10	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	62.2	49.8	76.1	31.0	31.7 2.7	
1φ10+1φ12	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	22.7 .09	6 .13	23.3 .01 .13	62.1	49.8	76.0	31.2	31.8 3.1	
1φ16	0.0 .00 .00	23.3 .01 .11	23.5 .10	6 .13	24.2 .01 .13	61.7	49.5	75.3	31.2	31.8 3.2		
2φ12	0.0 .00 .00	24.2 .01 .10	31.8 .11	6 .12	27.4 .01 .12	62.1	49.7	75.9	31.4	31.9 3.6		
1φ10+1φ16	26.3 .11	6 .11	27.1 .01	.13	38.8 .13	6 .15	33.6 .02 .16	61.9	49.6	75.6	31.7	32.1 4.2
1φ12+1φ16	35.2 .12	6 .10	30.4 .02	.12	43.3 .15	6 .17	37.6 .02 .15	61.9	49.6	75.5	31.9	32.2 4.6
3φ12	38.0 .13	6 .08	32.9 .02	.10	46.7 .16	6 .15	40.8 .02 .12	62.1	49.7	75.9	32.1	32.3 4.9
2φ16	44.3 .15	6 .13	38.6 .02	.11	54.2 .19	6 .20	57.4 .03 .13	61.7	49.5	75.3	32.5	32.5 5.5
4φ12	49.8 .17	6 .12	43.6 .02	.10	60.8 .22	6 .17	64.8 .03 .12	62.1	49.7	75.9	32.8	32.8
2φ16+1φ12	55.8 .20	6 .15	59.1 .03	.12	67.9 .25	6 .21	73.1 .03 .14	62.1	49.5	75.5	33.2	32.9 6.7
2φ10+2φ16	60.2 .22	6 .15	64.1 .03	.13	73.1 .28	6 .21	79.3 .04 .16	63.3	49.6	75.6	33.5	33.1 7.1
3φ16	64.3 .24	6 .16	68.8 .03	.11	77.8 .30	6 .21	85.0 .04 .13	64.3	49.8	75.3	33.7	33.2 7.5
6φ12	71.9 .27	6 .13	77.7 .03	.10	86.7 .34	6 .18	95.9 .04 .12	66.4	52.0	75.9	34.4	33.6 8.3
4φ16	82.6 .32	6 .16	90.9 .04	.11	98.9 .40	6 .21	112.0 .05 .13	68.8	54.8	75.3	35.0	33.9 9.2

RELACION a o RELACION W_{1,c} / W_{1,s} (11) : 6.55

INCREMENTO EXCENTRICIDAD (e,c-e,s), mm (12) : 152.6

ESFUERZO CORTANTE ULTIMO Vu, Sección maciza, kN/m : 171.5

ESFUERZO RASANTE ULTIMO Vu, Sección maciza, kN/m : 145.2

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS PRETENSADAS
MODELO T.13

PREFABRICADOS NAVARRO , S.A.

Ctra. Alicante-Cartagena, km 18
03190 PILAR DE LA HORADADA (Alicante)

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja n° 29 de 34

		FLEXION POSITIVA (por m)									
TIPO DE FORJADO (h + c) * s	TIPO DE VIGUETA	MOMENTO	ESFUERZO CORTANTE ULTIMO		ESFUERZO	MOMENTO DE	RIGIDEZ		MOMENTOS E.L.S.		
		ULTIMO Mu	MC-78	EHE-08	RASANTE Md < Mo Sección 1+Mo/Md=2	FISURACION (hormigón in situ) Mt	E·Ih	E·If	FISUR. Mo'	DESCOMP. DE SERVICIO	
		m·kN/m	kN/m	kN/m	kN/m	m·kN/m	m2·MN/m		m·kN/m		
		(3)	(4)	(4)	(5)	(6)	(6)		(7)		
*(27+5) * 71.	T.13-1	22.5	28.7	29.5	45.1	16.0	24.6	19.9	22.0	12.2	10.3
	-2	35.1	31.0	30.7	47.9	16.3	25.0	20.3	34.2	24.3	22.3
	-3	46.9	31.7	30.3	47.0	16.5	25.3	20.7	42.7	33.3	30.5
	-4	57.9	32.3	29.8	45.8	16.6	25.6	21.0	47.9	38.7	35.4
	-5	69.0	33.9	30.4	47.2	16.9	25.9	21.3	56.4	47.7	43.7
	-6	79.8	34.6	30.0	46.2	17.0	26.1	21.6	61.6	53.3	48.8

