

PREFABRICADOS NAVARRO, S.A.

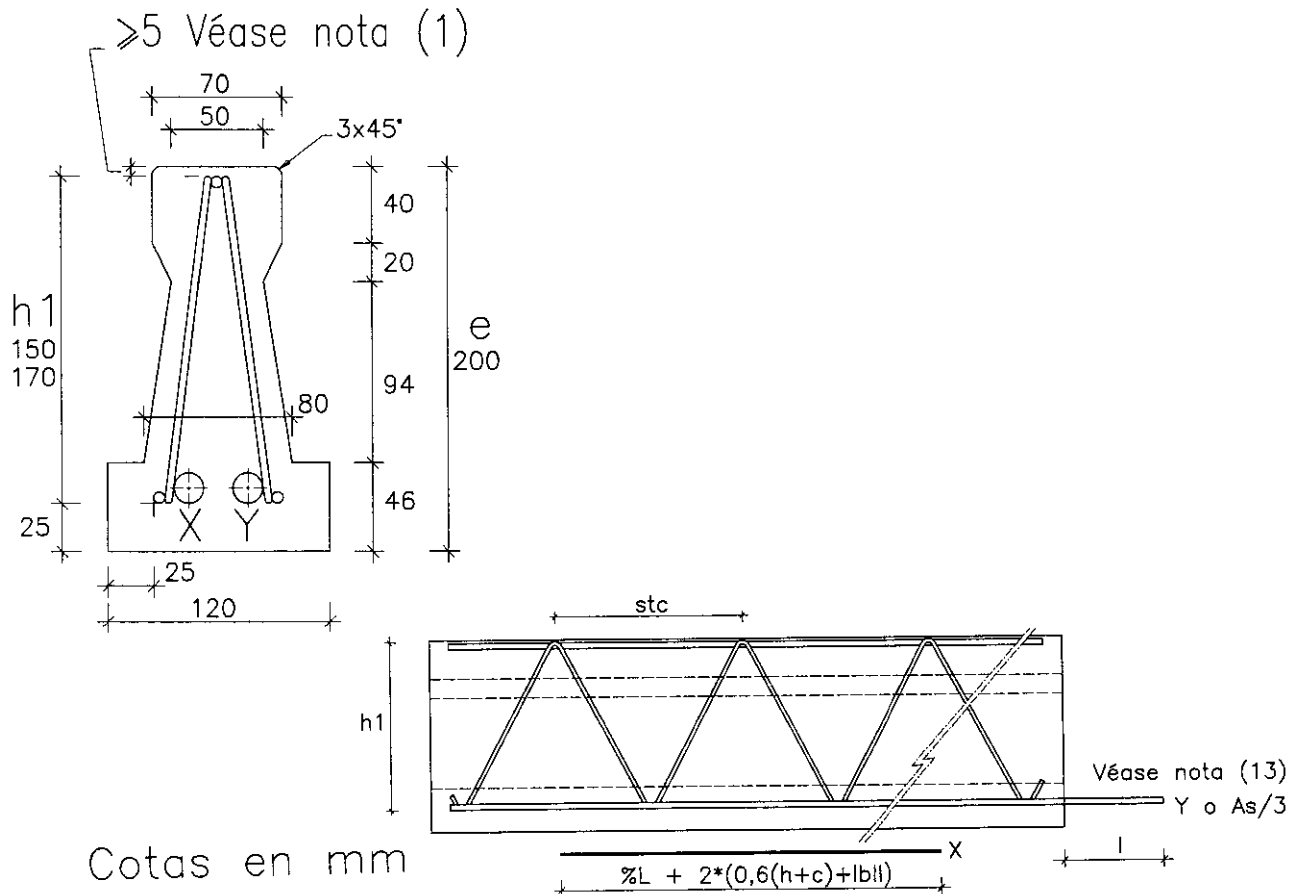
Ctra. Alicante-Cartagena, km 18
03190 PILAR DE LA HORADADA (Alicante)

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

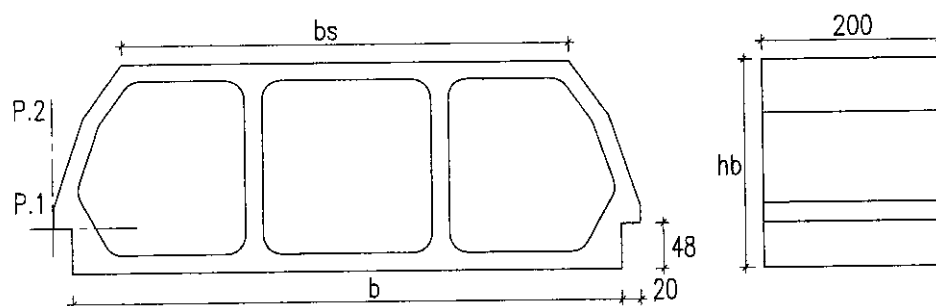
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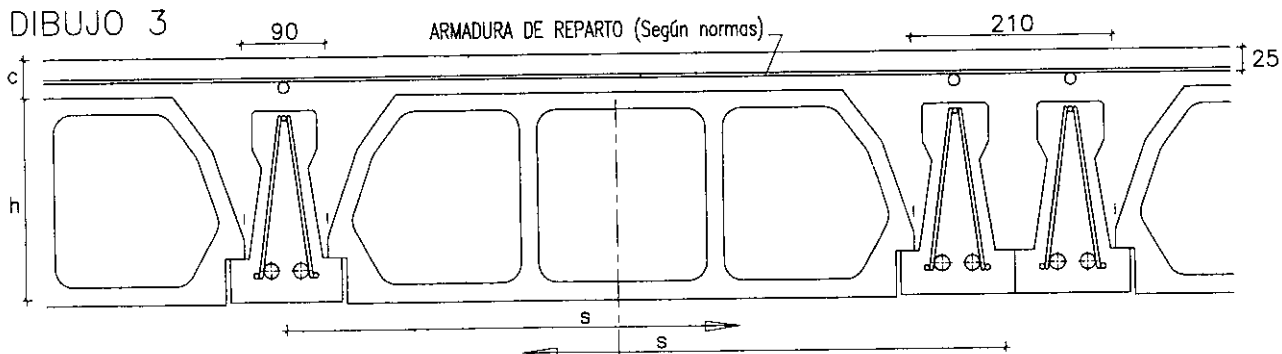
DIBUJO 1 TA.20



DIBUJO 2



DIBUJO 3



FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS ARMADAS
MODELO TA.20

PREFABRICADOS NAVARRO, S.A.

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1.- VIGUETA, CELOSIA, MOMENTO FLECTOR ULTIMO Y ARMADURA BASE (Véase dibujo 1)

VIGUETA			CELOSIA					MOM. FLECTOR ULTIMO		ARMADURA BASE
Nombre	e mm	Peso KN/m	Tipo	φsup. mm	h1 mm	nφ celosia mm	Paso stc mm	Sobre sop. mKN	En vano mKN	nφ inferior mm
TA20	200	0,38	1	6	170 150	2φ4	200	4.00 Ver detalle pág. 3	2.00	2φ 6

2.- BLOQUES ALIGERANTES (Véase dibujo 2)

Código	Cotas y coordenadas en mm					PESO (N/ud)		
	hb	b	bs	P.1	P.2	Cerámico	Hormigón	Poliest.
B20* 71	202	590	475	0; 20	33; 96	84	164	2
B22* 71	222	590	475	0; 20	33; 116	88	171	2
B25* 71	252	590	475	0; 20	33; 146	94	181	3
B26* 71	262	590	475	0; 20	33; 156	96	185	3
B27* 71	272	590	475	0; 20	33; 166	98	189	3
B30* 71	302	590	480	0; 20		104	200	3

3.- FORJADOS (Véase dibujo 3)

TIPO DE FORJADO (h + c) * s [/D]	VIGUETAS	ARMADURA BASE	BLOQUE	PESO (KN/m2)		
				Cerámico	Hormigón	Poliest.
(20+ 4)* 71.	TA.20	2φ 6	B20* 71	2.46	3.02	
(20+ 4)* 83. D	2xTA.20	2φ 6	B20* 71	2.94	3.41	
(20+ 5)* 71.	TA.20	2φ 6	B20* 71	2.70	3.25	2.12
(20+ 5)* 83. D	2xTA.20	2φ 6	B20* 71	3.18	3.66	2.69
(22+ 4)* 71.	TA.20	2φ 6	B22* 71	2.57	3.15	
(22+ 4)* 83. D	2xTA.20	2φ 6	B22* 71	3.10	3.59	
(22+ 5)* 71.	TA.20	2φ 6	B22* 71	2.80	3.38	2.20
(22+ 5)* 83. D	2xTA.20	2φ 6	B22* 71	3.33	3.83	2.81
(25+ 4)* 71.	TA.20	2φ 6	B25* 71	2.72	3.33	
(25+ 4)* 83. D	2xTA.20	2φ 6	B25* 71	3.33	3.86	
(25+ 5)* 71.	TA.20	2φ 6	B25* 71	2.96	3.58	2.31
(25+ 5)* 83. D	2xTA.20	2φ 6	B25* 71	3.58	4.10	3.03
(26+ 4)* 71.	TA.20	2φ 6	B26* 71	2.77	3.40	
(26+ 4)* 83. D	2xTA.20	2φ 6	B26* 71	3.41	3.95	
(26+ 5)* 71.	TA.20	2φ 6	B26* 71	3.01	3.64	2.35
(26+ 5)* 83. D	2xTA.20	2φ 6	B26* 71	3.66	4.19	3.09
(27+ 4)* 71.	TA.20	2φ 6	B27* 71	2.82	3.47	
(27+ 4)* 83. D	2xTA.20	2φ 6	B27* 71	3.49	4.04	
(27+ 5)* 71.	TA.20	2φ 6	B27* 71	3.07	3.71	2.39
(27+ 5)* 83. D	2xTA.20	2φ 6	B27* 71	3.74	4.28	3.16
(30+ 4)* 71.	TA.20	2φ 6	B30* 71	3.16	3.83	
(30+ 4)* 83. D	2xTA.20	2φ 6	B30* 71	3.88	4.46	
(30+ 5)* 71.	TA.20	2φ 6	B30* 71	3.40	4.08	2.69
(30+ 5)* 83. D	2xTA.20	2φ 6	B30* 71	4.13	4.71	3.52

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4.- MATERIALES

(2) CONTROL

HORMIGON DE LA VIGUETA : HA-25.0/P/16/IIa , fck = 25.0 N/mm² Gamma.c = 1.50
HORMIGON IN SITU : HA-25.0/B/16/IIa , fck = 25.0 N/mm² Gamma.c = 1.50 Normal
ACERO BASE : B-500 , fyk = 500 N/mm² Gamma.s = 1.15
ACERO REFUERZO INFERIOR: B-500S , fyk = 500 N/mm² Gamma.s = 1.15
ACERO REFUERZO SUPERIOR: B-400S , fyk = 400 N/mm² Gamma.s = 1.15 Normal
ACERO REFUERZO SUPERIOR: B-500S , fyk = 500 N/mm² Gamma.s = 1.15 Normal
ACERO CELOSIAS : B-500 , fyk = 500 N/mm² Gamma.s = 1.15

5.- ARMADO DE LA VIGUETA (Véase dibujo 4)

REFUERZO INFERIOR (3)

Y + X	0φ 0	1φ 6	1φ 8	1φ 6+1φ 6	1φ10	1φ 8+1φ 8	1φ12
X - %L				1φ 6 - 50		1φ 8 - 57	
Y + X	1φ10+1φ 8	1φ12+1φ 6	1φ10+1φ10	1φ12+1φ 8	1φ12+1φ10	1φ16	1φ12+1φ12
X - %L	1φ 8 - 52	1φ 6 - 38	1φ10 - 61	1φ 8 - 48	1φ10 - 56		1φ12 - 63
Y + X	1φ16+1φ 8	1φ16+1φ10	1φ16+1φ12	1φ16+1φ16			
X - %L	1φ 8 - 40	1φ10 - 48	1φ12 - 55	1φ16 - 66			

TA.20	Armado tipo	Momento en vano	Momento fisurac.	Rigidez	
Altura				total	fisur.
mm		mKN	mKN	m ² /MN	m ² /MN
200	1	4.1	2.3	1.77	0.25
	2	5.9	2.3	1.79	0.35
	3	7.3	2.4	1.81	0.42
	4	7.7	2.4	1.82	0.44
	5	8.9	2.4	1.83	0.51
	6	10.1	2.4	1.85	0.57
	7	10.6	2.5	1.85	0.60
	8	11.4	2.5	1.87	0.65
	9	12.0	2.5	1.87	0.67
	10	12.7	2.5	1.89	0.72
	11	12.9	2.5	1.89	0.73
	12	14.0	2.6	1.91	0.78
	13	14.0	2.6	1.90	0.78
	14	14.0	2.6	1.93	0.86
	15	14.0	2.6	1.93	0.90
	16	14.0	2.7	1.95	0.95
	17	14.0	2.7	1.97	1.02
	18	14.0	2.8	2.01	1.15

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6.- NOTAS

- (1) Se reduce el recubrimiento superior, temporal, a ≥ 5 mm, según 4.1.3.3 EC-2 Parte 1-3, UNE ENV 1992-1-3, respecto al indicado en 37.2.4.1.e) EHE-08, acogiéndose al párrafo b) del artículo 3.º de la EHE-08.
- (2) 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 losa superior de 50 mm tipo (h+5)*s el árido del hormigón de la obra podrá ser de tamaño máximo, $D \leq 20$ mm.
- (3) L = luz de cálculo. A la longitud (en % de L) de la armadura X se le sumará 2 veces $0,6 \cdot H$ más el anclaje correspondiente al diámetro. H es el canto total del forjado. El corte está calculado para vanos aislados y cargas repartidas.
- (4) La vigueta primera, sin refuerzo de armado positivo, no se colocará en vanos, sólo en voladizos, cuando el momento último, M_u , sea menor que 1,3 veces el de fisuración. Para voladizos en ambiente IIb o IIIa esta vigueta se fabricará con recubrimientos, nominal+margen, de 30 mm, hormigón con relación a/c $\leq 0,55$ ó 0,5, respectivamente, y con 300 kg/m³ de cemento.
- (5) Los momentos flectores y los esfuerzos cortantes producidos por las cargas mayoradas con el coef. Γ_f serán menores que los valores últimos M_u y V_u .
- (6) Momento de fisuración por compresión según 49.2.1 EHE-08. Sin embargo, EC-2 Parte 1-1 sólo prescribe este ELS para Clases de exposición ambiental equivalentes a III y IV.
- (7) W_k es la abertura característica de la fisura según 49.2.4 EHE-08, debida a un momento solicitante $M_u/1,4$. La abertura que provocan las acciones (combinación cuasipermanentes) es proporcional a los momentos hasta un mínimo de 0,4 W_k . Según 5.1.1.2 EHE-08, los límites de W_k son: $\leq 0,4$ mm en Clase de exp. ambiental I, $\leq 0,3$ en Clase IIa y IIb, $\leq 0,2$ en Clase IIIb, IV, F Y Qa y 0,1 en Clase IIIc Qb y Qc. Para ambientes más agresivos que el indicado, el recubrimiento se completará con revestimientos que cumplan 37.2.4.1 EHE-08 y el hormigón cumplirá la tabla 37.3.2.a. En caso de recubrimiento de la armadura superior de 30 mm se reducirá M_u en $5,5/d$ y $E_{I,fis} = 10/d$ (d = canto útil en mm).
- (8) Los valores indicados se han calculado según 50.2.2.2 EHE-08, pero homogeneizados. Para estimar las deformaciones se aplicará este mismo artículo y el siguiente de la EHE-98, 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	0,78	0,90	0,96	1,08	1,11	1,13	1,16
Momento fisuración	0,93	0,97	0,99	1,03	1,05	1,06	1,07
- (9) Refuerzo inferior mínimo por vigueta para alcanzar el momento último negativo en sección tipo.
- (10) 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-98.
- (11) Los valores del esfuerzo cortante último V_{cu} , corresponden a la colaboración del hormigón y V_u a la suma de $V_{cu} + V_{su} \leq V_{ul}$. V_{su} es la colaboración de la armadura transversal de cortante. Calculados según 44.2.3 EHE-08.
- (12) El esfuerzo cortante V_{su} , corresponde a la colaboración de la armadura transversal de cortante. V_u , suma de $V_{cu} + V_{su}$, puede quedar limitado por $V_{cu,lim}$ con b,lim a la altura de bigueta. En caso de variaciones en la anchura b,lim , el valor de $V_{cu,lim}$ es directamente proporcional. V_{ul} es generalmente superior, (véase la memoria técnica del proyecto).
- (13) En el dibujo, 1 corresponde a las longitudes 11 y 12 que se deducen del Anejo 12 apartado 7.1 de la norma EHE-08. Pueden organizarse en prolongación recta o inclinada, con un ángulo igual o menor a 30º. En caso de entrega en el apoyo 11 ≥ 10 cm y 12 ≥ 5 cm, según el citado apartado.

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FLEXION POSITIVA (por m)

TIPO DE FORJADO (h+c)	TIPO DE VIGUETA	REFUERZO INFERIOR VIGUETA	MOMENTO ULTIMO Mu	Rel. x/d	ESFUERZO CORTANTE Vcu Vu = Vcu+Vsu 1*Cel 2*Cel	Wk	CLASE POR RECUBRIM.	MOMENTO DE FISURACION Mf	RIGIDEZ TOTAL FISURADA E·Ib E·If	MOMENTO SERVICIO FIS.COMP.
* s	(4)	Y + X	m·kN/m(5)	(10)	kN/m (11)	mm (7)		m·kN/m (8)	(8) m2·MN/m	m·kN/m(6)
(20+ 4)	TA.20	1 0φ 0	7.4	.01	16.5 35.2 53.8	.09	IIa	7.0	10.17 0.67	23.0
* 71.		2 1φ 6	11.1	.02	16.5 35.2 53.8	.12	IIa	7.2	10.32 0.98	28.4
		3 1φ 8	13.9	.02	16.5 35.1 53.7	.16	IIa	7.3	10.44 1.21	31.7
		4 1φ 6+1φ 6	14.8	.02	16.5 35.2 53.8	.14	IIa	7.3	10.48 1.28	32.7
		5 1φ10	17.5	.03	16.5 35.0 53.6	.19	IIa	7.4	10.59 1.49	35.3
		6 1φ 8+1φ 8	20.4	.03	16.5 35.1 53.7	.17	IIa	7.5	10.72 1.73	38.0
		7 1φ12	21.8	.03	16.4 34.9 53.4	.21	IIa	7.5	10.76 1.82	39.0
		8 1φ10+1φ 8	23.9	.04	16.5 35.0 53.6	.19	IIa	7.6	10.86 2.00	40.9
		9 1φ12+1φ 6	25.5	.04	16.4 35.0 53.5	.20	IIa	7.7	10.92 2.11	42.0
		10 1φ10+1φ10	27.5	.04	16.5 35.0 53.5	.19	IIa	7.8	11.01 2.26	43.5
		11 1φ12+1φ 8	28.2	.04	16.4 34.9 53.4	.20	IIa	7.8	11.04 2.31	44.0
		12 1φ12+1φ10	31.7	.05	16.4 34.9 53.4	.20	IIa	7.9	11.18 2.58	46.4
		13 1φ16	32.6	.05	16.3 34.6 53.0	.23	IIa	7.9	11.20 2.62	46.5
		14 1φ12+1φ12	36.0	.05	16.4 34.9 53.3	.20	IIa	8.1	11.35 2.88	49.0
		15 1φ16+1φ 8	38.9	.06	16.7 35.0 53.4	.23	IIa	8.1	11.45 3.08	50.5
		16 1φ16+1φ10	42.3	.07	17.1 35.5 53.8	.23	IIa	8.3	11.60 3.33	52.4
		17 1φ16+1φ12	46.5	.07	17.1 35.5 53.8	.23	IIa	8.4	11.76 3.62	54.6
		18 1φ16+1φ16	56.8	.09	17.1 35.3 53.6	.22	IIa	8.8	12.17 4.32	59.4