		FLEXION NEGATIVA (por m)																	
REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERT. FISURA						B500 MOMENTO ULTIMO-ABERT. FISURA						ESF. CORTANTE bo Perim. Vu	ESF. RAS. Vr,u	MOMENTO FISUR.	RIGIDEZ TOTAL FIS. E·Ih E·If			
	Sección tipo			Sección maciza			Sección tipo			Sección maciza									
	Mu	Rel.	Vig.	Wk	Mu	Rel.	Wk	Mu	Rel.	Vig.	Wk	Mu	Perim.						
	x/d	lím.			x/d			x/d	lím.			x/d							
	m · kN/m	mm	m · kN/m	mm	m · kN/m	mm	m · kN/m	mm	m · kN/m	mm	kN/m	kN/m	kN/m	m · kN/m	m² · MN/m	m² · MN/m			
	(3)	(8)	(9)	(10)	(3)	(8)	(10)						(4)	(5)	(6)	(6)			
1φ10	0.0	.00	.00	0.0	.00	.00	0.0	.00	.00	0.0	.00	.00	33.4	30.2	46.7	28.8	24.3 1.9		
2φ 8	0.0	.00	.00	0.0	.00	.00	14.4	.09	6 .10	14.8	.01	.10	33.4	30.2	46.8	28.9	24.3 2.2		
1φ12	13.0	.08	6 .10	13.3	.01	.10	16.0	.10	6 .13	16.6	.01	.13	33.3	30.1	46.5	29.0	24.3 2.4		
1φ 8+1φ10	14.8	.09	6 .09	15.2	.01	.10	18.2	.12	6 .11	18.9	.01	.13	33.4	30.2	46.7	29.1	24.4 2.7		
2φ10	17.8	.11	6 .08	18.5	.01	.09	21.9	.14	6 .10	23.0	.01	.12	33.4	30.2	46.7	29.3	24.4 3.1		
1φ10+1φ12	21.5	.14	6 .09	22.5	.01	.11	31.6	.17	6 .11	28.0	.01	.14	33.3	30.1	46.6	29.5	24.5 3.5		
1φ16	22.3	.15	6 .11	23.4	.01	.11	32.7	.19	6 .13	29.1	.01	.13	33.1	30.0	46.2	29.5	24.5 3.6		
2φ12	30.1	.16	6 .08	26.5	.01	.10	36.7	.22	6 .11	32.9	.02	.13	33.5	30.1	46.5	29.7	24.6 4.0		
1φ10+1φ16	36.4	.21	6 .10	32.5	.02	.13	44.1	.28	6 .18	40.3	.02	.16	35.0	30.0	46.3	30.0	24.7 4.6		
1φ12+1φ16	40.3	.25	6 .12	36.5	.02	.12	48.7	.32	6 .19	45.2	.02	.15	35.9	30.2	46.3	30.2	24.8 5.0		
3φ12	43.4	.27	6 .10	39.5	.02	.10	52.2	.35	6 .16	49.0	.02	.13	36.6	31.0	46.5	30.4	24.9 5.3		
2φ16	49.7	.33	6 .14	46.4	.02	.11	59.4	.42	6 .20	68.9	.03	.13	37.9	32.8	46.2	30.7	25.0 5.9		
4φ12	55.3	.38	6 .12	62.9	.03	.10	65.7	.47	6 .17	77.8	.03	.13	39.1	34.2	46.5	31.1	25.1 6.5		
2φ16+1φ12	60.9	.43	6 .15	71.0	.03	.12	71.9	.53	6 .20	87.7	.04	.15	39.7	35.6	46.2	31.4	25.3 7.0		
2φ10+2φ16	65.0	.47	6 .15	77.0	.03	.13	77.1	.55	5 .20	95.0	.04	.16	39.7	36.6	46.3	31.7	25.4 7.4		
3φ16	68.6	.50	6 .15	82.6	.03	.11	83.1	.56	3 .20	101.9	.04	.13	39.6	37.5	46.2	31.9	25.4 7.8		
6φ12	75.4	.55	6 .13	93.2	.04	.10	94.8	.56	1 .17	114.9	.05	.13	39.8	39.1	46.5	32.6	25.7 8.5		
4φ16	86.4	.61	4 .15	108.9	.05	.11	98.7	.67	1 .20	134.1	.06	.13	39.6	39.1	46.2	33.2	25.9 9.3		

RELACION q o RELACION $w_{l,c} / w_{l,s}$ (11) : 7.29

INCREMENTO EXCENTRICIDAD (e,c-e,s), mm (12) : 185.6

ESFUERZO CORTANTE ULTIMO V_u , Sección maciza, kN/m : 175.7

ESEFUERZO FASANTE ULTIMO Vu. Sección maciza, kN/m : 128.4

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS PRETENSADAS
MODELO T.13

PREFABRICADOS NAVARRO , S.A.

Ctra. Alicante-Cartagena, km 18
03190 PILAR DE LA HORADADA (Alicante)

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja nº 30 de 34

FLEXION POSITIVA (por m)

TIPO DE FORJADO (h + c) * s	TIPO DE VIGUETA	MOMENTO ULTIMO Mu	ESFUERZO CORTANTE ULTIMO		ESFUERZO RASANTE	MOMENTO DE FISURACION Sección tipo (hormigón in situ) MF	RIGIDEZ		MOMENTOS E.L.S.		
			MC-78	EHE-08			E·Ih	E·If	FISUR. Mo'	DECOMP.	
			Md<Mo	Md>Mo			m·kN/m	kN/m	m·kN/m		
(27+ 5) * 82.5D	T.13-1	38.5	57.5	49.9	76.3	26.6	35.8	29.6	36.1	20.4	16.9
	-2	59.7	61.8	51.9	80.9	27.0	36.3	30.2	56.1	40.2	36.5
	-3	79.6	62.8	51.2	79.4	27.4	36.7	30.7	69.9	55.0	49.9
	-4	97.8	63.7	50.4	77.4	27.6	37.1	31.1	78.3	63.9	57.9
	-5	116.3	66.8	51.4	79.8	27.9	37.5	31.5	92.0	78.6	71.3
	-6	133.9	67.8	50.7	78.1	28.1	37.8	31.9	100.9	88.2	79.8

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERT. FISURA				B500 MOMENTO ULTIMO-ABERT. FISURA				ESF. CORTANTE		ESF. RAS.	MOMENTO FISUR.	RIGIDEZ TOTAL FIS.		
	Sección tipo		Sección maciza		Sección tipo		Sección maciza		bo	Perim.					
	Mu	Rel. Vig. Wk	Mu	Rel. Wk	Mu	Rel. Vig. Wk	Mu	Rel. Wk	Vu	Vr,u					
	m·kN/m	mm	m·kN/m	mm	m·kN/m	mm	m·kN/m	mm	kN/m	kN/m	kN/m	m·kN/m	m2·MN/m		
	(3)	(8)	(9)	(10)	(3)	(8)	(10)		(4)	(5)	(6)	(6)	(6)		
1φ10	0.0	.00	.00	0.0	.00	.00	0.0	.00	63.9	51.0	78.9	34.1	35.4	1.8	
2φ 8	0.0	.00	.00	0.0	.00	.00	0.0	.00	64.1	51.1	79.1	34.3	35.5	2.1	
1φ12	0.0	.00	.00	0.0	.00	.00	0.0	.00	63.8	50.9	78.6	34.3	35.5	2.3	
1φ 8+1φ10	0.0	.00	.00	0.0	.00	.00	0.0	.00	64.0	51.0	79.0	34.5	35.6	2.6	
2φ10	0.0	.00	.00	0.0	.00	.00	0.0	.00	63.9	51.0	78.9	34.6	35.7	3.0	
1φ10+1φ12	0.0	.00	.00	0.0	.00	.00	0.0	.00	63.8	50.9	78.7	34.8	35.8	3.4	
1φ16	0.0	.00	.00	0.0	.00	.00	24.4	.09	6 .13	25.1	.01 .13	63.4	50.6	78.0	34.9
2φ12	0.0	.00	.00	25.1	.01 .10	27.5	.10	6 .12	28.4	.01 .13	63.8	50.9	78.6	35.1	
1φ10+1φ16	27.3	.10	6 .11	28.1	.01 .13	40.3	.13	6 .14	34.8	.02 .16	63.6	50.7	78.3	35.4	
1φ12+1φ16	36.5	.12	6 .11	31.5	.02 .12	44.9	.14	6 .15	39.0	.02 .15	63.5	50.7	78.2	35.6	
3φ12	39.5	.12	6 .08	34.1	.02 .10	48.5	.15	6 .14	42.3	.02 .13	63.8	50.9	78.6	35.8	
2φ16	46.0	.15	6 .11	40.0	.02 .11	56.4	.18	6 .19	49.6	.02 .13	63.4	50.6	78.0	36.1	
4φ12	51.7	.16	6 .11	45.2	.02 .10	63.2	.21	6 .17	67.2	.03 .13	63.8	50.9	78.6	36.5	
2φ16+1φ12	58.0	.19	6 .14	61.3	.03 .12	70.6	.24	6 .21	75.8	.03 .15	63.5	50.7	78.2	36.8	
2φ10+2φ16	62.6	.21	6 .15	66.5	.03 .13	76.1	.27	6 .21	82.2	.03 .16	64.7	50.7	78.3	37.2	
3φ16	66.8	.23	6 .15	71.4	.03 .11	81.0	.29	6 .21	88.2	.04 .13	65.7	50.6	78.0	37.4	
6φ12	74.8	.26	6 .13	80.6	.03 .10	90.3	.33	6 .18	99.5	.04 .13	67.8	52.8	78.6	38.0	
4φ16	86.0	.31	6 .16	94.3	.04 .11	103.1	.39	6 .21	116.3	.05 .13	70.3	55.7	78.0	38.7	