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu Ref. Rel. Wk inf. x/d	B500 MOMENTO ULTIMO-ABERTURA FISURA Sección maciza Mu Rel. Wk x/d	B500 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu Ref. Rel. Wk inf. x/d	B500 MOMENTO ULTIMO-ABERTURA FISURA Sección maciza Mu Rel. Wk x/d	ESF.CORTANTE ULTIMO Vcu Vu 1*cel.	MOMENTO FISUR. Mf	RIGIDEZ TOTAL FIS. E·Ib E·If
	m·kN/m vig. (5) (9) (10) (7)	m·kN/m (5) (10) (7)	m·kN/m vig. (5) (9) (10) (7)	m·kN/m (5) (10) (7)	kN/m (11)	m·kN/m (8)	m2·MN/m (8)
1φ10	6.0 .08 .09	0.0 .00 .00	7.4 .10 .11	0.0 .00 .00	16.4 34.9	16.2	9.88 1.2
2φ 8	7.6 .11 .09	0.0 .00 .00	9.4 .13 .11	0.0 .00 .00	16.5 35.0	16.2	9.89 1.3
1φ12	8.4 .12 .09	0.0 .00 .00	10.4 .15 .12	0.0 .00 .00	16.4 34.9	16.2	9.89 1.4
1φ 8+1φ10	9.6 .14 .09	0.0 .00 .00	15.7 .17 .11	0.0 .00 .00	16.5 34.9	16.3	9.90 1.5
2φ10	11.5 .17 .08	0.0 .00 .00	18.8 .21 .10	0.0 .00 .00	16.4 34.9	16.3	9.92 1.7
1φ 8+1φ12	15.9 .17 .09	0.0 .00 .00	19.5 .22 .11	0.0 .00 .00	16.4 34.9	16.3	9.92 1.8
1φ10+1φ12	18.4 .20 .09	0.0 .00 .00	22.5 .25 .15	0.0 .00 .00	16.4 34.9	16.4	9.93 1.9
2φ12	21.3 .24 .10	0.0 .00 .00	25.8 .31 .17	0.0 .00 .00	16.4 34.9	16.5	9.94 2.1
1φ 8+1φ16	23.2 .27 .13	0.0 .00 .00	28.0 .36 .21	0.0 .00 .00	16.3 34.8	16.5	9.95 2.3
1φ10+1φ16	25.4 .31 .15	0.0 .00 .00	30.5 .41 .21	35.3 .06 .25	16.3 34.8	16.5	9.96 2.4
1φ12+1φ16	28.0 .36 .15	0.0 .00 .00	33.2 .48 .22	39.5 .07 .26	16.8 35.2	16.6	9.97 2.6
2φ16	33.7 .49 .16	40.2 .07 .19	39.2 .61 .22	49.9 .09 .27	17.0 35.5	16.7	10.00 3.0
4φ12	37.1 .55 .14	45.5 .08 .19	47.6 1φ12 .52 .19	56.5 .10 .26	17.2 35.6	16.9	10.04 3.3
2φ16+1φ12	40.1 .63 .17	51.2 .09 .23	51.4 1φ12 .61 .22	63.4 .12 .30	17.1 35.5	17.0	10.05 3.5
3φ16	49.3 1φ12 .57 .17	59.4 .11 .23	60.6 1φ16 .61 .22	73.5 .14 .29	17.0 35.5	17.1	10.08 3.8
4φ16	63.3 1φ16 .67 .17	78.0 .14 .22	82.0 2φ16 .61 .22	96.1 .18 .28	17.0 35.5	17.4	10.15 4.5

ESFUERZO CORTANTE Vsu (12) (kN/m)
b,l1m (mm) : 212

TA.20 (simple celosía) : 18.4
Vcu,l1m (kN/m) (TA.20) : 43.1

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FLEXION POSITIVA (por m)

TIPO DE FORJADO (h+c) * s	TIPO DE VIGUETA (4)	REFUERZO INFERIOR VIGUETA Y + X	MOMENTO Ultimo Mu m·kN/m(5)	Rel. x/d (10)	ESFUERZO CORTANTE Vcu Vu = Vcu+Vsu 1*Cel 2*Cel kN/m (11)	Wk mm (7)	CLASE POR RECUBRIM.	MOMENTO DE FISURACION Mf m·kN/m (8)	RIGIDEZ TOTAL FISURADA E·Ib E·If (8) m ² ·MN/m	MOMENTO SERVICIO FIS. COMP. m·kN/m(6)
(20+ 4) * 83. D	TA.20	1 0φ 0	12.7	.02	35.3 67.3 99.2	.10	IIa	11.4	14.86 1.11	30.0
		2 1φ 6	18.9	.03	35.3 67.3 99.2	.17	IIa	11.6	15.07 1.62	36.7
		3 1φ 8	23.7	.04	35.3 67.1 99.0	.21	IIa	11.8	15.23 1.98	40.9
		4 1φ 6+1φ 6	25.1	.04	35.3 67.3 99.2	.18	IIa	11.9	15.27 2.10	42.1
		5 1φ10	29.7	.04	35.2 67.0 98.7	.24	IIa	12.0	15.42 2.44	45.4
		6 1φ 8+1φ 8	34.5	.05	35.3 67.1 98.9	.20	IIa	12.2	15.59 2.80	48.8
		7 1φ12	37.0	.06	35.1 66.8 98.4	.25	IIa	12.2	15.65 2.97	50.0
		8 1φ10+1φ 8	40.5	.06	35.2 67.0 98.7	.22	IIa	12.4	15.77 3.24	52.4
		9 1φ12+1φ 6	43.0	.07	35.2 66.8 98.5	.25	IIa	12.4	15.85 3.41	53.7
		10 1φ10+1φ10	46.3	.07	35.2 66.9 98.6	.22	IIa	12.6	15.96 3.66	55.6
		11 1φ12+1φ 8	47.6	.07	35.2 66.8 98.5	.24	IIa	12.6	16.00 3.75	56.2
		12 1φ12+1φ10	53.4	.08	35.1 66.8 98.4	.24	IIa	12.8	16.19 4.15	59.1
		13 1φ16	54.8	.09	34.9 66.3 97.6	.28	IIa	12.8	16.20 4.21	59.1
		14 1φ12+1φ12	60.4	.09	35.1 66.6 98.2	.23	IIa	13.0	16.40 4.63	62.2
		15 1φ16+1φ 8	65.1	.10	35.0 66.4 97.8	.27	IIa	13.2	16.54 4.93	63.9
		16 1φ16+1φ10	70.8	.11	35.0 66.4 97.8	.26	IIa	13.4	16.72 5.30	66.2
		17 1φ16+1φ12	77.6	.12	35.2 66.6 98.0	.26	IIa	13.6	16.93 5.75	68.7
		18 1φ16+1φ16	94.2	.15	36.5 67.8 99.0	.25	IIa	14.2	17.44 6.81	73.8

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO- Sección tipo				ABERTURA FISURA Sección maciza				B500 MOMENTO ULTIMO- Sección tipo				ABERTURA FISURA Sección maciza				ESF. CORTANTE ULTIMO	MOMENTO FISUR.	RIGIDEZ TOTAL FIS.
	Mu	Ref.	Rel.	Wk	Mu	Rel.	Wk		Mu	Ref.	Rel.	Wk	Mu	Rel.	Wk		Vcu Vu 1*cel	Mf	E·Ib E·If
	m·kN/m	inf.	x/d	mm	m·kN/m	x/d	mm		m·kN/m	inf.	x/d	mm	m·kN/m	x/d	mm		kN/m	m·kN/m	m ² ·MN/m
	(5)	(9)	(10)	(7)	(5)	(10)	(7)		(5)	(9)	(10)	(7)	(5)	(10)	(7)		(11)	(8)	(8)
1φ10	0.0	.00	.00	.00	0.0	.00	.00		0.0	.00	.00	.00	0.0	.00	.00		35.1 66.8	19.2	14.50 1.4
2φ 8	0.0	.00	.00	.00	0.0	.00	.00		0.0	.00	.00	.00	0.0	.00	.00		35.2 66.9	19.3	14.52 1.5
1φ12	0.0	.00	.00	.00	0.0	.00	.00		0.0	.00	.00	.00	0.0	.00	.00		35.0 66.6	19.3	14.52 1.6
1φ 8+1φ10	0.0	.00	.00	.00	0.0	.00	.00		0.0	.00	.00	.00	0.0	.00	.00		35.2 66.8	19.3	14.54 1.7
2φ10	0.0	.00	.00	.00	0.0	.00	.00		12.7	.10	.11	.11	0.0	.00	.00		35.1 66.8	19.4	14.56 1.9
1φ 8+1φ12	0.0	.00	.00	.00	0.0	.00	.00		13.1	.11	.13	.13	0.0	.00	.00		35.1 66.7	19.4	14.57 1.9
1φ10+1φ12	0.0	.00	.00	.00	0.0	.00	.00		20.3	.13	.13	.13	0.0	.00	.00		35.1 66.7	19.4	14.59 2.1
2φ12	14.4	.12	.09	.09	0.0	.00	.00		23.7	.15	.12	.12	0.0	.00	.00		35.0 66.6	19.5	14.61 2.3
1φ 8+1φ16	21.0	.13	.11	.11	0.0	.00	.00		26.0	.17	.18	.18	0.0	.00	.00		34.9 66.5	19.5	14.63 2.5
1φ10+1φ16	23.3	.15	.10	.10	0.0	.00	.00		28.6	.19	.20	.20	0.0	.00	.00		34.9 66.5	19.6	14.65 2.6
1φ12+1φ16	25.9	.17	.13	.13	0.0	.00	.00		31.8	.21	.21	.21	33.9	.06	.19		34.9 66.5	19.7	14.67 2.8
2φ16	32.4	.21	.16	.16	34.5	.06	.14		39.5	.27	.23	.23	42.9	.08	.23		34.8 66.4	19.8	14.73 3.3
4φ12	36.4	.24	.14	.14	39.1	.07	.15		44.2	.30	.19	.19	48.6	.09	.23		35.0 66.6	20.0	14.78 3.6
2φ16+1φ12	40.5	.27	.17	.17	44.0	.08	.20		48.9	.35	.23	.23	54.6	.10	.28		34.9 66.5	20.1	14.80 3.8
3φ16	46.2	.33	.17	.17	51.2	.09	.20		55.2	.42	.23	.23	63.4	.12	.28		34.8 66.4	20.2	14.86 4.2
4φ16	58.2	.46	.18	.18	67.3	.12	.21		68.1	.57	.23	.23	83.1	.16	.28		36.1 67.7	20.6	15.00 5.1

ESFUERZO CORTANTE Vsu (12) (kN/m)
b, lfm (mm) : 332

TA.20 (simple celosía) : 31.6
Vcu, lfm (kN/m) (TA.20) : 57.8

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS ARMADAS
MODELO TA.20

PREFABRICADOS NAVARRO, S.A.

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

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja n° 7 de 28



FLEXION POSITIVA (por m)

TIPO DE FORJADO (h+c) * s	TIPO DE VIGUETA (4)	REFUERZO INFERIOR VIGUETA Y + X	MOMENTO ULTIMO Mu m·kN/m(5)	Rel. x/d (10)	ESFUERZO CORTANTE Vcu Vu = Vcu+Vsu 1*Cel 2*Cel kN/m (11)	Wk mm (7)	CLASE POR RECUBRIM.	MOMENTO DE FISURACION Mf m·kN/m (8)	RIGIDEZ TOTAL FISURADA E·Ib E·If (8) m2·MN/m	MOMENTO SERVICIO FIS.COMP. m·kN/m(6)
(20+ 5) * 71.	TA.20	1 0φ 0	7.8	.01	17.0 36.5 56.1	.09	IIa	7.6	11.62 0.74	24.5
		2 1φ 6	11.6	.02	17.0 36.5 56.1	.12	IIa	7.8	11.79 1.08	30.2
		3 1φ 8	14.6	.02	17.0 36.5 56.0	.16	IIa	7.9	11.93 1.33	33.8
		4 1φ 6+1φ 6	15.5	.02	17.0 36.5 56.1	.14	IIa	7.9	11.97 1.41	34.9
		5 1φ10	18.4	.03	17.0 36.4 55.8	.19	IIa	8.0	12.10 1.65	37.7
		6 1φ 8+1φ 8	21.4	.03	17.0 36.5 55.9	.17	IIa	8.1	12.24 1.90	40.7
		7 1φ12	22.9	.03	16.9 36.3 55.6	.21	IIa	8.2	12.29 2.01	41.8
		8 1φ10+1φ 8	25.1	.03	17.0 36.4 55.8	.19	IIa	8.3	12.40 2.20	43.8
		9 1φ12+1φ 6	26.7	.04	16.9 36.3 55.7	.20	IIa	8.3	12.47 2.32	45.0
		10 1φ10+1φ10	28.8	.04	16.9 36.4 55.8	.19	IIa	8.4	12.57 2.49	46.6
		11 1φ12+1φ 8	29.6	.04	16.9 36.3 55.7	.20	IIa	8.4	12.61 2.55	47.2
		12 1φ12+1φ10	33.3	.05	16.9 36.3 55.6	.20	IIa	8.6	12.76 2.84	49.7
		13 1φ16	34.2	.05	16.8 36.0 55.2	.24	IIa	8.6	12.78 2.88	49.9
		14 1φ12+1φ12	37.7	.05	16.9 36.2 55.5	.20	IIa	8.7	12.96 3.19	52.6
		15 1φ16+1φ 8	40.8	.06	17.0 36.2 55.5	.23	IIa	8.8	13.09 3.40	54.2
		16 1φ16+1φ10	44.4	.06	17.5 36.7 56.0	.23	IIa	9.0	13.25 3.68	56.3
		17 1φ16+1φ12	48.8	.07	17.7 37.0 56.2	.23	IIa	9.1	13.44 4.00	58.7
		18 1φ16+1φ16	59.7	.09	17.7 36.8 56.0	.22	IIa	9.5	13.90 4.78	64.0

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu Ref. Rel. Wk inf. x/d m·kN/m vig. (5) (9) (10) (7)	B500 MOMENTO ULTIMO-ABERTURA FISURA Sección maciza Mu Ref. Rel. Wk x/d m·kN/m (5) (10) (7)	B500 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu Ref. Rel. Wk inf. x/d m·kN/m vig. (5) (9) (10) (7)	B500 MOMENTO ULTIMO-ABERTURA FISURA Sección maciza Mu Ref. Rel. Wk x/d m·kN/m (5) (10) (7)	ESF.CORTANTE ULTIMO Vcu Vu 1*cel. kN/m (11)	MOMENTO FISUR. Mf m·kN/m (8)	RIGIDEZ TOTAL FIS. E·Ib E·If m2·MN/m (8)
1φ10	0.0 .00 .00	0.0 .00 .00	7.8 .10 .11	0.0 .00 .00	16.9 36.3	18.1	11.29 1.3
2φ 8	8.0 .10 .09	0.0 .00 .00	9.9 .13 .11	0.0 .00 .00	17.0 36.3	18.2	11.30 1.5
1φ12	8.8 .11 .10	0.0 .00 .00	10.9 .14 .12	0.0 .00 .00	16.9 36.2	18.2	11.30 1.6
1φ 8+1φ10	10.1 .13 .09	0.0 .00 .00	12.4 .16 .11	0.0 .00 .00	16.9 36.3	18.3	11.32 1.7
2φ10	12.1 .16 .08	0.0 .00 .00	19.8 .20 .10	0.0 .00 .00	16.9 36.3	18.3	11.33 1.9
1φ 8+1φ12	12.5 .16 .09	0.0 .00 .00	20.5 .21 .11	0.0 .00 .00	16.9 36.3	18.3	11.33 2.0
1φ10+1φ12	19.3 .19 .09	0.0 .00 .00	23.6 .24 .13	0.0 .00 .00	16.9 36.3	18.4	11.34 2.1
2φ12	22.4 .23 .09	0.0 .00 .00	27.3 .30 .16	0.0 .00 .00	16.9 36.2	18.4	11.36 2.4
1φ 8+1φ16	24.5 .25 .12	0.0 .00 .00	29.6 .34 .20	0.0 .00 .00	16.8 36.2	18.5	11.36 2.5
1φ10+1φ16	26.8 .29 .14	0.0 .00 .00	32.2 .40 .21	37.0 .06 .25	16.8 36.2	18.5	11.38 2.7
1φ12+1φ16	29.6 .34 .15	0.0 .00 .00	35.2 .45 .21	41.4 .07 .26	17.1 36.5	18.6	11.39 2.9
2φ16	35.7 .47 .16	42.2 .07 .19	41.7 .58 .22	52.4 .09 .27	17.7 37.0	18.7	11.42 3.3
4φ12	39.4 .53 .14	47.8 .08 .19	50.4 1φ12 .49 .19	59.3 .10 .26	17.8 37.1	18.9	11.47 3.6
2φ16+1φ12	42.7 .60 .17	53.8 .09 .23	54.6 1φ12 .58 .22	66.6 .11 .31	17.7 37.0	19.0	11.48 3.9
3φ16	52.3 1φ12 .54 .17	62.4 .10 .23	64.4 1φ16 .58 .22	77.2 .13 .30	17.7 37.0	19.1	11.51 4.3
4φ16	67.3 1φ16 .64 .17	82.0 .14 .22	87.0 2φ16 .58 .22	101.1 .17 .28	17.7 37.0	19.5	11.59 5.1

ESFUERZO CORTANTE Vsu (12) (kN/m) TA.20 (simple celosía) : 19.3
b,1fm (mm) : 212 Vcu,1fm (kN/m) (TA.20) : 44.4

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS ARMADAS
MODELO TA.20

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 28

FLEXION POSITIVA (por m)

TIPO DE FORJADO (h+c) * s	TIPO DE VIGUETA (4)	REFUERZO INFERIOR VIGUETA Y + X	MOMENTO ULTIMO Mu m·kN/m(5)	Rel. x/d (10)	ESFUERZO CORTANTE Vcu Vu = Vcu+Vsu 1*Cel 2*Cel kN/m (11)	Wk mm (7)	CLASE POR RECUBRIM.	MOMENTO DE FISURACION Mf m·kN/m (8)	RIGIDEZ TOTAL FISURADA E·Ib E·If (8) m ² ·MN/m	MOMENTO SERVICIO FIS.COMP. m·kN/m(6)
(20+ 5) * 83. D	TA.20	1 0φ 0	13.3	.02	36.4 69.8 103.2	.10	IIa	12.4	17.07 1.22	31.9
		2 1φ 6	19.8	.03	36.4 69.8 103.2	.16	IIa	12.7	17.30 1.77	39.2
		3 1φ 8	24.8	.03	36.3 69.7 103.0	.21	IIa	12.8	17.49 2.19	43.7
		4 1φ 6+1φ 6	26.3	.04	36.4 69.8 103.2	.18	IIa	12.9	17.55 2.31	45.0
		5 1φ10	31.1	.04	36.3 69.5 102.8	.24	IIa	13.0	17.71 2.69	48.6
		6 1φ 8+1φ 8	36.2	.05	36.3 69.7 103.0	.20	IIa	13.2	17.90 3.09	52.3
		7 1φ12	38.8	.05	36.2 69.3 102.4	.26	IIa	13.3	17.97 3.27	53.6
		8 1φ10+1φ 8	42.4	.06	36.3 69.5 102.8	.23	IIa	13.4	18.12 3.57	56.1
		9 1φ12+1φ 6	45.1	.06	36.2 69.4 102.5	.25	IIa	13.5	18.21 3.76	57.5
		10 1φ10+1φ10	48.6	.07	36.2 69.4 102.6	.22	IIa	13.6	18.33 4.04	59.6
		11 1φ12+1φ 8	49.9	.07	36.2 69.4 102.5	.24	IIa	13.7	18.37 4.13	60.3
		12 1φ12+1φ10	56.0	.08	36.2 69.3 102.4	.24	IIa	13.9	18.59 4.58	63.4
		13 1φ16	57.6	.08	36.0 68.8 101.7	.28	IIa	13.9	18.61 4.65	63.5
		14 1φ12+1φ12	63.4	.09	36.1 69.2 102.3	.23	IIa	14.1	18.84 5.11	66.9
		15 1φ16+1φ 8	68.4	.10	36.0 68.9 101.9	.27	IIa	14.3	19.00 5.44	68.8
		16 1φ16+1φ10	74.4	.11	36.0 68.9 101.8	.27	IIa	14.5	19.21 5.86	71.3
		17 1φ16+1φ12	81.5	.12	36.0 68.9 101.8	.26	IIa	14.8	19.45 6.36	74.2
		18 1φ16+1φ16	99.1	.15	37.8 70.6 103.4	.25	IIa	15.4	20.05 7.55	80.4

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu Ref. Rel. Wk inf. x/d m·kN/m vig. mm (5) (9) (10) (7)	B500 MOMENTO ULTIMO-ABERTURA FISURA Sección maciza Mu Ref. Rel. Wk x/d m·kN/m mm (5) (10) (7)	B500 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu Ref. Rel. Wk inf. x/d m·kN/m vig. mm (5) (9) (10) (7)	B500 MOMENTO ULTIMO-ABERTURA FISURA Sección maciza Mu Ref. Rel. Wk x/d m·kN/m mm (5) (10) (7)	ESF.CORTANTE ULTIMO Vcu Vu 1*cel. kN/m (11)	MOMENTO FISUR. Mf m·kN/m (8)	RIGIDEZ TOTAL FIS. E·Ib E·If m ² ·MN/m (8)
1φ10	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	36.2 69.3	21.6	16.65 1.5
2φ 8	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	36.3 69.4	21.7	16.68 1.7
1φ12	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	36.1 69.2	21.7	16.68 1.7
1φ 8+1φ10	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	36.2 69.3	21.8	16.70 1.9
2φ10	0.0 .00 .00	0.0 .00 .00	13.3 .10 .11	0.0 .00 .00	36.2 69.3	21.8	16.72 2.1
1φ 8+1φ12	0.0 .00 .00	0.0 .00 .00	13.8 .10 .14	0.0 .00 .00	36.1 69.3	21.8	16.73 2.1
1φ10+1φ12	0.0 .00 .00	0.0 .00 .00	21.3 .12 .13	0.0 .00 .00	36.1 69.2	21.9	16.75 2.2
2φ12	15.1 .11 .10	0.0 .00 .00	24.9 .14 .12	0.0 .00 .00	36.1 69.2	22.0	16.77 2.5
1φ 8+1φ16	22.1 .13 .11	0.0 .00 .00	27.3 .16 .15	0.0 .00 .00	36.0 69.1	22.0	16.78 2.7
1φ10+1φ16	24.5 .14 .11	0.0 .00 .00	30.1 .18 .18	0.0 .00 .00	36.0 69.1	22.1	16.80 2.9
1φ12+1φ16	27.3 .16 .11	0.0 .00 .00	33.5 .20 .20	0.0 .00 .00	36.0 69.1	22.1	16.83 3.1
2φ16	34.1 .20 .15	36.3 .06 .13	41.7 .26 .22	45.1 .07 .22	35.9 69.0	22.3	16.89 3.6
4φ12	38.3 .23 .13	41.0 .07 .15	46.7 .29 .19	51.0 .08 .23	36.1 69.2	22.5	16.95 4.0
2φ16+1φ12	42.7 .26 .17	46.2 .08 .19	51.6 .34 .23	57.4 .09 .28	35.9 69.0	22.6	16.98 4.2
3φ16	48.8 .31 .17	53.7 .09 .20	58.5 .40 .23	66.6 .11 .28	35.9 69.0	22.7	17.04 4.7
4φ16	61.6 .43 .17	70.8 .12 .22	72.4 .54 .22	87.4 .15 .28	36.8 69.9	23.1	17.19 5.6