RELACION a o RELACION W_{1,c} / W_{1,s} (11) : 6.94

INCREMENTO EXCENTRICIDAD (e,c-e,s), mm (12) : 163.6

ESFUERZO CORTANTE ULTIMO Vu, Sección maciza, kN/m : 175.7

ESFUERZO RASANTE ULTIMO Vu, Sección maciza, kN/m : 150.2

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS PRETENSADAS
MODELO T.13

PREFABRICADOS NAVARRO , S.A.

Ctra. Alicante-Cartagena, km 18
03190 PILAR DE LA HORADADA (Alicante)

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja n° 31 de 34

		FLEXION POSITIVA (por m)									
TIPO DE FORJADO (h + c) * s	TIPO DE VIGUETA	MOMENTO	ESFUERZO CORTANTE ULTIMO		ESFUERZO	MOMENTO DE	RIGIDEZ		MOMENTOS E.L.S.		
		ULTIMO	MC-78	EHE-08	RASANTE	FISURACION	TOTAL FISURADA	E·Ih	E·If	FISUR.	Mo'
		Mu	Md<Mo	Md>Mo	Sección	(hormigón in situ)	Mf	DESCOMP.			DE SERVICIO
			1+Mo/Md=2		tipo						
		m·kN/m	kN/m	kN/m	kN/m	m·kN/m	m ² ·MN/m			m·kN/m	
		(3)	(4)	(4)	(5)	(6)	(6)			(7)	
(30+4)	T.13-1	24.3	30.1	30.9	48.4	18.1	28.9	22.8	23.9	13.2	11.2
* 71.	-2	37.7	32.4	32.0	51.1	18.4	29.3	23.2	37.2	26.3	24.2
	-3	50.4	33.0	31.7	50.2	18.6	29.6	23.6	46.4	36.0	33.1
	-4	62.2	33.6	31.2	49.0	18.7	29.9	23.9	52.0	41.9	38.5
	-5	74.2	35.3	31.8	50.4	19.0	30.2	24.3	61.1	51.5	47.4
	-6	85.8	36.0	31.4	49.4	19.1	30.5	24.6	67.1	57.8	53.1

	FLEXION NEGATIVA (por m)																			
REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERT. FISURA						B500 MOMENTO ULTIMO-ABERT. FISURA						ESF. CORTANTE	ESF.	MOMENTO	RIGIDEZ				
	Sección tipo			Sección maciza			Sección tipo			Sección maciza										
	Mu	Rel.	Vig.	Wk	Mu	Rel.	Wk	Mu	Rel.	Vig.	Wk	Mu	bo	Perim.	Vr,u	Mf	E·Ih E·If			
	x/d	lím.			x/d			x/d	lím.			x/d					m·kN/m m2·MN/m			
	m·kN/m	mm	m·kN/m	mm	m·kN/m	mm	m·kN/m	mm	m·kN/m	mm	m·kN/m	kN/m	kN/m	kN/m	(5)	(6)	(6)			
	(3)	(8)	(9)	(10)	(3)	(8)	(10)								(4)	(5)	(6)	(6)		
1φ10	0.0	.00	.00		0.0	.00	.00	0.0	.00	.00	.00	0.0	35.1	31.5	49.9	29.9	28.5	2.1		
2φ 8	0.0	.00	.00		0.0	.00	.00	15.4	.08	.10	.10	15.9	.01	.10	35.2	31.6	50.0	30.1	28.6	2.5
1φ12	0.0	.00	.00		15.9	.01	.10	17.1	.10	.13	.13	17.7	.01	.13	35.0	31.5	49.7	30.2	28.7	2.7
1φ 8+1φ10	15.8	.09	.09		16.3	.01	.10	19.5	.11	.11	.11	20.2	.01	.13	35.2	31.6	49.9	30.3	28.7	3.0
2φ10	19.1	.11	.08		19.8	.01	.09	23.5	.13	.10	.10	24.6	.01	.12	35.1	31.5	49.9	30.5	28.8	3.5
1φ10+1φ12	23.1	.13	.09		24.1	.01	.11	34.0	.16	.11	.11	29.9	.01	.14	35.1	31.5	49.8	30.7	28.9	4.0
1φ16	23.9	.14	.11		25.1	.01	.11	35.2	.17	.14	.14	31.1	.01	.14	34.9	31.3	49.4	30.7	28.9	4.1
2φ12	32.3	.15	.08		28.4	.01	.10	39.5	.20	.12	.12	35.2	.02	.13	35.0	31.5	49.7	31.0	29.0	4.5
1φ10+1φ16	39.1	.20	.11		34.8	.02	.14	47.5	.26	.19	.19	43.2	.02	.17	36.5	31.4	49.5	31.3	29.2	5.3
1φ12+1φ16	43.4	.23	.12		39.1	.02	.13	52.5	.30	.20	.20	48.4	.02	.16	37.4	31.4	49.5	31.6	29.3	5.7
3φ12	46.7	.25	.11		42.3	.02	.10	56.4	.33	.17	.17	52.4	.02	.13	38.1	32.0	49.7	31.8	29.4	6.1
2φ16	53.7	.31	.15		49.7	.02	.11	64.4	.39	.20	.20	73.8	.03	.14	39.5	33.7	49.4	32.2	29.6	6.8
4φ12	59.7	.35	.13		56.1	.02	.10	71.2	.43	.17	.17	83.3	.03	.13	40.7	35.2	49.7	32.7	29.8	7.5
2φ16+1φ12	66.0	.40	.15		76.0	.03	.12	78.3	.49	.21	.21	94.0	.03	.15	41.8	36.7	49.5	33.0	30.0	8.1
2φ10+2φ16	70.6	.43	.15		82.5	.03	.14	83.4	.52	.21	.21	101.9	.04	.17	42.0	37.7	49.5	33.4	30.2	8.6
3φ16	74.6	.46	.16		88.5	.03	.11	87.8	.56	.20	.20	109.3	.04	.14	41.9	38.6	49.4	33.6	30.3	9.0
6φ12	82.2	.51	.13		99.9	.04	.10	99.5	.57	.17	.17	123.2	.05	.13	42.1	40.3	49.7	34.4	30.6	9.8
4φ16	92.2	.59	.16		116.8	.04	.11	114.6	.61	.20	.20	143.9	.05	.14	41.9	41.2	49.4	35.2	31.0	10.8

RELATION α o RELATION $W_1.C / W_1.S$ (11) : 7.94

INCREMENTO EXCENTRICIDAD (e.c-e.s), MM (12) : 197.6

ESEUERZO CORTANTE ULTIMO V_u Sección maciza: KN/m^2 : 183.8

ESFUERZO CORTANTE ÚLTIMO V_u , Sección maciza, kN/m : 137

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS PRETENSADAS
MODELO T.13

PREFABRICADOS NAVARRO , S.A.

Ctra. Alicante-Cartagena, km 18
03190 PILAR DE LA HORADADA (Alicante)

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja nº 32 de 34

FLEXION POSITIVA (por m)

TIPO DE FORJADO (h + c) * s	TIPO DE VIGUETA	MOMENTO	ESFUERZO CORTANTE ULTIMO	ESFUERZO	MOMENTO DE	RIGIDEZ	MOMENTOS E.L.S.				
		ULTIMO	MC-78	EHE-08	RASANTE	FISURACION	FISUR.	Mo'	DESCOMP.		
		Mu	Md<Mo	Md>Mo	Sección	(hormigón in situ) MF	E·Ih	E·If	DE SERVICIO		
		m·kN/m	kN/m	kN/m	tipo	m·kN/m	m2·MN/m	m·kN/m			
		(3)	(4)	(4)	(5)	(6)	(6)	(7)			
(30+ 4)* 82.5D	T.13-1	41.5	60.4	52.2	81.7	29.5	41.5	33.7	39.0	21.8	18.3
	-2	64.2	64.6	54.2	86.3	29.9	42.1	34.3	60.8	43.4	39.5
	-3	85.6	65.6	53.5	84.8	30.2	42.5	34.8	75.7	59.3	54.0
	-4	105.3	66.5	52.7	82.9	30.5	42.9	35.2	84.7	68.9	62.7
	-5	125.3	69.5	53.7	85.2	30.8	43.3	35.7	99.5	84.7	77.1
	-6	144.4	70.5	53.0	83.6	31.1	43.7	36.1	109.1	94.9	86.3