ESFUERZO CORTANTE Vsu (12) (kN/m) TA.20 (simple celosía) : 33.1
b,lím (mm) : 332 Vcu,lím (kN/m) (TA.20) : 59.5

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS ARMADAS
MODELO TA.20

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 28



FLEXION POSITIVA (por m)

TIPO DE FORJADO (h+c) * s	TIPO DE VIGUETA (4)	REFUERZO INFERIOR VIGUETA Y + X	MOMENTO ULTIMO Mu m·kN/m(5)	Rel. x/d (10)	ESFUERZO CORTANTE Vcu Vu = Vcu+Vsu 1*Cel 2*Cel kN/m (11)	Wk CLASE POR RECUBRIM. mm (7)	MOMENTO DE FISURACION Mf m·kN/m (8)	RIGIDEZ TOTAL FISURADA E·Ib E·If (8) m2·MN/m	MOMENTO SERVICIO FIS.COMP. m·kN/m(6)
(22+ 4) * 71.	TA.20	1 0φ 0	8.1	.01	17.5 37.9 58.3	.09 IIa	8.2	12.73 0.81	26.1
		2 1φ 6	12.2	.02	17.5 37.9 58.3	.12 IIa	8.3	12.92 1.19	32.3
		3 1φ 8	15.3	.02	17.5 37.9 58.2	.16 IIa	8.4	13.06 1.46	36.1
		4 1φ 6+1φ 6	16.2	.02	17.5 37.9 58.3	.14 IIa	8.5	13.11 1.55	37.2
		5 1φ10	19.2	.02	17.4 37.8 58.1	.19 IIa	8.6	13.24 1.80	40.3
		6 1φ 8+1φ 8	22.3	.03	17.5 37.8 58.2	.17 IIa	8.7	13.39 2.08	43.5
		7 1φ12	24.0	.03	17.4 37.6 57.9	.21 IIa	8.7	13.45 2.21	44.6
		8 1φ10+1φ 8	26.2	.03	17.5 37.8 58.1	.19 IIa	8.8	13.57 2.41	46.8
		9 1φ12+1φ 6	27.9	.04	17.4 37.7 58.0	.21 IIa	8.9	13.64 2.55	48.1
		10 1φ10+1φ10	30.1	.04	17.4 37.7 58.0	.19 IIa	9.0	13.75 2.74	49.9
		11 1φ12+1φ 8	31.0	.04	17.4 37.7 57.9	.20 IIa	9.0	13.77 2.80	50.4
		12 1φ12+1φ10	34.8	.04	17.4 37.6 57.9	.20 IIa	9.1	13.95 3.12	53.2
		13 1φ16	35.8	.05	17.3 37.4 57.5	.24 IIa	9.1	13.97 3.17	53.4
		14 1φ12+1φ12	39.5	.05	17.4 37.6 57.8	.20 IIa	9.3	14.16 3.49	56.3
		15 1φ16+1φ 8	42.7	.06	17.3 37.5 57.6	.23 IIa	9.4	14.28 3.74	58.0
		16 1φ16+1φ10	46.5	.06	17.9 38.0 58.1	.23 IIa	9.5	14.46 4.04	60.3
		17 1φ16+1φ12	51.1	.07	18.4 38.5 58.5	.23 IIa	9.7	14.66 4.39	62.9
		18 1φ16+1φ16	62.5	.08	18.3 38.3 58.4	.22 IIa	10.1	15.15 5.26	68.5

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERTURA FISURA						B500 MOMENTO ULTIMO-ABERTURA FISURA						ESF.CORTANTE		MOMENTO	RIGIDEZ			
	Sección tipo				Sección maciza		Sección tipo				Sección maciza		ULTIMO		FISUR.	TOTAL FIS.			
	Mu	Ref.	Rel.	Wk	Mu	Rel.	Wk	Mu	Ref.	Rel.	Wk	Mu	Rel.	Wk	Vcu	Vu	Mf	E·Ib	E·If
	inf.		x/d		x/d			inf.		x/d		x/d			1*cel.				
	m·kN/m	vig.		mm	m·kN/m		mm	m·kN/m	vig.		mm	m·kN/m		mm	kN/m		m·kN/m	m2·MN/m	
	(5)	(9)	(10)	(7)	(5)	(10)	(7)	(5)	(9)	(10)	(7)	(5)	(10)	(7)	(11)		(8)	(8)	
1φ10	0.0	.00	.00		0.0	.00	.00	8.1	.09	.12		0.0	.00	.00	17.4	37.6	18.6	12.39	1.4
2φ 8	8.4	.10	.09		0.0	.00	.00	10.3	.12	.11		0.0	.00	.00	17.5	37.7	18.6	12.41	1.6
1φ12	9.3	.11	.10		0.0	.00	.00	11.5	.14	.12		0.0	.00	.00	17.4	37.6	18.6	12.41	1.7
1φ 8+1φ10	10.6	.12	.09		0.0	.00	.00	13.0	.15	.11		0.0	.00	.00	17.4	37.7	18.7	12.42	1.8
2φ10	12.7	.15	.08		0.0	.00	.00	20.8	.19	.11		0.0	.00	.00	17.4	37.6	18.8	12.44	2.0
1φ 8+1φ12	13.1	.16	.09		0.0	.00	.00	21.5	.20	.12		0.0	.00	.00	17.4	37.6	18.8	12.44	2.1
1φ10+1φ12	20.3	.18	.09		0.0	.00	.00	24.8	.23	.14		0.0	.00	.00	17.4	37.6	18.8	12.46	2.3
2φ12	23.5	.22	.09		0.0	.00	.00	28.7	.28	.16		0.0	.00	.00	17.4	37.6	18.9	12.48	2.6
1φ 8+1φ16	25.7	.24	.13		0.0	.00	.00	31.1	.33	.21		0.0	.00	.00	17.3	37.5	19.0	12.49	2.7
1φ10+1φ16	28.2	.28	.14		0.0	.00	.00	34.0	.38	.21		0.0	.00	.00	17.3	37.5	19.0	12.50	2.9
1φ12+1φ16	31.1	.33	.15		0.0	.00	.00	37.1	.44	.22		43.4	.06	.26	17.4	37.7	19.1	12.52	3.1
2φ16	37.7	.45	.16		44.2	.07	.19	44.2	.57	.22		54.9	.08	.27	18.3	38.5	19.3	12.56	3.6
4φ12	41.6	.51	.14		50.0	.07	.19	53.2	1φ12	.47	.19	62.1	.09	.26	18.4	38.6	19.4	12.61	4.0
2φ16+1φ12	45.2	.58	.17		56.3	.08	.23	57.8	1φ12	.56	.23	69.8	.11	.31	18.3	38.5	19.5	12.63	4.3
3φ16	49.9	.67	.17		65.4	.10	.23	68.1	1φ16	.57	.23	81.0	.12	.30	18.3	38.5	19.7	12.67	4.7
4φ16	71.2	1φ16	.62	.17	86.0	.13	.22	92.0	2φ16	.57	.22	106.1	.17	.28	18.3	38.5	20.1	12.76	5.6

ESFUERZO CORTANTE Vsu (12) (kN/m) TA.20 (simple celosía) : 20.2
b,1fm (mm) : 192 Vcu,1fm (kN/m) (TA.20) : 41.4

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS ARMADAS
MODELO TA.20

PREFABRICADOS NAVARRO, S.A.

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

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja n° 10 de 28



FLEXION POSITIVA (por m)

TIPO DE FORJADO (h+c) * s	TIPO DE VIGUETA (4)	REFUERZO INFERIOR VIGUETA Y + X	MOMENTO ULTIMO Mu m·kN/m(5)	Rel. x/d (10)	ESFUERZO CORTANTE Vcu Vu = Vcu+Vsu 1*Cel 2*Cel kN/m (11)	Wk CLASE POR RECUBRIM. mm (7)	MOMENTO DE FISURACION Mf m·kN/m (8)	RIGIDEZ TOTAL FISURADA E·Ib E·If (8) m2·MN/m	MOMENTO SERVICIO FIS.COMP. m·kN/m(6)
(22+ 4) * 83. D	TA.20	1 0φ 0	13.9	.02	37.4 72.4 107.3	.11 IIa	13.3	18.65 1.34	34.0
		2 1φ 6	20.7	.03	37.4 72.4 107.3	.16 IIa	13.5	18.89 1.95	41.8
		3 1φ 8	25.9	.03	37.4 72.2 107.1	.21 IIa	13.7	19.09 2.39	46.6
		4 1φ 6+1φ 6	27.5	.03	37.4 72.4 107.3	.18 IIa	13.8	19.15 2.54	48.1
		5 1φ10	32.6	.04	37.3 72.1 106.8	.24 IIa	13.9	19.31 2.95	51.9
		6 1φ 8+1φ 8	37.9	.05	37.4 72.2 107.0	.21 IIa	14.1	19.52 3.39	55.8
		7 1φ12	40.6	.05	37.2 71.9 106.5	.26 IIa	14.2	19.60 3.59	57.3
		8 1φ10+1φ 8	44.4	.06	37.3 72.1 106.8	.23 IIa	14.4	19.75 3.92	60.0
		9 1φ12+1φ 6	47.2	.06	37.3 71.9 106.6	.25 IIa	14.4	19.83 4.13	61.5
		10 1φ10+1φ10	50.9	.07	37.3 72.0 106.7	.22 IIa	14.6	19.97 4.43	63.8
		11 1φ12+1φ 8	52.3	.07	37.2 71.9 106.6	.25 IIa	14.6	20.02 4.53	64.5
		12 1φ12+1φ10	58.7	.08	37.2 71.9 106.5	.24 IIa	14.8	20.25 5.03	67.8
		13 1φ16	60.3	.08	37.0 71.4 105.7	.28 IIa	14.9	20.25 5.11	68.0
		14 1φ12+1φ12	66.4	.09	37.2 71.7 106.3	.23 IIa	15.1	20.51 5.62	71.5
		15 1φ16+1φ 8	71.7	.09	37.1 71.5 105.9	.27 IIa	15.3	20.68 5.99	73.5
		16 1φ16+1φ10	78.0	.10	37.1 71.5 105.9	.27 IIa	15.5	20.89 6.45	76.0
		17 1φ16+1φ12	85.5	.11	37.1 71.4 105.8	.26 IIa	15.7	21.15 7.00	78.8
		18 1φ16+1φ16	104.0	.14	39.1 73.4 107.7	.25 IIa	16.4	21.77 8.30	84.7

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO Sección tipo Mu Ref. Rel. Wk inf. x/d	ABERTURA FISURA Sección maciza Mu Rel. Wk x/d	B500 MOMENTO ULTIMO Sección tipo Mu Ref. Rel. Wk vig. x/d	ABERTURA FISURA Sección maciza Mu Rel. Wk x/d	ESF.CORTANTE ULTIMO Vcu Vu 1*cel.	MOMENTO FISUR. Mf	RIGIDEZ TOTAL FIS. E·Ib E·If
	m·kN/m vig. (5) (9) (10) (7)	m·kN/m (5) (10) (7)	m·kN/m vig. (5) (9) (10) (7)	m·kN/m (5) (10) (7)	kN/m (11)	m·kN/m (8)	m2·MN/m (8)
1φ10	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	37.2 71.9	22.1	18.22 1.5
2φ 8	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	37.3 72.0	22.1	18.25 1.7
1φ12	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	37.1 71.7	22.1	18.25 1.8
1φ 8+1φ10	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	37.3 71.9	22.2	18.27 2.0
2φ10	0.0 .00 .00	0.0 .00 .00	13.9 .09 .12	0.0 .00 .00	37.2 71.9	22.3	18.30 2.2
1φ 8+1φ12	0.0 .00 .00	0.0 .00 .00	14.4 .10 .14	0.0 .00 .00	37.2 71.8	22.3	18.30 2.2
1φ10+1φ12	0.0 .00 .00	0.0 .00 .00	22.3 .12 .13	0.0 .00 .00	37.2 71.8	22.3	18.33 2.5
2φ12	15.9 .11 .10	0.0 .00 .00	26.1 .14 .12	0.0 .00 .00	37.1 71.7	22.4	18.36 2.7
1φ 8+1φ16	23.2 .12 .11	0.0 .00 .00	28.6 .15 .17	0.0 .00 .00	37.0 71.6	22.5	18.38 2.9
1φ10+1φ16	25.6 .14 .11	0.0 .00 .00	31.6 .17 .19	0.0 .00 .00	37.0 71.6	22.5	18.41 3.1
1φ12+1φ16	28.6 .15 .12	0.0 .00 .00	35.2 .19 .21	0.0 .00 .00	37.0 71.6	22.6	18.44 3.3
2φ16	35.8 .20 .16	0.0 .00 .00	43.8 .24 .23	47.2 .07 .22	36.9 71.5	22.8	18.52 3.9
4φ12	40.2 .22 .14	43.0 .06 .15	49.1 .28 .19	53.4 .08 .22	37.1 71.7	23.0	18.59 4.3
2φ16+1φ12	44.9 .25 .17	48.4 .07 .19	54.4 .32 .23	60.1 .09 .28	37.0 71.6	23.1	18.63 4.6
3φ16	51.4 .30 .17	56.3 .08 .20	61.7 .39 .23	69.8 .11 .28	36.9 71.5	23.3	18.70 5.1
4φ16	65.0 .42 .18	74.2 .11 .22	76.7 .52 .23	91.7 .14 .28	37.5 72.1	23.8	18.88 6.2

ESFUERZO CORTANTE Vsu (12) (kN/m) TA.20 (simple celosía) : 34.6
b,lím (mm) : 312 Vcu,lím (kN/m) (TA.20) : 57.5

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS ARMADAS
MODELO TA.20

PREFABRICADOS NAVARRO, S.A.

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

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja n° 12 de 28



FLEXION POSITIVA (por m)

TIPO DE FORJADO (h+c)	TIPO DE VIGUETA	REFUERZO INFERIOR VIGUETA	MOMENTO ULTIMO Mu	Rel. x/d	ESFUERZO CORTANTE Vcu Vu = Vcu+Vsu	Wk	CLASE POR RECUBRIM.	MOMENTO DE FISURACION Mf	RIGIDEZ TOTAL FISURADA E·Ib E·If	MOMENTO SERVICIO FIS.COMP.
* s	(4)	Y + X	m·kN/m(5)	(10)	1*Cel 2*Cel	mm	(7)	m·kN/m (8)	(8) m ² ·MN/m	m·kN/m(6)
(22+ 5)	TA.20	1 0φ 0	14.5	.02	38.5 74.9 111.3	.11	IIa	14.4	21.26 1.46	36.1
* 83. D		2 1φ 6	21.6	.03	38.5 74.9 111.3	.16	IIa	14.7	21.56 2.13	44.5
		3 1φ 8	27.1	.03	38.4 74.8 111.1	.21	IIa	14.9	21.76 2.62	49.7
		4 1φ 6+1φ 6	28.7	.03	38.5 74.9 111.3	.18	IIa	14.9	21.84 2.77	51.2
		5 1φ10	34.0	.04	38.3 74.6 110.9	.24	IIa	15.1	22.04 3.23	55.3
		6 1φ 8+1φ 8	39.5	.05	38.4 74.7 111.1	.21	IIa	15.3	22.26 3.72	59.5
		7 1φ12	42.4	.05	38.3 74.4 110.5	.26	IIa	15.4	22.35 3.93	61.1
		8 1φ10+1φ 8	46.4	.05	38.3 74.6 110.9	.23	IIa	15.5	22.52 4.28	64.0
		9 1φ12+1φ 6	49.3	.06	38.3 74.5 110.6	.25	IIa	15.6	22.63 4.52	65.7
		10 1φ10+1φ10	53.2	.06	38.3 74.5 110.7	.22	IIa	15.8	22.78 4.85	68.1
		11 1φ12+1φ 8	54.6	.07	38.3 74.4 110.6	.25	IIa	15.8	22.83 4.96	68.8
		12 1φ12+1φ10	61.3	.07	38.3 74.4 110.5	.24	IIa	16.0	23.10 5.51	72.5
		13 1φ16	63.0	.08	38.1 73.9 109.7	.29	IIa	16.1	23.12 5.60	72.7
		14 1φ12+1φ12	69.4	.08	38.2 74.3 110.4	.24	IIa	16.3	23.40 6.16	76.5
		15 1φ16+1φ 8	75.0	.09	38.1 74.0 109.9	.28	IIa	16.5	23.59 6.57	78.8
		16 1φ16+1φ10	81.5	.10	38.1 74.0 109.9	.27	IIa	16.7	23.83 7.08	81.8
		17 1φ16+1φ12	89.4	.11	38.1 74.0 109.9	.26	IIa	17.0	24.14 7.69	85.1
		18 1φ16+1φ16	108.9	.14	40.0 75.7 111.5	.25	IIa	17.7	24.85 9.14	92.2

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERTURA FISURA	B500 MOMENTO ULTIMO-ABERTURA FISURA	ESF.CORTANTE ULTIMO	MOMENTO FISUR.	RIGIDEZ TOTAL FIS.
	Sección tipo	Sección maciza	Sección tipo	Sección maciza	
	Mu Ref. Rel. Wk	Mu Ref. Rel. Wk	Mu Ref. Rel. Wk	Mu Ref. Rel. Wk	
	inf. x/d	inf. x/d	inf. x/d	inf. x/d	
	m·kN/m vig.	m·kN/m	m·kN/m vig.	m·kN/m	
	(5) (9) (10) (7)	(5) (10) (7)	(5) (9) (10) (7)	(5) (10) (7)	
1φ10	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	38.3 74.4	24.8 20.77 1.7
2φ 8	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	38.4 74.5	24.9 20.80 1.9
1φ12	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	38.1 74.3	24.9 20.81 2.0
1φ 8+1φ10	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	38.3 74.4	25.0 20.83 2.2
2φ10	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	38.3 74.4	25.0 20.86 2.4
1φ 8+1φ12	0.0 .00 .00	0.0 .00 .00	15.1 .09 .14	38.2 74.3	25.0 20.87 2.5
1φ10+1φ12	0.0 .00 .00	0.0 .00 .00	17.5 .11 .13	38.2 74.3	25.1 20.90 2.7
2φ12	16.6 .10 .10	0.0 .00 .00	27.3 .13 .12	38.1 74.3	25.2 20.93 3.0
1φ 8+1φ16	18.2 .12 .11	0.0 .00 .00	30.0 .15 .14	38.0 74.2	25.2 20.95 3.2
1φ10+1φ16	26.8 .13 .11	0.0 .00 .00	33.1 .16 .17	38.0 74.2	25.3 20.98 3.4
1φ12+1φ16	29.9 .15 .10	0.0 .00 .00	36.9 .18 .19	38.0 74.2	25.4 21.01 3.7
2φ16	37.5 .19 .14	0.0 .00 .00	46.0 .23 .22	37.9 74.1	25.6 21.09 4.3
4φ12	42.2 .21 .13	44.9 .06 .14	51.5 .27 .19	38.1 74.3	25.8 21.17 4.7
2φ16+1φ12	47.1 .24 .17	50.6 .07 .19	57.2 .31 .23	38.0 74.1	25.9 21.21 5.1
3φ16	53.9 .29 .17	58.9 .08 .20	64.9 .37 .23	37.9 74.1	26.1 21.28 5.6
4φ16	68.5 .40 .18	77.6 .11 .22	81.0 .50 .23	38.2 74.4	26.6 21.47 6.8

ESFUERZO CORTANTE Vsu (12) (kN/m) TA.20 (simple celosía) : 36.1
b,lím (mm) : 312 Vcu,lím (kN/m) (TA.20) : 59.1

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS ARMADAS
MODELO TA.20

PREFABRICADOS NAVARRO, S.A.