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERT. FISURA				B500 MOMENTO ULTIMO-ABERT. FISURA				ESF. CORTANTE	ESF.	MOMENTO	RIGIDEZ
	Sección tipo		Sección maciza		Sección tipo		Sección maciza		bo	Perim.	FISUR.	TOTAL FIS.
	Mu	Rel. Vig. Wk	Mu	Rel. Wk	Mu	Rel. Vig. Wk	Mu	Rel. Wk	Vu	Vr,u	Mf	E·Ih E·If
	m·kN/m	mm	m·kN/m	mm	m·kN/m	mm	m·kN/m	mm	kN/m	kN/m	m·kN/m	m2·MN/m
	(3)	(8)	(9)	(10)	(3)	(8)	(10)		(4)	(5)	(6)	(6)
1φ10	0.0	.00	.00	0.0	.00	.00	0.0	.00	67.3	53.3	84.3	35.8
2φ 8	0.0	.00	.00	0.0	.00	.00	0.0	.00	67.5	53.4	84.6	36.0
1φ12	0.0	.00	.00	0.0	.00	.00	0.0	.00	67.1	53.2	84.0	36.1
1φ 8 +1φ10	0.0	.00	.00	0.0	.00	.00	0.0	.00	67.4	53.3	84.4	36.2
2φ10	0.0	.00	.00	0.0	.00	.00	0.0	.00	67.3	53.3	84.3	36.4
1φ10+1φ12	0.0	.00	.00	0.0	.00	.00	0.0	.00	67.2	53.2	84.1	36.6
1φ16	0.0	.00	.00	0.0	.00	.00	0.0	.00	66.8	53.0	83.5	36.7
2φ12	0.0	.00	.00	0.0	.00	.00	29.5	.10	67.1	53.2	84.0	36.9
1φ10+1φ16	29.2	.10	6.11	30.0	.01	.14	43.2	.12	67.0	53.0	83.7	37.2
1φ12+1φ16	39.2	.11	6.11	33.7	.01	.13	48.2	.13	66.9	53.0	83.7	37.5
3φ12	42.4	.12	6.08	36.5	.02	.10	52.1	.14	67.1	53.2	84.0	37.7
2φ16	49.4	.14	6.12	42.9	.02	.11	60.6	.17	66.8	53.0	83.5	38.1
4φ12	55.6	.15	6.11	48.4	.02	.10	68.0	.20	67.1	53.2	84.0	38.5
2φ16+1φ12	62.4	.18	6.15	54.7	.02	.12	76.1	.23	66.9	53.0	83.6	38.9
2φ10+2φ16	67.3	.20	6.15	71.3	.03	.14	82.0	.25	67.5	53.0	83.7	39.3
3φ16	71.9	.21	6.16	76.5	.03	.11	87.4	.27	68.5	53.0	83.5	39.5
6φ12	80.5	.24	6.13	86.4	.03	.10	97.5	.30	70.7	54.4	84.0	40.2
4φ16	92.8	.29	6.16	101.1	.04	.11	111.6	.36	73.2	57.4	83.5	41.0

RELACION a o RELACION W1,c / W1,s (11) : 7.5

INCREMENTO EXCENTRICIDAD (e,c-e,s), mm (12) : 174.6

ESFUERZO CORTANTE ULTIMO Vu, Sección maciza, kN/m : 183.8

ESFUERZO RASANTE ULTIMO Vu, Sección maciza, kN/m : 160.3

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS PRETENSADAS
MODELO T.13

PREFABRICADOS NAVARRO , S.A.

Ctra. Alicante-Cartagena, km 18
03190 PILAR DE LA HORADADA (Alicante)

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja n° 33 de 34



	FLEXION NEGATIVA (por m)																		
REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERT. FISURA					B500 MOMENTO ULTIMO-ABERT. FISURA					ESF. CORTANTE bo Perim. Vu	ESF. RAS. Vu	MOMENTO FISUR.	RIGIDEZ TOTAL FIS. E·Ih E·If					
	Sección tipo		Sección maciza			Sección tipo		Sección maciza											
	Mu	Rel.	Vig.	Wk		Mu	Rel.	Vig.	Wk										
	x/d	lím.			x/d	x/d	lím.		x/d										
	m·kN/m	mm	m·kN/m	mm		m·kN/m	mm	m·kN/m	mm		kN/m	kN/m	kN/m	m·kN/m	m ² ·MN/m				
	(3)	(8)	(9)	(10)		(3)	(8)	(10)			(4)		(5)	(6)	(6)				
1φ10	0.0	.00	.00	0.0	.00	.00	0.0	.00	.00	0.0	.00	.00	36.0	32.2	51.5	33.5	31.9	2.3	
2φ 8	0.0	.00	.00	0.0	.00	.00	15.9	.08	6 .10	16.4	.01	.10	36.1	32.3	51.6	33.7	32.0	2.8	
1φ12	0.0	.00	.00	16.4	.01	.11	17.7	.09	6 .13	18.3	.01	.13	35.9	32.1	51.3	33.7	32.0	3.0	
1φ 8+1φ10	16.4	.08	6 .09	16.8	.01	.10	20.2	.11	6 .11	20.9	.01	.13	36.1	32.2	51.5	33.9	32.1	3.3	
2φ10	19.8	.10	6 .08	20.5	.01	.09	24.3	.13	6 .10	25.4	.01	.12	36.0	32.2	51.5	34.1	32.2	3.8	
1φ10+1φ12	23.8	.13	6 .09	24.9	.01	.12	35.1	.16	6 .11	30.9	.01	.14	36.0	32.2	51.4	34.3	32.3	4.4	
1φ16	24.8	.13	6 .11	25.9	.01	.11	36.4	.17	6 .14	32.1	.01	.14	35.8	32.0	51.0	34.3	32.3	4.5	
2φ12	33.4	.15	6 .09	29.3	.01	.11	40.9	.20	6 .11	36.3	.01	.13	35.9	32.1	51.3	34.6	32.4	4.9	
1φ10+1φ16	40.5	.19	6 .10	36.0	.01	.14	49.2	.25	6 .17	44.6	.02	.17	37.2	32.1	51.1	34.9	32.6	5.7	
1φ12+1φ16	45.0	.23	6 .11	40.4	.02	.13	54.5	.29	6 .18	50.0	.02	.16	38.2	32.1	51.1	35.2	32.7	6.2	
3φ12	48.4	.25	6 .10	43.7	.02	.11	58.4	.32	6 .16	54.2	.02	.13	38.9	32.4	51.3	35.4	32.8	6.6	
2φ16	55.7	.30	6 .14	51.3	.02	.11	66.8	.38	6 .20	76.2	.03	.14	40.3	34.2	51.0	35.8	32.9	7.4	
4φ12	62.0	.34	6 .12	58.0	.02	.11	74.0	.42	6 .17	86.1	.03	.13	41.5	35.7	51.3	36.3	33.2	8.1	
2φ16+1φ12	68.6	.39	6 .15	78.6	.03	.12	81.4	.47	6 .20	97.2	.03	.15	42.7	37.2	51.1	36.6	33.3	8.8	
2φ10+2φ16	73.3	.42	6 .15	85.2	.03	.14	86.8	.50	6 .20	105.3	.04	.17	43.2	38.3	51.1	37.0	33.5	9.3	
3φ16	77.6	.45	6 .15	91.5	.03	.11	91.5	.54	6 .20	113.0	.04	.14	43.1	39.2	51.0	37.2	33.6	9.7	
6φ12	85.6	.49	6 .13	103.2	.04	.11	102.8	.56	4 .17	127.4	.04	.13	43.3	40.9	51.3	38.0	34.0	10.6	
4φ16	96.2	.57	6 .15	120.8	.04	.11	120.2	.60	1 .20	148.8	.05	.14	43.1	42.3	51.0	38.8	34.3	11.7	

RELACION a o RELACION $W_{l,C} / W_{l,S}$ (11) : 8.32

INCREMENTO EXCENTRICIDAD (e,c-e,s), mm (12) : 209.6

ESEUERZO CORTANTE ULTIMO Vu. Sección maciza, kN/m : 187.9

ESFUERZO BASANTE ÚLTIMO V: Sección maciza, kN/m : 141.3

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS PRETENSADAS
MODELO T.13

PREFABRICADOS NAVARRO , S.A.

Ctra. Alicante-Cartagena, km 18
03190 PILAR DE LA HORADADA (Alicante)

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja nº 34 de 34

FLEXION POSITIVA (por m)

TIPO DE FORJADO (h + c) * s	TIPO DE VIGUETA	MOMENTO ULTIMO Mu	ESFUERZO CORTANTE ULTIMO		ESFUERZO RASANTE	MOMENTO DE FISURACION	RIGIDEZ		MOMENTOS E.L.S.			
			MC-78	EHE-08			(hormigón in situ) Mf	E·Ih	E·If	FISUR.	Mo'	DESCOMP.
			1+Mo/Md=2									
(30+ 5) * 82.5D	T.13-1	43.0	61.8	53.4	84.4	31.3	46.5	37.2	41.1	22.8	19.3	
		-2	66.5	65.9	55.3	89.1	31.7	47.1	38.0	63.9	45.4	41.6
		-3	88.6	67.0	54.6	87.5	32.0	47.6	38.5	79.9	62.3	57.0
		-4	109.0	67.8	53.8	85.6	32.3	48.0	39.0	89.5	72.4	66.2
		-5	129.8	70.8	54.8	87.9	32.6	48.5	39.6	105.1	89.1	81.4
		-6	149.6	71.8	54.1	86.3	32.9	48.9	40.0	115.3	99.8	91.2