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

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja n° 11 de 28



FLEXION POSITIVA (por m)

TIPO DE FORJADO (h+c)	TIPO DE VIGUETA	REFUERZO INFERIOR VIGUETA	MOMENTO ULTIMO Mu	Rel. x/d	ESFUERZO CORTANTE Vcu Vu = Vcu+Vsu 1*Cel 2*Cel	Wk CLASE POR RECUBRIM.	MOMENTO DE FISURACION MF	RIGIDEZ TOTAL FISURADA E·Ib E·If	MOMENTO SERVICIO FIS.COMP.
* s	(4)	Y + X	m·kN/m(5)	(10)	kN/m (11)	mm (7)	m·kN/m (8)	(8) m ² ·MN/m	m·kN/m(6)
(22+ 5)	TA.20	1 0φ 0	8.5	.01	18.0 39.3 60.6	.09 IIa	8.8	14.44 0.88	27.8
* 71.		2 1φ 6	12.7	.01	18.0 39.3 60.6	.11 IIa	9.0	14.66 1.29	34.3
		3 1φ 8	15.9	.02	18.0 39.2 60.5	.15 IIa	9.1	14.82 1.60	38.4
		4 1φ 6+1φ 6	16.9	.02	18.0 39.3 60.6	.14 IIa	9.1	14.87 1.69	39.7
		5 1φ10	20.0	.02	17.9 39.1 60.3	.18 IIa	9.2	15.02 1.97	42.9
		6 1φ 8+1φ 8	23.3	.03	18.0 39.2 60.4	.17 IIa	9.4	15.20 2.27	46.3
		7 1φ12	25.0	.03	17.9 39.0 60.1	.21 IIa	9.4	15.26 2.41	47.6
		8 1φ10+1φ 8	27.4	.03	17.9 39.1 60.3	.19 IIa	9.5	15.39 2.64	49.9
		9 1φ12+1φ 6	29.1	.03	17.9 39.0 60.2	.21 IIa	9.6	15.47 2.78	51.3
		10 1φ10+1φ10	31.5	.04	17.9 39.1 60.2	.19 IIa	9.7	15.59 2.99	53.2
		11 1φ12+1φ 8	32.3	.04	17.9 39.0 60.2	.20 IIa	9.7	15.63 3.07	53.8
		12 1φ12+1φ10	36.4	.04	17.9 39.0 60.1	.20 IIa	9.8	15.82 3.41	56.8
		13 1φ16	37.4	.04	17.8 38.7 59.7	.24 IIa	9.9	15.85 3.47	57.1
		14 1φ12+1φ12	41.2	.05	17.9 39.0 60.0	.20 IIa	10.0	16.06 3.82	60.1
		15 1φ16+1φ 8	44.6	.05	17.8 38.8 59.8	.23 IIa	10.1	16.21 4.09	62.0
		16 1φ16+1φ10	48.6	.06	18.2 39.2 60.2	.23 IIa	10.3	16.40 4.42	64.5
		17 1φ16+1φ12	53.4	.06	18.8 39.8 60.7	.23 IIa	10.5	16.64 4.81	67.2
		18 1φ16+1φ16	65.4	.08	18.9 39.8 60.7	.22 IIa	10.9	17.20 5.76	73.3

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu Ref. Rel. Wk inf. x/d	B500 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu Ref. Rel. Wk inf. x/d	ESF.CORTANTE ULTIMO Vcu Vu 1*cel	MOMENTO FISUR. MF	RIGIDEZ TOTAL FIS. E·Ib E·If
	m·kN/m vig. (5) (9) (10) (7)	m·kN/m (5) (10) (7)	m·kN/m vig. (5) (9) (10) (7)	m·kN/m (8)	m ² ·MN/m (8)
1φ10	0.0 .00 .00	0.0 .00 .00	8.5 .09 .12	17.9 39.0	20.8 14.06 1.5
2φ 8	8.7 .09 .09	0.0 .00 .00	10.8 .12 .11	17.9 39.0	20.9 14.08 1.7
1φ12	9.7 .10 .10	0.0 .00 .00	12.0 .13 .12	17.8 39.0	20.9 14.09 1.8
1φ 8+1φ10	11.0 .12 .09	0.0 .00 .00	13.6 .15 .12	17.9 39.0	21.0 14.10 2.0
2φ10	13.3 .14 .09	0.0 .00 .00	21.8 .18 .11	17.9 39.0	21.0 14.12 2.3
1φ 8+1φ12	13.8 .15 .10	0.0 .00 .00	22.5 .19 .12	17.9 39.0	21.0 14.12 2.3
1φ10+1φ12	21.2 .18 .09	0.0 .00 .00	26.0 .22 .12	17.9 39.0	21.1 14.14 2.5
2φ12	24.6 .21 .08	0.0 .00 .00	30.1 .27 .15	17.8 39.0	21.2 14.16 2.8
1φ 8+1φ16	27.0 .23 .12	0.0 .00 .00	32.7 .32 .20	17.8 38.9	21.2 14.17 3.0
1φ10+1φ16	29.6 .27 .13	0.0 .00 .00	35.7 .36 .21	17.8 38.9	21.3 14.18 3.2
1φ12+1φ16	32.7 .32 .15	0.0 .00 .00	39.1 .42 .21	17.8 38.9	21.4 14.20 3.5
2φ16	39.7 .43 .16	46.2 .06 .19	46.7 .54 .22	18.9 40.0	21.5 14.25 4.0
4φ12	43.9 .49 .14	52.3 .07 .19	51.1 .60 .19	19.0 40.1	21.7 14.29 4.4
2φ16+1φ12	47.7 .56 .17	58.9 .08 .23	61.0 1φ12 .54 .22	18.9 40.0	21.8 14.31 4.7
3φ16	52.9 .64 .17	68.4 .09 .23	71.8 1φ16 .54 .22	18.9 40.0	22.0 14.35 5.2
4φ16	75.2 1φ16 .60 .17	90.0 .13 .22	97.0 2φ16 .54 .22	18.9 40.0	22.4 14.46 6.2

ESFUERZO CORTANTE Vsu (12) (kN/m) TA.20 (simple celosía) : 21.1
b,lím (mm) : 192 Vcu,lím (kN/m) (TA.20) : 42.5

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS ARMADAS
MODELO TA.20

PREFABRICADOS NAVARRO, S.A.

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

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja n° 13 de 28



FLEXION POSITIVA (por m)

TIPO DE FORJADO (h+c)	TIPO DE VIGUETA	REFUERZO INFERIOR VIGUETA	MOMENTO ULTIMO Mu	Rel. x/d	ESFUERZO CORTANTE Vcu Vu = Vcu+Vsu 1*Cel 2*Cel	Wk	CLASE POR RECUBRIM.	MOMENTO DE FISURACION Mf	RIGIDEZ TOTAL FISURADA E·Ib E·If	MOMENTO SERVICIO FIS.COMP.
* s	(4)	Y + X	m·kN/m(5)	(10)	kN/m (11)	mm (7)		m·kN/m (8)	(8) m2·MN/m	m·kN/m(6)
(25+ 4) * 71.	TA.20	1 0φ 0	9.2	.01	18.9 42.0 65.0	.09	IIa	10.0	17.27 1.05	31.4
		2 1φ 6	13.7	.01	18.9 42.0 65.0	.11	IIa	10.2	17.52 1.53	38.8
		3 1φ 8	17.3	.02	18.9 41.9 64.9	.15	IIa	10.3	17.71 1.89	43.4
		4 1φ 6+1φ 6	18.3	.02	18.9 42.0 65.0	.13	IIa	10.3	17.76 2.00	44.8
		5 1φ10	21.7	.02	18.9 41.8 64.8	.18	IIa	10.5	17.93 2.33	48.5
		6 1φ 8+1φ 8	25.3	.03	18.9 41.9 64.9	.17	IIa	10.6	18.13 2.70	52.3
		7 1φ12	27.1	.03	18.8 41.7 64.6	.21	IIa	10.7	18.21 2.86	53.8
		8 1φ10+1φ 8	29.7	.03	18.9 41.8 64.8	.19	IIa	10.8	18.35 3.12	56.4
		9 1φ12+1φ 6	31.6	.03	18.9 41.8 64.7	.21	IIa	10.8	18.44 3.30	58.0
		10 1φ10+1φ10	34.1	.03	18.9 41.8 64.7	.19	IIa	10.9	18.58 3.54	60.2
		11 1φ12+1φ 8	35.1	.04	18.8 41.7 64.6	.21	IIa	11.0	18.63 3.63	60.9
		12 1φ12+1φ10	39.4	.04	18.8 41.7 64.6	.20	IIa	11.1	18.84 4.04	64.3
		13 1φ16	40.6	.04	18.7 41.5 64.2	.24	IIa	11.1	18.87 4.12	64.6
		14 1φ12+1φ12	44.8	.05	18.8 41.7 64.5	.20	IIa	11.3	19.12 4.53	68.0
		15 1φ16+1φ 8	48.4	.05	18.8 41.5 64.3	.24	IIa	11.4	19.28 4.85	70.2
		16 1φ16+1φ10	52.8	.05	18.8 41.6 64.3	.23	IIa	11.6	19.50 5.25	73.0
		17 1φ16+1φ12	58.0	.06	19.4 42.2 64.9	.23	IIa	11.8	19.76 5.72	76.2
		18 1φ16+1φ16	71.1	.07	20.1 42.8 65.5	.23	IIa	12.3	20.40 6.85	82.8

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERTURA FISURA						B500 MOMENTO ULTIMO-ABERTURA FISURA						ESF.CORTANTE		MOMENTO FISUR. Mf	RIGIDEZ			
	Sección tipo			Sección maciza			Sección tipo			Sección maciza			ULTIMO Vcu Vu 1*cel.	TOTAL FIS. E·Ib E·If					
	Mu	Ref.	Rel.	Mu	Rel.	Wk	Mu	Ref.	Rel.	Mu	Rel.	Wk							
	inf.	x/d		x/d			inf.	x/d		x/d									
	m·kN/m	vig.	mm	m·kN/m		mm	m·kN/m	vig.	mm	m·kN/m		mm				kN/m	m·kN/m	m2·MN/m	
(5)	(9)	(10)	(7)	(5)	(10)	(7)	(5)	(9)	(10)	(7)	(5)	(10)	(7)	(11)	(8)	(8)			
1φ10	0.0	.00	.00	0.0	.00	.00	9.2	.08	.12	0.0	.00	.00	18.8	41.7	22.3	16.86	1.7		
2φ 8	9.5	.09	.09	0.0	.00	.00	11.8	.11	.11	0.0	.00	.00	18.9	41.8	22.4	16.88	2.0		
1φ12	10.5	.10	.10	0.0	.00	.00	13.0	.12	.13	0.0	.00	.00	18.8	41.7	22.4	16.89	2.1		
1φ 8+1φ10	12.0	.11	.10	0.0	.00	.00	14.8	.14	.12	0.0	.00	.00	18.9	41.7	22.5	16.91	2.3		
2φ10	14.5	.13	.09	0.0	.00	.00	23.7	.17	.11	0.0	.00	.00	18.8	41.7	22.6	16.93	2.6		
1φ 8+1φ12	15.0	.14	.10	0.0	.00	.00	24.6	.17	.12	0.0	.00	.00	18.8	41.7	22.6	16.94	2.7		
1φ10+1φ12	23.1	.16	.09	0.0	.00	.00	28.4	.20	.13	0.0	.00	.00	18.8	41.7	22.7	16.96	2.9		
2φ12	26.9	.19	.09	0.0	.00	.00	32.9	.25	.16	0.0	.00	.00	18.8	41.7	22.8	16.99	3.3		
1φ 8+1φ16	29.5	.22	.12	0.0	.00	.00	35.9	.29	.20	0.0	.00	.00	18.7	41.6	22.8	17.01	3.5		
1φ10+1φ16	32.4	.25	.14	0.0	.00	.00	39.2	.34	.21	0.0	.00	.00	18.7	41.6	22.9	17.03	3.8		
1φ12+1φ16	35.9	.29	.15	0.0	.00	.00	43.0	.39	.22	0.0	.00	.00	18.7	41.6	23.0	17.06	4.0		
2φ16	43.8	.40	.17	50.2	.06	.18	51.6	.51	.22	62.4	.07	.27	19.9	42.8	23.2	17.12	4.8		
4φ12	48.4	.45	.14	56.8	.07	.19	56.6	.56	.19	70.5	.08	.26	20.2	43.1	23.4	17.19	5.2		
2φ16+1φ12	52.8	.52	.17	64.0	.07	.23	67.3	1φ12	.51	.23	79.5	.09	.32	20.1	43.0	23.6	17.22	5.6	
3φ16	58.8	.60	.17	74.4	.09	.23	74.6	1φ12	.61	.23	92.3	.11	.31	20.1	43.0	23.8	17.27	6.2	
4φ16	78.0	1φ12	.66	.17	98.0	.12	.22	107.0	2φ16	.51	.23	121.1	.15	.29	20.1	43.0	24.3	17.43	7.5

ESFUERZO CORTANTE Vsu (12) (kN/m) TA.20 (simple celosía) : 22.8
b,lím (mm) : 159 Vcu,lím (kN/m) (TA.20) : 37.1

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS ARMADAS
MODELO TA.20

PREFABRICADOS NAVARRO, S.A.

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

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja n° 14 de 28



FLEXION POSITIVA (por m)

TIPO DE FORJADO (h+c) * s	TIPO DE VIGUETA (4)	REFUERZO INFERIOR VIGUETA Y + X	MOMENTO ULTIMO Mu m·kN/m(5)	Rel. x/d (10)	ESFUERZO CORTANTE Vcu Vu = Vcu+Vsu 1*Cel 2*Cel kN/m (11)	Wk CLASE POR RECUBRIM. mm (7)	MOMENTO DE FISURACION Mf m·kN/m (8)	RIGIDEZ TOTAL FISURADA E·Ib E·If (8) m ² ·MN/m	MOMENTO SERVICIO FIS.COMP. m·kN/m(6)
(25+ 4) * 83. D	TA.20	1 0φ 0	15.7	.02	40.5 79.9 119.4	.11	16.4	25.37 1.75	40.8
		2 1φ 6	23.4	.02	40.5 79.9 119.4	.15	16.6	25.70 2.53	50.2
		3 1φ 8	29.4	.03	40.4 79.8 119.2	.21	16.8	25.93 3.11	56.1
		4 1φ 6+1φ 6	31.1	.03	40.5 79.9 119.4	.17	16.9	26.01 3.28	57.8
		5 1φ10	36.9	.04	40.4 79.6 118.9	.24	17.1	26.24 3.82	62.5
		6 1φ 8+1φ 8	42.9	.04	40.4 79.8 119.1	.21	17.3	26.49 4.40	67.3
		7 1φ12	46.0	.05	40.3 79.4 118.6	.27	17.4	26.60 4.67	69.2
		8 1φ10+1φ 8	50.3	.05	40.4 79.6 118.9	.23	17.6	26.78 5.09	72.4
		9 1φ12+1φ 6	53.5	.05	40.3 79.5 118.7	.26	17.7	26.90 5.36	74.3
		10 1φ10+1φ10	57.7	.06	40.3 79.6 118.8	.23	17.8	27.08 5.75	77.0
		11 1φ12+1φ 8	59.3	.06	40.3 79.5 118.7	.25	17.9	27.14 5.89	77.9
		12 1φ12+1φ10	66.6	.07	40.3 79.4 118.6	.25	18.1	27.43 6.54	81.9
		13 1φ16	68.5	.07	40.1 78.9 117.8	.29	18.2	27.46 6.65	82.2
		14 1φ12+1φ12	75.4	.08	40.2 79.3 118.4	.24	18.4	27.77 7.30	86.2
		15 1φ16+1φ 8	81.5	.08	40.1 79.1 118.0	.28	18.6	27.99 7.79	88.6
		16 1φ16+1φ10	88.7	.09	40.1 79.1 118.0	.27	18.9	28.27 8.41	91.7
		17 1φ16+1φ12	97.3	.10	40.1 79.0 117.9	.27	19.2	28.61 9.13	95.0
		18 1φ16+1φ16	118.7	.13	41.4 80.2 119.0	.26	20.0	29.42 10.84	102.0

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERTURA FISURA							B500 MOMENTO ULTIMO-ABERTURA FISURA							ESF.CORTANTE		MOMENTO	RIGIDEZ		
	Sección tipo				Sección maciza			Sección tipo				Sección maciza			ULTIMO		FISUR.	TOTAL FIS.		
	Mu	Ref.	Rel.	Wk	Mu	Rel.	Wk	Mu	Ref.	Rel.	Wk	Mu	Rel.	Wk	Vcu	Vu	Mf	E·Ib	E·If	
	inf.	x/d				x/d		inf.	x/d			inf.	x/d		1*cel.					
	m·kN/m	vig.		mm	m·kN/m		mm	m·kN/m	vig.		mm	m·kN/m		mm	kN/m		m·kN/m		m ² ·MN/m	
(5)	(9)	(10)	(7)	(5)	(10)	(7)	(5)	(9)	(10)	(7)	(5)	(10)	(7)	(5)	(10)	(7)	(11)	(8)	(8)	
1φ10	0.0	.00	.00	.00	0.0	.00	.00	0.0	.00	.00	.00	0.0	.00	.00	40.3	79.4	26.6	24.84	1.8	
2φ 8	0.0	.00	.00	.00	0.0	.00	.00	0.0	.00	.00	.00	0.0	.00	.00	40.4	79.5	26.7	24.88	2.1	
1φ12	0.0	.00	.00	.00	0.0	.00	.00	0.0	.00	.00	.00	0.0	.00	.00	40.2	79.3	26.7	24.89	2.2	
1φ 8+1φ10	0.0	.00	.00	.00	0.0	.00	.00	0.0	.00	.00	.00	0.0	.00	.00	40.3	79.5	26.8	24.92	2.4	
2φ10	0.0	.00	.00	.00	0.0	.00	.00	0.0	.00	.00	.00	0.0	.00	.00	40.3	79.4	26.9	24.96	2.7	
1φ 8+1φ12	0.0	.00	.00	.00	0.0	.00	.00	0.0	.00	.00	.00	0.0	.00	.00	40.2	79.4	26.9	24.97	2.8	
1φ10+1φ12	0.0	.00	.00	.00	0.0	.00	.00	19.1	.10	.14	.00	0.0	.00	.00	40.2	79.4	27.0	25.01	3.1	
2φ12	0.0	.00	.00	.00	0.0	.00	.00	29.7	.12	.13	.00	0.0	.00	.00	40.2	79.3	27.0	25.06	3.4	
1φ 8+1φ16	19.8	.11	.12	.00	0.0	.00	.00	32.6	.13	.15	.00	0.0	.00	.00	40.1	79.2	27.1	25.08	3.6	
1φ10+1φ16	29.2	.12	.11	.00	0.0	.00	.00	36.1	.15	.18	.00	0.0	.00	.00	40.1	79.2	27.2	25.12	3.9	
1φ12+1φ16	32.6	.13	.11	.00	0.0	.00	.00	40.2	.17	.20	.00	0.0	.00	.00	40.0	79.2	27.3	25.17	4.2	
2φ16	40.9	.17	.15	.00	0.0	.00	.00	50.3	.22	.23	.21	53.6	.06	.21	40.0	79.1	27.5	25.27	5.0	
4φ12	46.0	.19	.14	.00	0.0	.00	.00	56.4	.25	.20	.22	60.6	.07	.22	40.2	79.3	27.7	25.37	5.5	
2φ16+1φ12	51.5	.22	.17	.18	55.0	.06	.18	62.7	.29	.24	.28	68.4	.08	.28	40.0	79.2	27.9	25.43	5.9	
3φ16	59.1	.27	.18	.20	64.0	.07	.20	71.4	.34	.24	.28	79.4	.09	.28	40.0	79.1	28.1	25.54	6.6	
4φ16	75.3	.37	.18	.22	84.5	.10	.22	89.5	.46	.23	.29	104.5	.12	.29	40.0	79.1	28.7	25.80	8.0	

ESFUERZO CORTANTE Vsu (12) (kN/m) TA.20 (simple celosía) : 39.1
b,lím (mm) : 279 Vcu,lím (kN/m) (TA.20) : 55.7

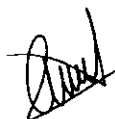
FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS ARMADAS
MODELO TA.20

PREFABRICADOS NAVARRO, S.A.

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

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja n° 15 de 28



FLEXION POSITIVA (por m)

TIPO DE FORJADO (h+c)	TIPO DE VIGUETA	REFUERZO INFERIOR VIGUETA	MOMENTO ULTIMO Mu	Rel. x/d	ESFUERZO CORTANTE Vcu Vu = Vcu+Vsu 1*Cel 2*Cel	Wk CLASE POR RECUBRIM.	MOMENTO DE FISURACION Mf	RIGIDEZ TOTAL FISURADA E·Ib E·If	MOMENTO SERVICIO FIS.COMP.
* s	(4)	Y + X	m·kN/m(5)	(10)	kN/m (11)	mm (7)	m·kN/m (8)	(8) m ² ·MN/m	m·kN/m(6)
(25+ 5)	TA.20	1 0φ 0	0.0	.00	19.4 43.3 67.3	.00	10.7	19.45 1.15	0.0
* 71.		2 1φ 6	14.3	.01	19.4 43.3 67.3	.10	10.9	19.73 1.66	41.0
		3 1φ 8	17.9	.02	19.4 43.3 67.2	.15	11.0	19.93 2.05	46.0
		4 1φ 6+1φ 6	19.0	.02	19.4 43.3 67.3	.13	11.1	20.00 2.17	47.4
		5 1φ10	22.6	.02	19.3 43.2 67.0	.18	11.2	20.19 2.53	51.4
		6 1φ 8+1φ 8	26.2	.02	19.4 43.2 67.1	.17	11.4	20.40 2.92	55.5
		7 1φ12	28.2	.03	19.3 43.1 66.8	.21	11.4	20.50 3.10	57.1
		8 1φ10+1φ 8	30.9	.03	19.3 43.2 67.0	.19	11.5	20.66 3.38	59.8
		9 1φ12+1φ 6	32.8	.03	19.3 43.1 66.9	.21	11.6	20.76 3.58	61.5
		10 1φ10+1φ10	35.4	.03	19.3 43.1 66.9	.19	11.7	20.91 3.84	63.8
		11 1φ12+1φ 8	36.4	.03	19.3 43.1 66.9	.21	11.7	20.96 3.93	64.6
		12 1φ12+1φ10	41.0	.04	19.3 43.1 66.8	.21	11.9	21.22 4.38	68.2
		13 1φ16	42.2	.04	19.2 42.8 66.4	.24	11.9	21.25 4.46	68.6
		14 1φ12+1φ12	46.5	.04	19.3 43.0 66.7	.20	12.1	21.51 4.91	72.2
		15 1φ16+1φ 8	50.4	.05	19.2 42.9 66.5	.24	12.2	21.71 5.26	74.5
		16 1φ16+1φ10	54.9	.05	19.2 42.9 66.5	.23	12.4	21.95 5.69	77.5
		17 1φ16+1φ12	60.3	.06	19.8 43.4 67.0	.23	12.6	22.25 6.20	80.9
		18 1φ16+1φ16	74.0	.07	20.7 44.3 67.8	.23	13.1	22.97 7.43	88.4

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu Ref. Rel. Wk inf. x/d	B500 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu Ref. Rel. Wk inf. x/d	ESF.CORTANTE ULTIMO Vcu Vu 1*cel.	MOMENTO FISUR. Mf	RIGIDEZ TOTAL FIS. E·Ib E·If
	m·kN/m vig. (5) (9) (10) (7)	m·kN/m (5) (10) (7)	m·kN/m vig. (5) (9) (10) (7)	m·kN/m (8)	m ² ·MN/m (8)
1φ10	0.0 .00 .00	0.0 .00 .00	9.6 .08 .12	19.3 43.1	25.1 18.98 1.9
2φ 8	9.9 .08 .09	0.0 .00 .00	12.2 .10 .11	19.4 43.1	25.1 19.01 2.2
1φ12	11.0 .09 .10	0.0 .00 .00	13.6 .12 .13	19.3 43.0	25.2 19.01 2.3
1φ 8+1φ10	12.5 .11 .10	0.0 .00 .00	15.4 .13 .12	19.3 43.1	25.2 19.03 2.5
2φ10	15.0 .13 .09	0.0 .00 .00	24.7 .16 .11	19.3 43.1	25.3 19.06 2.8
1φ 8+1φ12	15.6 .13 .10	0.0 .00 .00	25.6 .17 .12	19.3 43.0	25.3 19.06 2.9
1φ10+1φ12	18.1 .16 .09	0.0 .00 .00	29.6 .20 .12	19.3 43.0	25.4 19.09 3.2
2φ12	28.0 .19 .09	0.0 .00 .00	34.3 .24 .14	19.3 43.0	25.5 19.12 3.6
1φ 8+1φ16	30.7 .21 .10	0.0 .00 .00	37.5 .28 .19	19.2 43.0	25.5 19.13 3.8
1φ10+1φ16	33.8 .24 .12	0.0 .00 .00	41.0 .32 .20	19.2 43.0	25.6 19.16 4.1
1φ12+1φ16	37.4 .28 .14	0.0 .00 .00	45.0 .37 .21	19.2 43.0	25.7 19.19 4.4
2φ16	45.8 .39 .16	0.0 .00 .00	54.1 .49 .22	64.9 .07 .27	20.3 44.0 26.0 19.25 5.2
4φ12	50.6 .44 .14	59.0 .06 .19	59.4 .54 .19	73.4 .08 .26	20.8 44.6 26.2 19.31 5.7
2φ16+1φ12	55.4 .50 .17	66.6 .07 .23	64.4 .61 .22	82.7 .09 .32	20.7 44.5 26.3 19.34 6.2
3φ16	61.8 .58 .17	77.4 .08 .23	78.4 1φ12 .59 .22	96.0 .11 .31	20.7 44.4 26.5 19.41 6.8
4φ16	82.0 1φ12 .63 .17	102.0 .11 .23	112.0 2φ16 .49 .23	126.1 .14 .29	20.7 44.4 27.1 19.56 8.2

ESFUERZO CORTANTE Vsu (12) (kN/m) TA.20 (simple celosía) : 23.7
b,lím (mm) : 159 Vcu,lím (kN/m) (TA.20) : 38.0

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS ARMADAS
MODELO TA.20

PREFABRICADOS NAVARRO, S.A.

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

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja n° 16 de 28



FLEXION POSITIVA (por m)

TIPO DE FORJADO (h+c)	TIPO DE VIGUETA	REFUERZO INFERIOR VIGUETA	MOMENTO ULTIMO Mu	Rel. x/d	ESFUERZO CORTANTE Vcu Vu = Vcu+Vsu 1*Cel 2*Cel	Wk CLASE POR RECUBRIM.	MOMENTO DE FISURACION Mf	RIGIDEZ TOTAL FISURADA E·Ib E·If	MOMENTO SERVICIO FIS.COMP.
* s	(4)	Y + X	m·kN/m(5)	(10)	kN/m (11)	mm (7)	m·kN/m (8)	(8) m ² ·MN/m	m·kN/m(6)
(25+ 5)	TA.20	1 0φ 0	16.3	.02	41.5 82.4 123.4	.11	17.6	28.71 1.89	43.2
* 83. D		2 1φ 6	24.3	.02	41.5 82.4 123.4	.14	17.9	29.07 2.74	53.2
		3 1φ 8	30.5	.03	41.4 82.3 123.2	.20	18.1	29.34 3.37	59.5
		4 1φ 6+1φ 6	32.3	.03	41.5 82.4 123.4	.17	18.2	29.43 3.56	61.3
		5 1φ10	38.3	.04	41.4 82.1 122.9	.24	18.4	29.68 4.15	66.3
		6 1φ 8+1φ 8	44.5	.04	41.4 82.3 123.1	.21	18.6	29.96 4.76	71.4
		7 1φ12	47.8	.05	41.3 81.9 122.6	.27	18.7	30.09 5.06	73.4
		8 1φ10+1φ 8	52.3	.05	41.4 82.1 122.9	.23	18.9	30.29 5.51	76.8
		9 1φ12+1φ 6	55.6	.05	41.3 82.0 122.7	.26	19.0	30.43 5.81	78.9
		10 1φ10+1φ10	60.0	.06	41.3 82.1 122.8	.23	19.2	30.63 6.24	81.7
		11 1φ12+1φ 8	61.6	.06	41.3 82.0 122.7	.25	19.2	30.70 6.38	82.7
		12 1φ12+1φ10	69.3	.07	41.3 81.9 122.6	.25	19.5	31.03 7.09	87.1
		13 1φ16	71.3	.07	41.1 81.5 121.8	.30	19.5	31.06 7.22	87.6
		14 1φ12+1φ12	78.4	.08	41.2 81.8 122.4	.24	19.8	31.42 7.92	92.0
		15 1φ16+1φ 8	84.8	.08	41.1 81.6 122.0	.28	20.0	31.67 8.47	94.9
		16 1φ16+1φ10	92.3	.09	41.1 81.6 122.0	.28	20.3	31.98 9.14	98.5
		17 1φ16+1φ12	101.3	.10	41.1 81.5 121.9	.27	20.6	32.36 9.92	102.5
		18 1φ16+1φ16	123.5	.12	42.1 82.4 122.7	.26	21.4	33.29 11.82	110.9

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu Ref. Rel. Wk inf. x/d	Sección maciza Mu Rel. Wk x/d	B500 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu Ref. Rel. Wk inf. x/d	Sección maciza Mu Rel. Wk x/d	ESF.CORTANTE ULTIMO Vcu Vu 1*cel	MOMENTO FISUR. Mf	RIGIDEZ TOTAL FIS. E·Ib E·If
	m·kN/m vig. (5)	mm (9) (10) (7)	m·kN/m (5) (10) (7)	m·kN/m vig. (5) (9) (10) (7)	mm (5) (10) (7)	kN/m (11)	m·kN/m (8) m ² ·MN/m (8)
1φ10	0.0	.00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	41.3 81.9	29.8 28.10 2.0
2φ 8	0.0	.00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	41.4 82.0	29.9 28.14 2.3
1φ12	0.0	.00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	41.2 81.8	29.9 28.15 2.4
1φ 8+1φ10	0.0	.00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	41.3 82.0	30.0 28.18 2.6
2φ10	0.0	.00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	41.3 81.9	30.1 28.22 3.0
1φ 8+1φ12	0.0	.00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	41.2 81.9	30.1 28.23 3.0
1φ10+1φ12	0.0	.00 .00	0.0 .00 .00	19.9 .10 .14	0.0 .00 .00	41.2 81.9	30.2 28.26 3.4
2φ12	0.0	.00 .00	0.0 .00 .00	30.9 .12 .13	0.0 .00 .00	41.2 81.8	30.3 28.31 3.7
1φ 8+1φ16	20.6	.10 .12	0.0 .00 .00	34.0 .13 .15	0.0 .00 .00	41.1 81.7	30.4 28.34 4.0
1φ10+1φ16	22.9	.12 .11	0.0 .00 .00	37.6 .14 .16	0.0 .00 .00	41.1 81.7	30.4 28.38 4.3
1φ12+1φ16	33.9	.13 .11	0.0 .00 .00	41.9 .16 .19	0.0 .00 .00	41.0 81.7	30.5 28.43 4.6
2φ16	42.7	.17 .14	0.0 .00 .00	52.4 .21 .22	55.8 .06 .20	41.0 81.6	30.8 28.55 5.4
4φ12	47.9	.19 .13	0.0 .00 .00	58.8 .24 .19	63.0 .07 .22	41.2 81.8	31.0 28.65 6.0
2φ16+1φ12	53.7	.21 .16	57.2 .06 .18	65.5 .28 .23	71.1 .08 .28	41.0 81.7	31.1 28.71 6.5
3φ16	61.7	.26 .17	66.6 .07 .20	74.6 .33 .23	82.6 .09 .28	41.0 81.6	31.4 28.81 7.2
4φ16	78.8	.35 .18	87.9 .10 .22	93.9 .45 .23	108.8 .12 .29	41.0 81.6	32.0 29.09 8.8

ESFUERZO CORTANTE Vsu (12) (kN/m) TA.20 (simple celosía) : 40.6
b,lím (mm) : 279 Vcu,lím (kN/m) (TA.20) : 57.1

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS ARMADAS
MODELO TA.20

PREFABRICADOS NAVARRO, S.A.

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

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja n° 17 de 28

FLEXION POSITIVA (por m)

TIPO DE FORJADO (h+c) * s	TIPO DE VIGUETA (4)	REFUERZO INFERIOR VIGUETA Y + X	MOMENTO ULTIMO Mu m·kN/m(5)	Rel. x/d (10)	ESFUERZO CORTANTE Vcu Vu = Vcu+Vsu 1*Cel 2*Cel kN/m (11)	Wk mm (7)	CLASE POR RECUBRIM.	MOMENTO DE FISURACION MF m·kN/m (8)	RIGIDEZ TOTAL FISURADA E·Ib E·If (8) m2·MN/m	MOMENTO SERVICIO FIS.COMP. m·kN/m(6)
(26+ 4) * 71.	TA.20	1 0φ 0	0.0	.00	19.4 43.3 67.3	.00	IIa	10.6	18.99 1.15	0.0
		2 1φ 6	14.3	.01	19.4 43.3 67.3	.10	IIa	10.8	19.25 1.66	41.1
		3 1φ 8	17.9	.02	19.4 43.3 67.2	.15	IIa	11.0	19.45 2.05	46.0
		4 1φ 6+1φ 6	19.0	.02	19.4 43.3 67.3	.13	IIa	11.0	19.52 2.17	47.4
		5 1φ10	22.6	.02	19.3 43.2 67.0	.18	IIa	11.1	19.70 2.53	51.4
		6 1φ 8+1φ 8	26.2	.02	19.4 43.2 67.1	.17	IIa	11.3	19.90 2.92	55.4
		7 1φ12	28.2	.03	19.3 43.1 66.8	.21	IIa	11.3	20.00 3.10	57.1
		8 1φ10+1φ 8	30.9	.03	19.3 43.2 67.0	.19	IIa	11.4	20.15 3.38	59.8
		9 1φ12+1φ 6	32.8	.03	19.3 43.1 66.9	.21	IIa	11.5	20.25 3.58	61.5
		10 1φ10+1φ10	35.4	.03	19.3 43.1 66.9	.19	IIa	11.6	20.39 3.84	63.8
		11 1φ12+1φ 8	36.4	.03	19.3 43.1 66.9	.21	IIa	11.6	20.44 3.93	64.5
		12 1φ12+1φ10	41.0	.04	19.3 43.1 66.8	.21	IIa	11.8	20.69 4.38	68.2
		13 1φ16	42.2	.04	19.2 42.8 66.4	.24	IIa	11.8	20.72 4.46	68.6
		14 1φ12+1φ12	46.5	.04	19.3 43.0 66.7	.20	IIa	12.0	20.97 4.91	72.2
		15 1φ16+1φ 8	50.4	.05	19.2 42.9 66.5	.24	IIa	12.2	21.16 5.25	74.5
		16 1φ16+1φ10	54.9	.05	19.2 42.9 66.5	.23	IIa	12.3	21.39 5.69	77.5
		17 1φ16+1φ12	60.3	.06	19.8 43.4 67.0	.23	IIa	12.5	21.68 6.20	80.8
		18 1φ16+1φ16	74.0	.07	20.7 44.3 67.8	.23	IIa	13.0	22.36 7.43	87.8

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu Ref. Rel. Wk inf. x/d m·kN/m vig. mm (5) (9) (10) (7)	B500 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu Ref. Rel. Wk inf. x/d m·kN/m vig. mm (5) (9) (10) (7)	ESF.CORTANTE ULTIMO Vcu Vu 1*cel kN/m (11)	MOMENTO FISUR. MF m·kN/m (8)	RIGIDEZ TOTAL FIS. E·Ib E·If m2·MN/m (8)
1φ10	0.0 .00 .00	0.0 .00 .00	9.6 .08 .12	0.0 .00 .00	19.3 43.1 23.6 18.55 1.8
2φ 8	9.9 .08 .09	0.0 .00 .00	12.2 .10 .11	0.0 .00 .00	19.4 43.1 23.7 18.58 2.1
1φ12	11.0 .09 .10	0.0 .00 .00	13.6 .12 .13	0.0 .00 .00	19.3 43.0 23.7 18.58 2.2
1φ 8+1φ10	12.5 .11 .10	0.0 .00 .00	15.4 .13 .12	0.0 .00 .00	19.3 43.1 23.8 18.61 2.5
2φ10	15.0 .13 .09	0.0 .00 .00	24.7 .16 .11	0.0 .00 .00	19.3 43.1 23.9 18.63 2.8
1φ 8+1φ12	15.6 .13 .10	0.0 .00 .00	25.6 .17 .12	0.0 .00 .00	19.3 43.0 23.9 18.64 2.9
1φ10+1φ12	24.1 .16 .09	0.0 .00 .00	29.6 .20 .13	0.0 .00 .00	19.3 43.0 24.0 18.67 3.2
2φ12	28.0 .19 .09	0.0 .00 .00	34.3 .24 .16	0.0 .00 .00	19.3 43.0 24.1 18.70 3.5
1φ 8+1φ16	30.7 .21 .12	0.0 .00 .00	37.5 .28 .20	0.0 .00 .00	19.2 43.0 24.2 18.72 3.8
1φ10+1φ16	33.8 .24 .14	0.0 .00 .00	41.0 .32 .21	0.0 .00 .00	19.2 43.0 24.3 18.74 4.1
1φ12+1φ16	37.4 .28 .15	0.0 .00 .00	45.0 .37 .22	0.0 .00 .00	19.2 43.0 24.4 18.77 4.4
2φ16	45.8 .39 .17	0.0 .00 .00	54.1 .49 .22	64.9 .07 .27	20.3 44.0 24.6 18.84 5.2
4φ12	50.6 .44 .14	59.0 .06 .19	59.4 .54 .19	73.4 .08 .26	20.8 44.6 24.8 18.92 5.7
2φ16+1φ12	55.4 .50 .17	66.6 .07 .23	64.3 .62 .22	82.7 .09 .32	20.7 44.5 25.0 18.95 6.1
3φ16	61.7 .58 .17	77.4 .08 .23	78.3 1φ12 .59 .23	96.0 .11 .31	20.7 44.4 25.2 19.02 6.8
4φ16	81.9 1φ12 .64 .17	102.0 .11 .23	112.0 2φ16 .49 .23	126.1 .14 .29	20.7 44.4 25.8 19.20 8.2

ESFUERZO CORTANTE Vsu (12) (kN/m)

b, lím (mm) : 154

TA.20 (simple celosía) : 23.7

Vcu, lím (kN/m) (TA.20) : 36.8

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS ARMADAS
MODELO TA.20

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 28



FLEXION POSITIVA (por m)

TIPO DE FORJADO (h+c)	TIPO DE VIGUETA	REFUERZO INFERIOR VIGUETA	MOMENTO ULTIMO Mu	Rel. x/d	ESFUERZO CORTANTE Vcu Vu = Vcu+Vsu 1*Cel 2*Cel	Wk	CLASE POR RECUBRIM.	MOMENTO DE FISURACION Mf	RIGIDEZ TOTAL FISURADA E·Ib E·If	MOMENTO SERVICIO FIS.COMP.
* s	(4)	Y + X	m·kN/m(5)	(10)	kN/m (11)	mm (7)		m·kN/m (8)	(8) m ² ·MN/m	m·kN/m(6)
(26+ 4)	TA.20	1 0φ 0	16.3	.02	41.5 82.4 123.4	.11	IIa	17.5	27.91 1.89	43.2
* 83. D		2 1φ 6	24.3	.02	41.5 82.4 123.4	.14	IIa	17.7	28.26 2.74	53.2
		3 1φ 8	30.5	.03	41.4 82.3 123.2	.20	IIa	18.0	28.52 3.37	59.5
		4 1φ 6+1φ 6	32.3	.03	41.5 82.4 123.4	.17	IIa	18.0	28.61 3.56	61.3
		5 1φ10	38.3	.04	41.4 82.1 122.9	.24	IIa	18.2	28.84 4.15	66.3
		6 1φ 8+1φ 8	44.5	.04	41.4 82.3 123.1	.21	IIa	18.4	29.12 4.76	71.4
		7 1φ12	47.8	.05	41.3 81.9 122.6	.27	IIa	18.5	29.24 5.06	73.4
		8 1φ10+1φ 8	52.3	.05	41.4 82.1 122.9	.23	IIa	18.7	29.44 5.51	76.8
		9 1φ12+1φ 6	55.6	.05	41.3 82.0 122.7	.26	IIa	18.8	29.57 5.81	78.8
		10 1φ10+1φ10	60.0	.06	41.3 82.1 122.8	.23	IIa	19.0	29.75 6.24	81.7
		11 1φ12+1φ 8	61.6	.06	41.3 82.0 122.7	.25	IIa	19.0	29.81 6.38	82.6
		12 1φ12+1φ10	69.3	.07	41.3 81.9 122.6	.25	IIa	19.3	30.13 7.09	86.8
		13 1φ16	71.3	.07	41.1 81.5 121.8	.30	IIa	19.3	30.17 7.22	87.2
		14 1φ12+1φ12	78.4	.08	41.2 81.8 122.4	.24	IIa	19.6	30.50 7.92	91.3
		15 1φ16+1φ 8	84.8	.08	41.1 81.6 122.0	.28	IIa	19.8	30.74 8.46	93.9
		16 1φ16+1φ10	92.3	.09	41.1 81.6 122.0	.28	IIa	20.1	31.04 9.13	97.1
		17 1φ16+1φ12	101.3	.10	41.1 81.5 121.9	.27	IIa	20.4	31.41 9.91	100.6
		18 1φ16+1φ16	123.5	.12	42.1 82.4 122.7	.26	IIa	21.2	32.28 11.77	108.0

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu Ref. Rel. Wk inf. x/d	B500 MOMENTO ULTIMO-ABERTURA FISURA Sección maciza Mu Ref. Rel. Wk inf. x/d	ESF.CORTANTE ULTIMO Vcu Vu 1*cel.	MOMENTO FISUR. Mf	RIGIDEZ TOTAL FIS. E·Ib E·If
	m·kN/m vig. (5) (9) (10) (7)	m·kN/m (5) (10) (7)	m·kN/m vig. (5) (9) (10) (7)	m·kN/m (8)	m ² ·MN/m (8)
1φ10	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	41.3 81.9	27.34 1.9
2φ 8	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	41.4 82.0	27.38 2.2
1φ12	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	41.2 81.8	27.40 2.4
1φ 8+1φ10	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	41.3 82.0	27.43 2.6
2φ10	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	41.3 81.9	27.48 2.9
1φ 8+1φ12	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	41.2 81.9	27.49 3.0
1φ10+1φ12	0.0 .00 .00	0.0 .00 .00	19.9 .10 .14	41.2 81.9	27.53 3.3
2φ12	0.0 .00 .00	0.0 .00 .00	30.9 .12 .13	41.2 81.8	27.58 3.7
1φ 8+1φ16	20.6 .10 .12	0.0 .00 .00	34.0 .13 .15	41.1 81.7	27.61 3.9
1φ10+1φ16	30.4 .12 .11	0.0 .00 .00	37.6 .14 .18	41.1 81.7	27.66 4.2
1φ12+1φ16	33.9 .13 .11	0.0 .00 .00	41.9 .16 .20	41.0 81.7	27.71 4.6
2φ16	42.7 .17 .15	0.0 .00 .00	52.4 .21 .23	41.0 81.6	27.83 5.4
4φ12	47.9 .19 .14	0.0 .00 .00	58.8 .24 .20	41.2 81.8	27.94 5.9
2φ16+1φ12	53.7 .21 .17	57.2 .06 .18	65.5 .28 .24	41.0 81.7	28.01 6.4
3φ16	61.7 .26 .18	66.6 .07 .20	74.6 .33 .24	41.0 81.6	28.13 7.2
4φ16	78.8 .35 .18	87.9 .10 .22	93.8 .45 .23	41.0 81.6	28.41 8.7

ESFUERZO CORTANTE Vsu (12) (kN/m) TA.20 (simple celosía) : 40.6
b,lím (mm) : 274 Vcu,lím (kN/m) (TA.20) : 56.1

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS ARMADAS
MODELO TA.20

PREFABRICADOS NAVARRO, S.A.