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERT. FISURA				B500 MOMENTO ULTIMO-ABERT. FISURA				ESF. CORTANTE bo	ESF. Ras.	MOMENTO FISUR.	RIGIDEZ TOTAL FIS. E·Ih E·If						
	Sección tipo		Sección maciza		Sección tipo		Sección maciza											
	Mu	Rel. Vig. Wk	Mu	Rel. Wk	Mu	Rel. Vig. Wk	Mu	Rel. Wk										
	x/d	lím.	x/d	lím.	x/d	lím.	x/d	lím.		Vu								
	m·kN/m	mm	m·kN/m	mm	m·kN/m	mm	m·kN/m	mm	kN/m	kN/m	kN/m	m2·MN/m						
	(3)	(8)	(9)	(10)	(3)	(8)	(9)	(10)	(4)	(5)	(6)	(6)						
1φ10	0.0	.00	.00	0.0	.00	.00	0.0	.00	69.0	54.4	87.0	39.9	46.0	2.2				
2φ 8	0.0	.00	.00	0.0	.00	.00	0.0	.00	69.2	54.5	87.3	40.1	46.1	2.6				
1φ12	0.0	.00	.00	0.0	.00	.00	0.0	.00	68.8	54.3	86.8	40.1	46.1	2.8				
1φ 8+1φ10	0.0	.00	.00	0.0	.00	.00	0.0	.00	69.1	54.5	87.1	40.3	46.2	3.2				
2φ10	0.0	.00	.00	0.0	.00	.00	0.0	.00	69.0	54.4	87.0	40.5	46.3	3.7				
1φ10+1φ12	0.0	.00	.00	0.0	.00	.00	0.0	.00	58.9	54.4	86.9	40.7	46.5	4.3				
1φ16	0.0	.00	.00	0.0	.00	.00	0.0	.00	68.5	54.1	86.2	40.7	46.5	4.3				
2φ12	0.0	.00	.00	0.0	.00	.00	30.5	.09	6.13	31.3	.01	.13	68.8	54.3	86.8	41.0	46.6	4.8
1φ10+1φ16	0.0	.00	.00	31.3	.01	.14	44.7	.12	6.14	38.5	.02	.17	68.6	54.2	86.4	41.3	46.9	5.6
1φ12+1φ16	40.5	.10	6.11	34.8	.01	.13	49.9	.13	6.14	43.1	.02	.16	68.6	54.2	86.4	41.5	47.0	6.2
3φ12	43.8	.11	6.09	37.7	.02	.11	53.9	.14	6.13	46.7	.02	.13	68.8	54.3	86.8	41.8	47.2	6.6
2φ16	51.1	.13	6.10	44.3	.02	.11	62.7	.17	6.19	54.9	.02	.14	68.5	54.1	86.2	42.2	47.4	7.4
4φ12	57.5	.15	6.10	50.0	.02	.11	70.4	.19	6.16	74.4	.03	.13	68.8	54.3	86.8	42.6	47.7	8.3
2φ16+1φ12	64.5	.17	6.14	56.5	.02	.12	78.8	.22	6.21	84.0	.03	.15	68.6	54.1	86.3	43.0	48.0	9.0
2φ10+2φ16	69.7	.19	6.14	73.6	.03	.14	84.9	.24	6.21	91.1	.03	.17	68.8	54.2	86.4	43.4	48.2	9.6
3φ16	74.5	.21	6.15	79.0	.03	.11	90.5	.26	6.21	97.7	.03	.14	69.9	54.1	86.2	43.6	48.4	10.1
6φ12	83.4	.23	6.13	89.2	.03	.11	101.0	.29	6.18	110.2	.04	.13	72.1	55.2	86.8	44.4	48.8	11.2
4φ16	96.2	.28	6.16	104.5	.04	.11	115.9	.35	6.21	129.0	.05	.14	74.7	58.2	86.2	45.2	49.3	12.5

RELACION a o RELACION W_{1,c} / W_{1,s} (11) : 7.93

INCREMENTO EXCENTRICIDAD (e,c-e,s), mm (12) : 185.6

ESFUERZO CORTANTE ULTIMO Vu, Sección maciza, kN/m : 187.9

ESFUERZO RASANTE ULTIMO Vu, Sección maciza, kN/m : 165.4