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

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja n° 19 de 28



FLEXION POSITIVA (por m)

TIPO DE FORJADO (h+c) * s	TIPO DE VIGUETA (4)	REFUERZO INFERIOR VIGUETA Y + X	MOMENTO ULTIMO Mu m·kN/m(5)	Rel. x/d (10)	ESFUERZO CORTANTE Vcu Vu = Vcu+Vsu 1*Cel 2*Cel kN/m (11)	Wk CLASE POR RECUBRIM. mm (7)	MOMENTO DE FISURACION Mf m·kN/m (8)	RIGIDEZ TOTAL FISURADA E·Ib E·If (8) m ² ·MN/m	MOMENTO SERVICIO FIS.COMP. m·kN/m(6)
(26+ 5) * 71.	TA.20	1 0φ 0	0.0	.00	19.9 44.7 69.5	.00 IIa	11.4	21.34 1.24	0.0
		2 1φ 6	14.8	.01	19.9 44.7 69.5	.10 IIa	11.6	21.63 1.79	43.4
		3 1φ 8	18.6	.02	19.8 44.6 69.4	.15 IIa	11.7	21.85 2.22	48.6
		4 1φ 6+1φ 6	19.7	.02	19.9 44.7 69.5	.13 IIa	11.8	21.92 2.34	50.2
		5 1φ10	23.4	.02	19.8 44.5 69.2	.18 IIa	11.9	22.13 2.74	54.4
		6 1φ 8+1φ 8	27.2	.02	19.8 44.6 69.4	.17 IIa	12.1	22.36 3.15	58.7
		7 1φ12	29.2	.03	19.8 44.4 69.0	.21 IIa	12.1	22.46 3.34	60.4
		8 1φ10+1φ 8	32.0	.03	19.8 44.5 69.2	.19 IIa	12.2	22.64 3.66	63.3
		9 1φ12+1φ 6	34.1	.03	19.8 44.5 69.1	.21 IIa	12.3	22.75 3.86	65.1
		10 1φ10+1φ10	36.8	.03	19.8 44.5 69.2	.19 IIa	12.4	22.90 4.15	67.5
		11 1φ12+1φ 8	37.8	.03	19.8 44.4 69.1	.21 IIa	12.5	22.96 4.25	68.3
		12 1φ12+1φ10	42.5	.04	19.8 44.4 69.0	.21 IIa	12.6	23.24 4.74	72.1
		13 1φ16	43.8	.04	19.7 44.2 68.6	.24 IIa	12.7	23.27 4.82	72.6
		14 1φ12+1φ12	48.3	.04	19.8 44.4 69.0	.20 IIa	12.9	23.56 5.30	76.4
		15 1φ16+1φ 8	52.3	.05	19.7 44.2 68.7	.24 IIa	13.0	23.76 5.69	78.9
		16 1φ16+1φ10	57.0	.05	19.7 44.2 68.7	.24 IIa	13.2	24.03 6.15	82.1
		17 1φ16+1φ12	62.6	.06	20.1 44.6 69.1	.23 IIa	13.4	24.35 6.70	85.7
		18 1φ16+1φ16	76.8	.07	21.3 45.7 70.2	.23 IIa	13.9	25.13 8.04	93.6

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIOS	B400 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu Ref. Rel. Wk inf. x/d m·kN/m vig. mm (5) (9) (10) (7)	B500 MOMENTO ULTIMO-ABERTURA FISURA Sección maciza Mu Ref. Rel. Wk x/d m·kN/m mm (5) (10) (7)	B500 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu Ref. Rel. Wk inf. x/d m·kN/m vig. mm (5) (9) (10) (7)	B500 MOMENTO ULTIMO-ABERTURA FISURA Sección maciza Mu Ref. Rel. Wk x/d m·kN/m mm (5) (10) (7)	ESF.CORTANTE ULTIMO Vcu Vu 1*cel. kN/m (11)	MOMENTO FISUR. MF m·kN/m (8)	RIGIDEZ TOTAL FIS. E·Ib E·If m ² ·MN/m (8)
1φ10	0.0 .00 .00	0.0 .00 .00	10.0 .08 .12	0.0 .00 .00	19.8 44.4	26.5	20.83 2.0
2φ 8	10.2 .08 .09	0.0 .00 .00	12.7 .10 .11	0.0 .00 .00	19.8 44.5	26.6	20.86 2.3
1φ12	11.4 .09 .11	0.0 .00 .00	14.1 .11 .13	0.0 .00 .00	19.7 44.4	26.6	20.86 2.5
1φ 8+1φ10	13.0 .10 .10	0.0 .00 .00	16.0 .13 .12	0.0 .00 .00	19.8 44.4	26.7	20.89 2.7
2φ10	15.6 .12 .09	0.0 .00 .00	19.3 .15 .11	0.0 .00 .00	19.8 44.4	26.8	20.92 3.1
1φ 8+1φ12	16.2 .13 .10	0.0 .00 .00	26.6 .16 .13	0.0 .00 .00	19.8 44.4	26.8	20.92 3.1
1φ10+1φ12	18.8 .15 .09	0.0 .00 .00	30.8 .19 .12	0.0 .00 .00	19.7 44.4	26.9	20.95 3.5
2φ12	29.1 .18 .09	0.0 .00 .00	35.7 .23 .14	0.0 .00 .00	19.7 44.4	27.0	20.98 3.9
1φ 8+1φ16	32.0 .20 .10	0.0 .00 .00	39.0 .27 .19	0.0 .00 .00	19.7 44.3	27.0	21.00 4.1
1φ10+1φ16	35.2 .23 .12	0.0 .00 .00	42.7 .31 .20	0.0 .00 .00	19.7 44.3	27.1	21.03 4.4
1φ12+1φ16	39.0 .27 .14	0.0 .00 .00	47.0 .36 .21	0.0 .00 .00	19.7 44.3	27.2	21.06 4.8
2φ16	47.8 .37 .16	0.0 .00 .00	56.6 .47 .22	67.4 .07 .27	20.6 45.2	27.5	21.14 5.6
4φ12	52.9 .42 .14	61.3 .06 .19	62.2 .53 .19	76.2 .08 .26	21.4 46.0	27.7	21.21 6.2
2φ16+1φ12	57.9 .48 .17	69.1 .07 .23	67.5 .59 .22	85.9 .09 .32	21.3 45.9	27.8	21.25 6.7
3φ16	64.7 .56 .17	80.4 .08 .23	82.1 1φ12 .57 .23	99.8 .10 .31	21.3 45.9	28.1	21.31 7.4
4φ16	85.9 1φ12 .61 .17	106.0 .11 .23	117.0 2φ16 .47 .23	131.1 .14 .29	21.3 45.9	28.7	21.49 8.9

ESFUERZO CORTANTE Vsu (12) (kN/m) TA.20 (simple celosía) : 24.6
b,lím (mm) : 154 Vcu,lím (kN/m) (TA.20) : 37.7

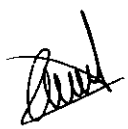
FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS ARMADAS
MODELO TA.20

PREFABRICADOS NAVARRO, S.A.

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

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja n° 20 de 28



FLEXION POSITIVA (por m)

TIPO DE FORJADO (h+c) * s	TIPO DE VIGUETA (4)	REFUERZO INFERIOR VIGUETA Y + X	MOMENTO ULTIMO Mu m·kN/m(5)	Rel. x/d (10)	ESFUERZO CORTANTE Vcu Vu = Vcu+Vsu 1*Cel 2*Cel kN/m (11)	WK CLASE POR RECUBRIM. mm (7)	MOMENTO DE FISURACION Mf m·kN/m (8)	RIGIDEZ TOTAL FISURADA E·Ib E·If (8) m ² ·MN/m	MOMENTO SERVICIO FIS.COMP. m·kN/m(6)
(26+ 5) * 83. D	TA.20	1 0φ 0	16.9	.01	42.5 84.9 127.4	.11	18.8	31.51 2.05	45.8
		2 1φ 6	25.2	.02	42.5 84.9 127.4	.13	19.1	31.89 2.96	56.3
		3 1φ 8	31.6	.03	42.4 84.8 127.2	.20	19.3	32.19 3.64	62.9
		4 1φ 6+1φ 6	33.5	.03	42.5 84.9 127.4	.17	19.4	32.28 3.85	64.9
		5 1φ10	39.8	.03	42.4 84.6 126.9	.24	19.6	32.55 4.48	70.2
		6 1φ 8+1φ 8	46.2	.04	42.4 84.8 127.1	.21	19.8	32.85 5.16	75.5
		7 1φ12	49.6	.04	42.3 84.4 126.6	.27	19.9	32.99 5.47	77.7
		8 1φ10+1φ 8	54.3	.05	42.4 84.6 126.9	.24	20.1	33.22 5.96	81.3
		9 1φ12+1φ 6	57.7	.05	42.3 84.5 126.7	.26	20.2	33.36 6.28	83.5
		10 1φ10+1φ10	62.3	.06	42.3 84.6 126.8	.23	20.4	33.58 6.75	86.5
		11 1φ12+1φ 8	64.0	.06	42.3 84.5 126.7	.26	20.4	33.65 6.90	87.5
		12 1φ12+1φ10	71.9	.06	42.3 84.4 126.6	.25	20.7	34.00 7.67	92.3
		13 1φ16	74.0	.07	42.1 84.0 125.8	.30	20.8	34.04 7.81	92.8
		14 1φ12+1φ12	81.5	.07	42.2 84.3 126.4	.24	21.0	34.42 8.57	97.5
		15 1φ16+1φ 8	88.1	.08	42.1 84.1 126.0	.29	21.3	34.69 9.16	100.5
		16 1φ16+1φ10	95.9	.09	42.1 84.1 126.0	.28	21.5	35.04 9.88	104.3
		17 1φ16+1φ12	105.2	.10	42.1 84.0 125.9	.27	21.9	35.45 10.75	108.5
		18 1φ16+1φ16	128.4	.12	42.8 84.5 126.3	.26	22.7	36.45 12.79	117.4

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERTURA FISURA						B500 MOMENTO ULTIMO-ABERTURA FISURA						ESF. CORTANTE		MOMENTO FISUR. Mf	RIGIDEZ		
	Sección tipo			Sección maciza			Sección tipo			Sección maciza			ULTIMO			TOTAL FIS.		
	Mu	Ref.	Rel. Wk	Mu	Rel.	Wk	Mu	Ref.	Rel. Wk	Mu	Rel.	Wk	Vcu	Vu			E·Ib	E·If
	inf.	x/d		x/d		inf.	x/d		x/d		1*cel.	kN/m	m·kN/m	m ² ·MN/m				
	m·kN/m	vig.	mm	m·kN/m		mm	m·kN/m	vig.	mm	m·kN/m		mm						
	(5)	(9)	(10)	(7)	(5)	(10)	(7)	(5)	(9)	(10)	(7)	(5)	(10)	(7)	(11)	(8)	(8)	
1φ10	0.0	.00	.00		0.0	.00	.00	0.0	.00	.00		0.0	.00	.00	42.3	84.4	30.85	2.1
2φ 8	0.0	.00	.00		0.0	.00	.00	0.0	.00	.00		0.0	.00	.00	42.4	84.5	30.89	2.4
1φ12	0.0	.00	.00		0.0	.00	.00	0.0	.00	.00		0.0	.00	.00	42.2	84.3	30.91	2.6
1φ 8+1φ10	0.0	.00	.00		0.0	.00	.00	0.0	.00	.00		0.0	.00	.00	42.3	84.5	30.94	2.8
2φ10	0.0	.00	.00		0.0	.00	.00	0.0	.00	.00		0.0	.00	.00	42.3	84.4	30.99	3.2
1φ 8+1φ12	0.0	.00	.00		0.0	.00	.00	0.0	.00	.00		0.0	.00	.00	42.2	84.4	31.00	3.2
1φ10+1φ12	0.0	.00	.00		0.0	.00	.00	20.6	.09	.14		0.0	.00	.00	42.2	84.4	31.04	3.6
2φ12	0.0	.00	.00		0.0	.00	.00	24.1	.11	.13		0.0	.00	.00	42.2	84.3	31.10	4.0
1φ 8+1φ16	21.5	.10	.12		0.0	.00	.00	35.3	.12	.15		0.0	.00	.00	42.1	84.2	31.13	4.3
1φ10+1φ16	23.8	.11	.12		0.0	.00	.00	39.1	.14	.15		0.0	.00	.00	42.1	84.2	31.18	4.6
1φ12+1φ16	35.3	.12	.11		0.0	.00	.00	43.5	.16	.18		0.0	.00	.00	42.0	84.2	31.23	5.0
2φ16	44.4	.16	.14		0.0	.00	.00	54.5	.20	.22		57.9	.06	.19	42.0	84.1	31.35	5.9
4φ12	49.9	.18	.13		0.0	.00	.00	61.2	.23	.19		65.5	.06	.21	42.2	84.3	31.46	6.5
2φ16+1φ12	55.8	.20	.16		59.4	.06	.17	68.2	.27	.23		73.8	.07	.27	42.0	84.2	31.53	7.0
3φ16	64.2	.25	.17		69.1	.07	.19	77.9	.32	.23		85.9	.09	.28	42.0	84.1	31.66	7.8
4φ16	82.2	.34	.18		91.3	.09	.22	98.1	.43	.23		113.1	.12	.29	42.0	84.1	31.95	9.5

ESFUERZO CORTANTE Vsu (12) (kN/m) TA.20 (simple celosía) : 42.1
b,lím (mm) : 274 Vcu,lím (kN/m) (TA.20) : 57.5

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS ARMADAS
MODELO TA.20

PREFABRICADOS NAVARRO, S.A.

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

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja n° 21 de 28



FLEXION POSITIVA (por m)

TIPO DE FORJADO (h+c) * s	TIPO DE VIGUETA (4)	REFUERZO INFERIOR VIGUETA Y + X	MOMENTO ULTIMO Mu m·kN/m(5)	Rel. x/d (10)	ESFUERZO CORTANTE Vcu Vu = Vcu+Vsu 1*Cel 2*Cel kN/m (11)	Wk CLASE POR RECUBRIM. mm (7)	MOMENTO DE FISURACION MF m·kN/m (8)	RIGIDEZ TOTAL FISURADA E·Ib E·If (8) m2·MN/m	MOMENTO SERVICIO FIS.COMP. m·kN/m(6)
(27+ 4) * 71.	TA.20	1 0φ 0	0.0	.00	19.9 44.7 69.5	.00 IIa	11.3	20.81 1.24	0.0
		2 1φ 6	14.8	.01	19.9 44.7 69.5	.10 IIa	11.5	21.09 1.79	43.4
		3 1φ 8	18.6	.02	19.8 44.6 69.4	.15 IIa	11.6	21.30 2.22	48.6
		4 1φ 6+1φ 6	19.7	.02	19.9 44.7 69.5	.13 IIa	11.7	21.37 2.34	50.2
		5 1φ10	23.4	.02	19.8 44.5 69.2	.18 IIa	11.8	21.57 2.74	54.4
		6 1φ 8+1φ 8	27.2	.02	19.8 44.6 69.4	.17 IIa	12.0	21.79 3.15	58.7
		7 1φ12	29.2	.03	19.8 44.4 69.0	.21 IIa	12.0	21.89 3.34	60.4
		8 1φ10+1φ 8	32.0	.03	19.8 44.5 69.2	.19 IIa	12.1	22.06 3.66	63.3
		9 1φ12+1φ 6	34.1	.03	19.8 44.5 69.1	.21 IIa	12.2	22.17 3.86	65.0
		10 1φ10+1φ10	36.8	.03	19.8 44.5 69.2	.19 IIa	12.3	22.31 4.15	67.5
		11 1φ12+1φ 8	37.8	.03	19.8 44.4 69.1	.21 IIa	12.4	22.37 4.25	68.3
		12 1φ12+1φ10	42.5	.04	19.8 44.4 69.0	.21 IIa	12.5	22.63 4.74	72.1
		13 1φ16	43.8	.04	19.7 44.2 68.6	.24 IIa	12.6	22.67 4.82	72.6
		14 1φ12+1φ12	48.3	.04	19.8 44.4 69.0	.20 IIa	12.7	22.94 5.30	76.4
		15 1φ16+1φ 8	52.3	.05	19.7 44.2 68.7	.24 IIa	12.9	23.14 5.69	78.9
		16 1φ16+1φ10	57.0	.05	19.7 44.2 68.7	.24 IIa	13.1	23.39 6.15	82.0
		17 1φ16+1φ12	62.6	.06	20.1 44.6 69.1	.23 IIa	13.3	23.70 6.70	85.5
		18 1φ16+1φ16	76.8	.07	21.3 45.7 70.2	.23 IIa	13.8	24.44 8.04	92.8

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIOS	B400 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu Ref. Rel. Wk inf. x/d m·kN/m vig. (5) (9) (10) (7)	Sección maciza Mu Rel. Wk x/d m·kN/m (5) (10) (7)	B500 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu Ref. Rel. Wk inf. x/d m·kN/m vig. (5) (9) (10) (7)	Sección maciza Mu Rel. Wk x/d m·kN/m (5) (10) (7)	ESF.CORTANTE ULTIMO Vcu Vu 1*cel kN/m (11)	MOMENTO FISUR. MF m·kN/m (8)	RIGIDEZ TOTAL FIS. E·Ib E·If m2·MN/m (8)
1φ10	0.0 .00 .00	0.0 .00 .00	10.0 .08 .12	0.0 .00 .00	19.8 44.4	25.0	20.33 1.9
2φ 8	10.2 .08 .09	0.0 .00 .00	12.7 .10 .11	0.0 .00 .00	19.8 44.5	25.0	20.37 2.3
1φ12	11.4 .09 .11	0.0 .00 .00	14.1 .11 .13	0.0 .00 .00	19.7 44.4	25.1	20.37 2.4
1φ 8+1φ10	13.0 .10 .10	0.0 .00 .00	16.0 .13 .12	0.0 .00 .00	19.8 44.4	25.1	20.40 2.6
2φ10	15.6 .12 .09	0.0 .00 .00	25.7 .15 .11	0.0 .00 .00	19.8 44.4	25.2	20.43 3.0
1φ 8+1φ12	16.2 .13 .10	0.0 .00 .00	26.6 .16 .13	0.0 .00 .00	19.8 44.4	25.3	20.44 3.1
1φ10+1φ12	18.8 .15 .09	0.0 .00 .00	30.8 .19 .12	0.0 .00 .00	19.7 44.4	25.4	20.47 3.4
2φ12	29.1 .18 .09	0.0 .00 .00	35.7 .23 .16	0.0 .00 .00	19.7 44.4	25.5	20.51 3.8
1φ 8+1φ16	32.0 .20 .12	0.0 .00 .00	39.0 .27 .20	0.0 .00 .00	19.7 44.3	25.5	20.52 4.1
1φ10+1φ16	35.2 .23 .14	0.0 .00 .00	42.7 .31 .21	0.0 .00 .00	19.7 44.3	25.6	20.55 4.4
1φ12+1φ16	39.0 .27 .15	0.0 .00 .00	47.0 .36 .22	0.0 .00 .00	19.7 44.3	25.7	20.59 4.7
2φ16	47.8 .37 .17	0.0 .00 .00	56.6 .47 .23	67.4 .07 .27	20.6 45.2	26.0	20.68 5.6
4φ12	52.9 .42 .14	61.3 .06 .19	62.2 .53 .19	76.2 .08 .26	21.4 46.0	26.2	20.75 6.2
2φ16+1φ12	57.9 .49 .17	69.1 .07 .23	67.5 .60 .23	85.9 .09 .32	21.3 45.9	26.4	20.79 6.6
3φ16	64.7 .57 .17	80.4 .08 .23	82.1 1φ12 .57 .23	99.8 .10 .31	21.3 45.9	26.6	20.87 7.4
4φ16	85.9 1φ12 .62 .18	106.0 .11 .23	117.0 2φ16 .48 .23	131.1 .14 .29	21.3 45.9	27.3	21.06 8.9

ESFUERZO CORTANTE Vsu (12) (kN/m) TA.20 (simple celosía) : 24.6
b,lím (mm) : 150 Vcu,lím (kN/m) (TA.20) : 36.8

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS ARMADAS
MODELO TA.20

PREFABRICADOS NAVARRO, S.A.

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

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja n° 22 de 28



FLEXION POSITIVA (por m)

TIPO DE FORJADO (h+c) * s	TIPO DE VIGUETA (4)	REFUERZO INFERIOR VIGUETA Y + X	MOMENTO ULTIMO Mu m·kN/m(5)	Rel. x/d (10)	ESFUERZO CORTANTE Vcu Vu = Vcu+Vsu 1*Cel 2*Cel kN/m (11)	Wk CLASE POR RECUBRIM. mm (7)	MOMENTO DE FISURACION Mf m·kN/m (8)	RIGIDEZ TOTAL FISURADA E·Ib E·If (8) m ² ·MN/m	MOMENTO SERVICIO FIS.COMP. m·kN/m(6)
(27+ 4) * 83. D	TA.20	1 0φ 0	16.9	.01	42.5 84.9 127.4	.11	18.6	30.61 2.05	45.8
		2 1φ 6	25.2	.02	42.5 84.9 127.4	.14	18.9	30.98 2.96	56.3
		3 1φ 8	31.6	.03	42.4 84.8 127.2	.20	19.1	31.26 3.64	62.9
		4 1φ 6+1φ 6	33.5	.03	42.5 84.9 127.4	.17	19.2	31.35 3.85	64.9
		5 1φ10	39.8	.03	42.4 84.6 126.9	.24	19.4	31.61 4.48	70.2
		6 1φ 8+1φ 8	46.2	.04	42.4 84.8 127.1	.21	19.6	31.90 5.16	75.5
		7 1φ12	49.6	.04	42.3 84.4 126.6	.27	19.7	32.03 5.47	77.7
		8 1φ10+1φ 8	54.3	.05	42.4 84.6 126.9	.24	19.9	32.25 5.96	81.3
		9 1φ12+1φ 6	57.7	.05	42.3 84.5 126.7	.26	20.0	32.38 6.28	83.4
		10 1φ10+1φ10	62.3	.06	42.3 84.6 126.8	.23	20.2	32.59 6.75	86.4
		11 1φ12+1φ 8	64.0	.06	42.3 84.5 126.7	.26	20.2	32.66 6.90	87.4
		12 1φ12+1φ10	71.9	.06	42.3 84.4 126.6	.25	20.5	33.00 7.67	91.8
		13 1φ16	74.0	.07	42.1 84.0 125.8	.30	20.5	33.04 7.80	92.3
		14 1φ12+1φ12	81.5	.07	42.2 84.3 126.4	.24	20.8	33.40 8.57	96.6
		15 1φ16+1φ 8	88.1	.08	42.1 84.1 126.0	.29	21.0	33.65 9.16	99.3
		16 1φ16+1φ10	95.9	.09	42.1 84.1 126.0	.28	21.3	33.98 9.87	102.6
		17 1φ16+1φ12	105.2	.10	42.1 84.0 125.9	.27	21.7	34.37 10.72	106.3
		18 1φ16+1φ16	128.4	.12	42.8 84.5 126.3	.26	22.5	35.32 12.75	114.1

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERTURA FISURA												B500 MOMENTO ULTIMO-ABERTURA FISURA				ESF.CORTANTE		MOMENTO FISUR.		RIGIDEZ	
	Sección tipo				Sección maciza				Sección tipo				Sección maciza				ULTIMO		FISUR.		TOTAL FIS.	
	Mu	Ref.	Rel.	Wk	Mu	Rel.	Wk	Mu	Ref.	Rel.	Wk	Mu	Rel.	Wk	Vcu	Vu	Mf	E·Ib	E·If			
	inf.							inf.														
	x/d				x/d			x/d				x/d			1*cel.							
m·kN/m	vig.		mm	m·kN/m		mm	m·kN/m	vig.		mm	m·kN/m		mm	kN/m			m·kN/m	m2·MN/m				
(5)	(9)	(10)	(7)	(5)	(10)	(7)	(5)	(9)	(10)	(7)	(5)	(10)	(7)	(11)			(8)	(8)				
1φ10	0.0	.00	.00		0.0	.00	.00	0.0	.00	.00		0.0	.00	.00	42.3	84.4	29.8	30.00	2.0			
2φ 8	0.0	.00	.00		0.0	.00	.00	0.0	.00	.00		0.0	.00	.00	42.4	84.5	29.9	30.05	2.4			
1φ12	0.0	.00	.00		0.0	.00	.00	0.0	.00	.00		0.0	.00	.00	42.2	84.3	29.9	30.06	2.5			
1φ 8+1φ10	0.0	.00	.00		0.0	.00	.00	0.0	.00	.00		0.0	.00	.00	42.3	84.5	30.0	30.10	2.7			
2φ10	0.0	.00	.00		0.0	.00	.00	0.0	.00	.00		0.0	.00	.00	42.3	84.4	30.1	30.15	3.1			
1φ 8+1φ12	0.0	.00	.00		0.0	.00	.00	0.0	.00	.00		0.0	.00	.00	42.2	84.4	30.1	30.16	3.2			
1φ10+1φ12	0.0	.00	.00		0.0	.00	.00	20.6	.09	.14		0.0	.00	.00	42.2	84.4	30.2	30.21	3.5			
2φ12	0.0	.00	.00		0.0	.00	.00	32.1	.11	.13		0.0	.00	.00	42.2	84.3	30.3	30.26	3.9			
1φ 8+1φ16	21.5	.10	.12		0.0	.00	.00	35.3	.12	.15		0.0	.00	.00	42.1	84.2	30.4	30.30	4.2			
1φ10+1φ16	31.6	.11	.12		0.0	.00	.00	39.1	.14	.17		0.0	.00	.00	42.1	84.2	30.5	30.35	4.5			
1φ12+1φ16	35.3	.12	.11		0.0	.00	.00	43.5	.16	.20		0.0	.00	.00	42.0	84.2	30.6	30.40	4.9			
2φ16	44.4	.16	.15		0.0	.00	.00	54.5	.20	.23	57.9	.06	.19		42.0	84.1	30.9	30.55	5.8			
4φ12	49.9	.18	.14		0.0	.00	.00	61.2	.23	.20	65.5	.06	.21		42.2	84.3	31.1	30.67	6.4			
2φ16+1φ12	55.8	.20	.17		59.4	.06	.17	68.2	.27	.24	73.8	.07	.27		42.0	84.2	31.2	30.75	6.9			
3φ16	64.2	.25	.18		69.1	.07	.19	77.9	.32	.24	85.9	.09	.28		42.0	84.1	31.5	30.87	7.7			
4φ16	82.2	.34	.18		91.3	.09	.22	98.1	.43	.23	113.1	.12	.29		42.0	84.1	32.2	31.20	9.5			

ESFUERZO CORTANTE Vsu (12) (kN/m) TA.20 (simple celosía) : 42.1
b,lífm (mm) : 270 Vcu,lífm (kN/m) (TA.20) : 56.6

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS ARMADAS
MODELO TA.20

PREFABRICADOS NAVARRO, S.A.

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

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja n° 23 de 28



FLEXION POSITIVA (por m)

TIPO DE FORJADO (h+c) * s	TIPO DE VIGUETA (4)	REFUERZO INFERIOR VIGUETA Y + X	MOMENTO ULTIMO Mu m·kN/m(5)	Rel. x/d (10)	ESFUERZO CORTANTE Vcu Vu = Vcu+Vsu 1*Cel 2*Cel kN/m (11)	Wk	CLASE POR RECUBRIM. (7)	MOMENTO DE FISURACION Mf m·kN/m (8)	RIGIDEZ TOTAL FISURADA E·Ib E·If (8) m ² ·MN/m	MOMENTO SERVICIO FIS.COMP. m·kN/m(6)
(27+ 5) * 71.	TA.20	1 0φ 0	0.0	.00	20.3 46.0 71.7	.00	IIa	12.1	23.33 1.33	0.0
		2 1φ 6	15.3	.01	20.3 46.0 71.7	.09	IIa	12.3	23.65 1.94	45.9
		3 1φ 8	19.2	.02	20.3 46.0 71.6	.15	IIa	12.4	23.88 2.38	51.4
		4 1φ 6+1φ 6	20.4	.02	20.3 46.0 71.7	.13	IIa	12.5	23.96 2.52	53.0
		5 1φ10	24.2	.02	20.3 45.9 71.5	.18	IIa	12.6	24.19 2.94	57.4
		6 1φ 8+1φ 8	28.2	.02	20.3 45.9 71.6	.17	IIa	12.8	24.43 3.39	61.9
		7 1φ12	30.3	.02	20.2 45.8 71.3	.21	IIa	12.9	24.54 3.61	63.8
		8 1φ10+1φ 8	33.2	.03	20.3 45.9 71.5	.19	IIa	13.0	24.73 3.93	66.8
		9 1φ12+1φ 6	35.3	.03	20.2 45.8 71.3	.21	IIa	13.0	24.84 4.16	68.7
		10 1φ10+1φ10	38.1	.03	20.3 45.8 71.4	.19	IIa	13.2	25.02 4.47	71.3
		11 1φ12+1φ 8	39.2	.03	20.2 45.8 71.3	.21	IIa	13.2	25.08 4.58	72.2
		12 1φ12+1φ10	44.1	.04	20.2 45.8 71.3	.21	IIa	13.4	25.36 5.10	76.2
		13 1φ16	45.4	.04	20.1 45.5 70.8	.24	IIa	13.4	25.41 5.21	76.7
		14 1φ12+1φ12	50.0	.04	20.2 45.7 71.2	.20	IIa	13.6	25.72 5.72	80.7
		15 1φ16+1φ 8	54.2	.04	20.2 45.6 71.0	.24	IIa	13.8	25.94 6.13	83.4
		16 1φ16+1φ10	59.0	.05	20.2 45.6 71.0	.24	IIa	13.9	26.23 6.63	86.8
		17 1φ16+1φ12	64.9	.05	20.4 45.8 71.1	.23	IIa	14.2	26.57 7.23	90.5
		18 1φ16+1φ16	79.7	.07	21.9 47.2 72.5	.23	IIa	14.7	27.40 8.68	99.0

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIOS	B400 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu Ref. Rel. Wk inf. x/d m·kN/m vig. mm (5) (9) (10) (7)	B500 MOMENTO ULTIMO-ABERTURA FISURA Sección maciza Mu Ref. Rel. Wk x/d m·kN/m mm (5) (10) (7)	B500 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu Ref. Rel. Wk inf. x/d m·kN/m vig. mm (5) (9) (10) (7)	B500 MOMENTO ULTIMO-ABERTURA FISURA Sección maciza Mu Ref. Rel. Wk x/d m·kN/m mm (5) (10) (7)	ESF.CORTANTE ULTIMO Vcu Vu 1*cel. kN/m (11)	MOMENTO FISUR. Mf m·kN/m (8)	RIGIDEZ TOTAL FIS. E·Ib E·If m ² ·MN/m (8)
1φ10	0.0 .00 .00	0.0 .00 .00	10.3 .07 .12	0.0 .00 .00	20.2 45.8	28.0	22.79 2.1
2φ 8	0.0 .00 .00	0.0 .00 .00	13.2 .10 .11	0.0 .00 .00	20.3 45.8	28.1	22.82 2.5
1φ12	11.8 .09 .11	0.0 .00 .00	14.6 .11 .13	0.0 .00 .00	20.2 45.7	28.1	22.83 2.6
1φ 8+1φ10	13.4 .10 .10	0.0 .00 .00	16.6 .12 .12	0.0 .00 .00	20.2 45.8	28.2	22.86 2.9
2φ10	16.2 .12 .09	0.0 .00 .00	20.0 .15 .11	0.0 .00 .00	20.2 45.8	28.3	22.89 3.3
1φ 8+1φ12	16.8 .12 .10	0.0 .00 .00	20.8 .16 .13	0.0 .00 .00	20.2 45.7	28.3	22.89 3.4
1φ10+1φ12	19.5 .15 .10	0.0 .00 .00	32.0 .18 .12	0.0 .00 .00	20.2 45.7	28.4	22.93 3.7
2φ12	30.3 .17 .09	0.0 .00 .00	37.2 .22 .14	0.0 .00 .00	20.2 45.7	28.5	22.96 4.2
1φ 8+1φ16	33.2 .19 .10	0.0 .00 .00	40.6 .26 .19	0.0 .00 .00	20.1 45.6	28.6	22.98 4.4
1φ10+1φ16	36.6 .22 .12	0.0 .00 .00	44.5 .30 .20	0.0 .00 .00	20.1 45.6	28.7	23.01 4.8
1φ12+1φ16	40.6 .26 .14	0.0 .00 .00	48.9 .35 .21	0.0 .00 .00	20.1 45.6	28.8	23.05 5.2
2φ16	49.8 .36 .16	0.0 .00 .00	59.1 .46 .22	70.0 .07 .27	20.9 46.4	29.0	23.13 6.1
4φ12	55.1 .41 .14	63.5 .06 .18	65.0 .51 .19	79.0 .07 .26	21.8 47.3	29.3	23.22 6.7
2φ16+1φ12	60.5 .47 .17	71.7 .07 .23	70.7 .58 .22	89.1 .08 .32	21.9 47.4	29.4	23.25 7.2
3φ16	67.7 .55 .17	83.4 .08 .23	85.8 1φ12 .55 .23	103.5 .10 .31	21.9 47.4	29.7	23.33 8.0
4φ16	89.9 1φ12 .60 .17	110.0 .10 .23	122.0 2φ16 .46 .23	136.1 .13 .30	21.9 47.4	30.3	23.53 9.7

ESFUERZO CORTANTE Vsu (12) (kN/m)
b,lím (mm) : 150

TA.20 (simple celosía) : 25.5
Vcu,lím (kN/m) (TA.20) : 37.6

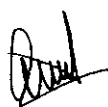
FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS ARMADAS
MODELO TA.20

PREFABRICADOS NAVARRO, S.A.

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

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja n° 24 de 28



FLEXION POSITIVA (por m)

TIPO DE FORJADO (h+c) * s	TIPO DE VIGUETA (4)	REFUERZO INFERIOR VIGUETA Y + X	MOMENTO ULTIMO Mu m·kN/m(5)	Rel. x/d (10)	ESFUERZO CORTANTE Vcu Vu = Vcu+Vsu 1*Cel 2*Cel kN/m (11)	Wk CLASE POR RECUBRIM. mm (7)	MOMENTO DE FISURACION Mf m·kN/m (8)	RIGIDEZ TOTAL FISURADA E·Ib E·If (8) m ² ·MN/m	MOMENTO SERVICIO FIS.COMP. m·kN/m(6)
(27+ 5) * 83. D	TA.20	1 0φ 0	0.0	.00	43.5 87.4 131.4	.00 IIa	19.9	34.47 2.22	0.0
		2 1φ 6	26.1	.02	43.5 87.4 131.4	.13 IIa	20.2	34.88 3.20	59.5
		3 1φ 8	32.8	.03	43.4 87.3 131.2	.20 IIa	20.5	35.20 3.93	66.5
		4 1φ 6+1φ 6	34.7	.03	43.5 87.4 131.4	.16 IIa	20.5	35.30 4.15	68.5
		5 1φ10	41.2	.03	43.3 87.1 130.9	.24 IIa	20.8	35.59 4.83	74.1
		6 1φ 8+1φ 8	47.9	.04	43.4 87.3 131.1	.21 IIa	21.0	35.92 5.56	79.8
		7 1φ12	51.4	.04	43.3 86.9 130.6	.27 IIa	21.1	36.06 5.89	82.1
		8 1φ10+1φ 8	56.2	.05	43.4 87.1 130.9	.24 IIa	21.3	36.30 6.42	85.9
		9 1φ12+1φ 6	59.8	.05	43.3 87.0 130.7	.26 IIa	21.4	36.46 6.78	88.2
		10 1φ10+1φ10	64.5	.05	43.3 87.1 130.8	.23 IIa	21.6	36.69 7.27	91.5
		11 1φ12+1φ 8	66.3	.05	43.3 87.0 130.7	.26 IIa	21.7	36.76 7.44	92.5
		12 1φ12+1φ10	74.5	.06	43.3 86.9 130.6	.25 IIa	22.0	37.15 8.27	97.5
		13 1φ16	76.8	.06	43.1 86.5 129.8	.30 IIa	22.0	37.20 8.43	98.1
		14 1φ12+1φ12	84.5	.07	43.2 86.8 130.4	.24 IIa	22.3	37.60 9.25	103.0
		15 1φ16+1φ 8	91.4	.08	43.1 86.6 130.0	.29 IIa	22.5	37.89 9.88	106.3
		16 1φ16+1φ10	99.4	.08	43.1 86.6 130.0	.28 IIa	22.8	38.26 10.67	110.3
		17 1φ16+1φ12	109.1	.09	43.1 86.5 129.9	.28 IIa	23.2	38.71 11.59	114.7
		18 1φ16+1φ16	133.3	.11	43.4 86.7 130.0	.26 IIa	24.1	39.78 13.81	124.0

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERTURA FISURA						B500 MOMENTO ULTIMO-ABERTURA FISURA						ESF.CORTANTE		MOMENTO FISUR. Mf	RIGIDEZ			
	Sección tipo						Sección tipo						Sección maciza			ULTIMO Vcu Vu 1*cel kN/m	TOTAL FIS. E·Ib E·If		
	Mu	Ref.	Rel.	Wk	Mu	Rel.	Wk	Mu	Ref.	Rel.	Wk	Mu	Rel.	Wk					
	inf.	x/d		x/d	inf.	x/d		inf.	x/d		x/d								
	m·kN/m	vig.	mm	m·kN/m	mm	m·kN/m	vig.	mm	m·kN/m	mm	m·kN/m	mm	m·kN/m	m ² ·MN/m					
(5)	(9)	(10)	(7)	(5)	(10)	(7)	(5)	(9)	(10)	(7)	(5)	(10)	(7)	(11)	(8)	(8)			
1φ10	0.0	.00	.00		0.0	.00	.00	0.0	.00	.00		0.0	.00	.00	43.3	86.9	33.4	33.77	2.2
2φ 8	0.0	.00	.00		0.0	.00	.00	0.0	.00	.00		0.0	.00	.00	43.4	87.0	33.4	33.82	2.6
1φ12	0.0	.00	.00		0.0	.00	.00	0.0	.00	.00		0.0	.00	.00	43.2	86.8	33.5	33.83	2.7
1φ 8+1φ10	0.0	.00	.00		0.0	.00	.00	0.0	.00	.00		0.0	.00	.00	43.3	87.0	33.5	33.87	3.0
2φ10	0.0	.00	.00		0.0	.00	.00	0.0	.00	.00		0.0	.00	.00	43.3	86.9	33.6	33.92	3.4
1φ 8+1φ12	0.0	.00	.00		0.0	.00	.00	0.0	.00	.00		0.0	.00	.00	43.2	86.9	33.6	33.93	3.5
1φ10+1φ12	0.0	.00	.00		0.0	.00	.00	0.0	.00	.00		0.0	.00	.00	43.2	86.9	33.7	33.99	3.8
2φ12	0.0	.00	.00		0.0	.00	.00	25.0	.11	.13		0.0	.00	.00	43.2	86.8	33.9	34.05	4.3
1φ 8+1φ16	0.0	.00	.00		0.0	.00	.00	36.6	.12	.15		0.0	.00	.00	43.0	86.7	33.9	34.08	4.6
1φ10+1φ16	24.6	.11	.12		0.0	.00	.00	40.5	.13	.15		0.0	.00	.00	43.0	86.7	34.0	34.13	4.9
1φ12+1φ16	36.6	.12	.11		0.0	.00	.00	45.2	.15	.18		0.0	.00	.00	43.0	86.7	34.1	34.19	5.3
2φ16	46.1	.15	.13		0.0	.00	.00	56.7	.19	.22		0.0	.00	.00	43.0	86.6	34.4	34.32	6.3
4φ12	51.8	.17	.13		0.0	.00	.00	63.6	.22	.19		67.9	.06	.21	43.2	86.8	34.7	34.45	6.9
2φ16+1φ12	58.0	.20	.16		61.6	.06	.17	71.0	.26	.23		76.6	.07	.27	43.0	86.7	34.8	34.53	7.5
3φ16	66.8	.24	.17		71.7	.07	.19	81.1	.31	.23		89.1	.08	.28	43.0	86.6	35.1	34.67	8.4
4φ16	85.6	.33	.18		94.7	.09	.22	102.5	.42	.23		117.4	.11	.29	43.0	86.6	35.8	34.99	10.3

ESFUERZO CORTANTE Vsu (12) (kN/m) TA.20 (simple celosía) : 43.6
b,lím (mm) : 270 Vcu,lím (kN/m) (TA.20) : 58.0

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS ARMADAS
MODELO TA.20

PREFABRICADOS NAVARRO, S.A.

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

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja n° 25 de 28



FLEXION POSITIVA (por m)

TIPO DE FORJADO (h+c) * s	TIPO DE VIGUETA (4)	REFUERZO INFERIOR VIGUETA Y + X	MOMENTO ULTIMO Mu m·kN/m(5)	Rel. x/d (10)	ESFUERZO CORTANTE Vcu Vu = Vcu+Vsu 1*Cel 2*Cel kN/m (11)	Wk CLASE POR RECUBRIM. mm (7)	MOMENTO DE FISURACION Mf m·kN/m (8)	RIGIDEZ TOTAL FISURADA E·Ib E·If (8) m2·MN/m	MOMENTO SERVICIO FIS.COMP. m·kN/m(6)
(30+ 4) * 71.	TA.20	1 0φ 0	0.0	.00	21.2 48.7 76.1	.00 IIa	13.9	27.59 1.55	0.0
		2 1φ 6	16.4	.01	21.2 48.7 76.1	.08 IIa	14.1	27.92 2.24	51.0
		3 1φ 8	20.6	.01	21.2 48.6 76.0	.14 IIa	14.3	28.18 2.75	57.0
		4 1φ 6+1φ 6	21.8	.02	21.2 48.7 76.1	.12 IIa	14.3	28.25 2.91	58.8
		5 1φ10	25.9	.02	21.2 48.5 75.9	.18 IIa	14.5	28.50 3.40	63.8
		6 1φ 8+1φ 8	30.2	.02	21.2 48.6 76.0	.16 IIa	14.6	28.76 3.91	68.7
		7 1φ12	32.4	.02	21.1 48.4 75.7	.21 IIa	14.7	28.88 4.16	70.8
		8 1φ10+1φ 8	35.5	.03	21.2 48.5 75.9	.19 IIa	14.8	29.08 4.54	74.2
		9 1φ12+1φ 6	37.8	.03	21.2 48.5 75.8	.21 IIa	14.9	29.21 4.79	76.3
		10 1φ10+1φ10	40.8	.03	21.2 48.5 75.8	.19 IIa	15.0	29.39 5.15	79.1
		11 1φ12+1φ 8	41.9	.03	21.2 48.5 75.8	.21 IIa	15.0	29.45 5.27	80.1
		12 1φ12+1φ10	47.2	.03	21.1 48.4 75.7	.21 IIa	15.3	29.76 5.88	84.6
		13 1φ16	48.6	.04	21.1 48.2 75.3	.24 IIa	15.3	29.81 6.00	85.2
		14 1φ12+1φ12	53.5	.04	21.1 48.4 75.6	.21 IIa	15.5	30.14 6.60	89.6
		15 1φ16+1φ 8	58.0	.04	21.1 48.2 75.4	.24 IIa	15.6	30.38 7.07	92.6
		16 1φ16+1φ10	63.2	.05	21.1 48.2 75.4	.24 IIa	15.8	30.69 7.65	96.2
		17 1φ16+1φ12	69.5	.05	21.1 48.2 75.3	.23 IIa	16.1	31.05 8.33	100.1
		18 1φ16+1φ16	85.4	.06	22.5 49.6 76.7	.23 IIa	16.7	31.95 10.01	108.4

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu Ref. Rel. Wk inf. x/d m·kN/m vig. (5) (9) (10) (7)	Sección maciza Mu Rel. Wk x/d m·kN/m (5) (10) (7)	B500 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu Ref. Rel. Wk inf. x/d m·kN/m vig. (5) (9) (10) (7)	Sección maciza Mu Rel. Wk x/d m·kN/m (5) (10) (7)	ESF.CORTANTE ULTIMO Vcu Vu 1*cel. kN/m (11)	MOMENTO FISUR. Mf m·kN/m (8)	RIGIDEZ TOTAL FIS. E·Ib E·If m2·MN/m (8)
1φ10	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	21.1 48.4	29.1	27.06 2.3
2φ 8	0.0 .00 .00	0.0 .00 .00	14.1 .09 .11	0.0 .00 .00	21.2 48.5	29.2	27.10 2.7
1φ12	12.6 .08 .11	0.0 .00 .00	15.7 .10 .14	0.0 .00 .00	21.1 48.4	29.3	27.11 2.9
1φ 8+1φ10	14.4 .09 .10	0.0 .00 .00	17.9 .11 .12	0.0 .00 .00	21.2 48.5	29.3	27.15 3.2
2φ10	17.4 .11 .09	0.0 .00 .00	21.5 .14 .11	0.0 .00 .00	21.1 48.4	29.5	27.19 3.7
1φ 8+1φ12	18.0 .12 .10	0.0 .00 .00	22.3 .15 .13	0.0 .00 .00	21.1 48.4	29.5	27.20 3.8
1φ10+1φ12	21.0 .14 .10	0.0 .00 .00	34.4 .17 .12	0.0 .00 .00	21.1 48.4	29.6	27.25 4.2
2φ12	32.5 .16 .09	0.0 .00 .00	40.0 .21 .15	0.0 .00 .00	21.1 48.4	29.7	27.30 4.7
1φ 8+1φ16	35.7 .18 .11	0.0 .00 .00	43.7 .24 .20	0.0 .00 .00	21.0 48.3	29.8	27.32 5.1
1φ10+1φ16	39.4 .21 .13	0.0 .00 .00	48.0 .28 .21	0.0 .00 .00	21.0 48.3	29.9	27.37 5.5
1φ12+1φ16	43.7 .24 .15	0.0 .00 .00	52.9 .33 .22	0.0 .00 .00	21.0 48.3	30.0	27.42 5.9
2φ16	53.8 .33 .16	0.0 .00 .00	64.2 .42 .23	75.0 .06 .26	21.5 48.8	30.3	27.55 7.1
4φ12	59.7 .38 .14	0.0 .00 .00	70.8 .47 .19	84.6 .07 .26	22.5 49.8	30.6	27.67 7.8
2φ16+1φ12	65.7 .43 .17	76.8 .06 .23	77.4 .53 .23	95.5 .08 .32	23.1 50.3	30.8	27.74 8.5
3φ16	73.9 .50 .17	89.4 .07 .24	86.1 .60 .23	111.0 .09 .32	23.0 50.3	31.1	27.85 9.5
4φ16	90.3 .63 .17	118.0 .10 .23	119.9 1φ16 .60 .23	146.1 .12 .30	23.0 50.3	31.8	28.14 11.7

ESFUERZO CORTANTE Vsu (12) (kN/m) TA.20 (simple celosía) : 27.2
b,lím (mm) : 167 Vcu,lím (kN/m) (TA.20) : 43.8

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS ARMADAS
MODELO TA.20

PREFABRICADOS NAVARRO, S.A.

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

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja n° 26 de 28



FLEXION POSITIVA (por m)

TIPO DE FORJADO (h+c) * s	TIPO DE VIGUETA (4)	REFUERZO INFERIOR VIGUETA Y + X	MOMENTO ULTIMO Mu m·kN/m(5)	Rel. x/d (10)	ESFUERZO CORTANTE Vcu Vu = Vcu+Vsu 1*Cel 2*Cel kN/m (11)	Wk CLASE POR RECUBRIM. mm (7)	MOMENTO DE FISURACION Mf m·kN/m (8)	RIGIDEZ TOTAL FISURADA E·Ib E·If (8) m ² ·MN/m	MOMENTO SERVICIO FIS.COMP. m·kN/m(6)
(30+ 4) * 83. D	TA.20	1 0φ 0	0.0	.00	45.4 92.4 139.4	.00 IIa	22.4	40.09 2.57	0.0
		2 1φ 6	27.9	.02	45.4 92.4 139.4	.11 IIa	22.7	40.55 3.70	66.2
		3 1φ 8	35.0	.03	45.4 92.3 139.2	.20 IIa	23.0	40.88 4.54	73.9
		4 1φ 6+1φ 6	37.1	.03	45.4 92.4 139.4	.16 IIa	23.0	40.99 4.79	76.1
		5 1φ10	44.1	.03	45.3 92.1 138.9	.24 IIa	23.3	41.31 5.58	82.4
		6 1φ 8+1φ 8	51.2	.04	45.4 92.2 139.1	.21 IIa	23.5	41.67 6.41	88.6
		7 1φ12	55.0	.04	45.2 91.9 138.6	.27 IIa	23.6	41.82 6.81	91.2
		8 1φ10+1φ 8	60.2	.04	45.3 92.1 138.9	.24 IIa	23.8	42.09 7.41	95.3
		9 1φ12+1φ 6	64.1	.05	45.2 92.0 138.7	.27 IIa	24.0	42.26 7.82	97.8
		10 1φ10+1φ10	69.1	.05	45.3 92.0 138.8	.23 IIa	24.1	42.51 8.39	101.2
		11 1φ12+1φ 8	71.0	.05	45.2 92.0 138.7	.26 IIa	24.2	42.59 8.59	102.3
		12 1φ12+1φ10	79.8	.06	45.2 91.9 138.6	.26 IIa	24.5	43.01 9.54	107.4
		13 1φ16	82.3	.06	45.0 91.4 137.8	.31 IIa	24.6	43.06 9.74	108.0
		14 1φ12+1φ12	90.5	.07	45.2 91.8 138.4	.25 IIa	24.9	43.50 10.67	112.9
		15 1φ16+1φ 8	97.9	.07	45.1 91.5 138.0	.29 IIa	25.1	43.81 11.40	116.0
		16 1φ16+1φ10	106.6	.08	45.1 91.5 138.0	.29 IIa	25.5	44.23 12.30	119.8
		17 1φ16+1φ12	117.0	.09	45.1 91.5 137.9	.28 IIa	25.8	44.71 13.35	124.0
		18 1φ16+1φ16	143.1	.11	45.0 91.3 137.6	.27 IIa	26.8	45.88 15.89	133.0

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu Ref. Rel. Wk inf. x/d m·kN/m vig. mm (5) (9) (10) (7)	B500 MOMENTO ULTIMO-ABERTURA FISURA Sección maciza Mu Ref. Rel. Wk x/d m·kN/m mm (5) (10) (7)	B500 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu Ref. Rel. Wk inf. x/d m·kN/m vig. mm (5) (9) (10) (7)	B500 MOMENTO ULTIMO-ABERTURA FISURA Sección maciza Mu Ref. Rel. Wk x/d m·kN/m mm (5) (10) (7)	ESF.CORTANTE ULTIMO Vcu Vu 1*cel. kN/m (11)	MOMENTO FISUR. Mf m·kN/m (8)	RIGIDEZ TOTAL FIS. E·Ib E·If m ² ·MN/m (8)
1φ10	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	45.2 91.9	35.1	39.37 2.4
2φ 8	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	45.3 92.0	35.2	39.43 2.8
1φ12	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	45.1 91.8	35.2	39.45 3.0
1φ 8+1φ10	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	45.3 91.9	35.3	39.50 3.3
2φ10	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	45.2 91.9	35.4	39.57 3.7
1φ 8+1φ12	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	45.2 91.9	35.4	39.58 3.8
1φ10+1φ12	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	45.2 91.8	35.5	39.65 4.3
2φ12	0.0 .00 .00	0.0 .00 .00	26.8 .10 .14	0.0 .00 .00	45.1 91.8	35.7	39.73 4.8
1φ 8+1φ16	0.0 .00 .00	0.0 .00 .00	39.3 .11 .16	0.0 .00 .00	45.0 91.7	35.7	39.77 5.1
1φ10+1φ16	26.4 .10 .12	0.0 .00 .00	43.5 .13 .16	0.0 .00 .00	45.0 91.7	35.9	39.84 5.5
1φ12+1φ16	39.3 .11 .11	0.0 .00 .00	48.6 .14 .19	0.0 .00 .00	45.0 91.7	36.0	39.92 6.0
2φ16	49.5 .14 .14	0.0 .00 .00	61.0 .18 .22	0.0 .00 .00	44.9 91.6	36.3	40.11 7.2
4φ12	55.6 .16 .13	0.0 .00 .00	68.4 .21 .19	72.7 .06 .20	45.1 91.8	36.6	40.26 7.9
2φ16+1φ12	62.4 .18 .17	0.0 .00 .00	76.5 .24 .24	82.1 .07 .27	45.0 91.6	36.8	40.36 8.6
3φ16	72.0 .22 .18	76.8 .06 .19	87.6 .29 .24	95.5 .08 .28	44.9 91.6	37.1	40.55 9.6
4φ16	92.5 .31 .18	101.6 .08 .22	111.1 .39 .24	126.0 .10 .30	44.9 91.6	37.8	40.98 11.9

ESFUERZO CORTANTE Vsu (12) (kN/m) TA.20 (simple celosía) : 46.6
b,lím (mm) : 287 Vcu,lím (kN/m) (TA.20) : 64.4

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS ARMADAS
MODELO TA.20

PREFABRICADOS NAVARRO, S.A.

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

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja n° 27 de 28



FLEXION POSITIVA (por m)

TIPO DE FORJADO (h+c)	TIPO DE VIGUETA	REFUERZO INFERIOR VIGUETA	MOMENTO ULTIMO Mu	Rel. x/d	ESFUERZO CORTANTE Vcu Vu = Vcu+Vsu 1*Cel 2*Cel	Wk	CLASE POR RECUBRIM.	MOMENTO DE FISURACION Mf	RIGIDEZ TOTAL FISURADA E·Ib E·If	MOMENTO SERVICIO FIS.COMP.
* s	(4)	Y + X	m·kN/m(5)	(10)	kN/m (11)	mm (7)		m·kN/m (8)	(8) m2·MN/m	m·kN/m(6)
(30+ 5)	TA.20	1 0φ 0	0.0	.00	21.7 50.0 78.4	.00	IIa	14.9	30.85 1.67	0.0
* 71.		2 1φ 6	16.9	.01	21.7 50.0 78.4	.08	IIa	15.1	31.23 2.40	53.6
		3 1φ 8	21.2	.01	21.7 50.0 78.3	.13	IIa	15.3	31.50 2.95	60.0
		4 1φ 6+1φ 6	22.5	.02	21.7 50.0 78.4	.11	IIa	15.3	31.59 3.12	61.8
		5 1φ10	26.8	.02	21.6 49.9 78.1	.17	IIa	15.5	31.85 3.64	67.0
		6 1φ 8+1φ 8	31.1	.02	21.7 49.9 78.2	.16	IIa	15.6	32.15 4.19	72.3
		7 1φ12	33.5	.02	21.6 49.8 77.9	.21	IIa	15.7	32.28 4.45	74.5
		8 1φ10+1φ 8	36.6	.02	21.6 49.9 78.1	.19	IIa	15.8	32.50 4.85	78.0
		9 1φ12+1φ 6	39.0	.03	21.6 49.8 78.0	.21	IIa	15.9	32.64 5.14	80.2
		10 1φ10+1φ10	42.1	.03	21.6 49.8 78.0	.19	IIa	16.0	32.84 5.51	83.2
		11 1φ12+1φ 8	43.3	.03	21.6 49.8 78.0	.21	IIa	16.1	32.91 5.65	84.2
		12 1φ12+1φ10	48.7	.03	21.6 49.8 77.9	.21	IIa	16.3	33.26 6.29	89.0
		13 1φ16	50.2	.03	21.5 49.5 77.5	.24	IIa	16.3	33.32 6.42	89.7
		14 1φ12+1φ12	55.3	.04	21.6 49.7 77.8	.21	IIa	16.5	33.68 7.06	94.3
		15 1φ16+1φ 8	59.9	.04	21.5 49.6 77.6	.24	IIa	16.7	33.95 7.57	97.5
		16 1φ16+1φ10	65.3	.04	21.5 49.6 77.6	.24	IIa	16.9	34.28 8.19	101.4
		17 1φ16+1φ12	71.9	.05	21.5 49.5 77.6	.24	IIa	17.2	34.70 8.92	105.8
		18 1φ16+1φ16	88.2	.06	22.9 50.8 78.8	.23	IIa	17.8	35.70 10.73	115.8

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO Sección tipo Mu Ref. Rel. inf. x/d	ABERTURA FISURA Sección maciza Mu Rel. x/d	B500 MOMENTO ULTIMO Sección tipo Mu Ref. Rel. inf. x/d	ABERTURA FISURA Sección maciza Mu Rel. x/d	ESF.CORTANTE ULTIMO Vcu Vu 1*cel.	MOMENTO FISUR. Mf	RIGIDEZ TOTAL FIS. E·Ib E·If
	m·kN/m vig. (5) (9) (10) (7)	m·kN/m (5) (10) (7)	m·kN/m vig. (5) (9) (10) (7)	m·kN/m (5) (10) (7)	kN/m (11)	m·kN/m (8)	m2·MN/m (8)
1φ10	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	0.0 .00 .00	21.6 49.8	32.6	30.25 2.5
2φ 8	0.0 .00 .00	0.0 .00 .00	14.6 .09 .11	0.0 .00 .00	21.6 49.8	32.7	30.29 3.0
1φ12	13.1 .08 .11	0.0 .00 .00	16.2 .10 .14	0.0 .00 .00	21.5 49.7	32.7	30.30 3.2
1φ 8+1φ10	14.9 .09 .10	0.0 .00 .00	18.5 .11 .12	0.0 .00 .00	21.6 49.8	32.8	30.33 3.5
2φ10	18.0 .11 .09	0.0 .00 .00	22.2 .14 .11	0.0 .00 .00	21.6 49.8	32.9	30.38 4.0
1φ 8+1φ12	18.6 .11 .11	0.0 .00 .00	23.0 .14 .13	0.0 .00 .00	21.6 49.7	33.0	30.39 4.1
1φ10+1φ12	21.7 .13 .10	0.0 .00 .00	35.6 .17 .12	0.0 .00 .00	21.6 49.7	33.1	30.44 4.6
2φ12	33.6 .16 .09	0.0 .00 .00	41.4 .20 .13	0.0 .00 .00	21.5 49.7	33.2	30.49 5.1
1φ 8+1φ16	37.0 .17 .11	0.0 .00 .00	45.3 .24 .18	0.0 .00 .00	21.5 49.7	33.3	30.52 5.5
1φ10+1φ16	40.8 .20 .11	0.0 .00 .00	49.7 .27 .20	0.0 .00 .00	21.5 49.7	33.4	30.57 5.9
1φ12+1φ16	45.3 .24 .13	0.0 .00 .00	54.8 .31 .21	0.0 .00 .00	21.5 49.6	33.5	30.62 6.4
2φ16	55.8 .32 .16	0.0 .00 .00	66.7 .41 .22	77.5 .06 .26	21.9 50.0	33.8	30.75 7.7
4φ12	61.9 .37 .14	0.0 .00 .00	73.6 .45 .19	87.4 .07 .26	22.8 51.0	34.1	30.85 8.5
2φ16+1φ12	68.3 .42 .17	79.4 .06 .23	80.6 .51 .22	98.7 .08 .33	23.6 51.8	34.3	30.92 9.2
3φ16	76.9 .48 .17	92.4 .07 .24	89.9 .58 .22	114.8 .09 .32	23.6 51.8	34.6	31.04 10.3
4φ16	94.3 .61 .17	122.0 .09 .23	124.9 1φ16 .58 .23	151.2 .12 .30	23.6 51.8	35.4	31.33 12.7

ESFUERZO CORTANTE Vsu (12) (kN/m) TA.20 (simple celosía) : 28.1
b,lím (mm) : 167 Vcu,lím (kN/m) (TA.20) : 44.8

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS ARMADAS
MODELO TA.20

PREFABRICADOS NAVARRO, S.A.

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

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja n° 28 de 28

FLEXION POSITIVA (por m)

TIPO DE FORJADO (h+c) * s	TIPO DE VIGUETA (4)	REFUERZO INFERIOR VIGUETA Y + X	MOMENTO ULTIMO Mu m·kN/m(5)	Rel. x/d (10)	ESFUERZO CORTANTE Vcu Vu = Vcu+Vsu 1*Cel 2*Cel kN/m (11)	Wk CLASE POR RECUPERIM. mm (7)	MOMENTO DE FISURACION Mf m·kN/m (8)	RIGIDEZ TOTAL FISURADA E·Ib E·If (8) m ² ·MN/m	MOMENTO SERVICIO FIS. COMP. m·kN/m(6)
(30+ 5) * 83. D	TA.20	1 0φ 0	0.0	.00	46.4 94.9 143.3	.00	24.0	44.87 2.76	0.0
		2 1φ 6	28.8	.02	46.4 94.9 143.3	.10	24.3	45.37 3.97	69.6
		3 1φ 8	36.2	.02	46.3 94.7 143.1	.19	24.6	45.75 4.86	77.7
		4 1φ 6+1φ 6	38.3	.03	46.4 94.9 143.3	.15	24.6	45.86 5.14	80.1
		5 1φ10	45.5	.03	46.3 94.6 142.9	.24	24.9	46.23 5.98	86.7
		6 1φ 8+1φ 8	52.9	.04	46.3 94.7 143.1	.21	25.2	46.62 6.86	93.2
		7 1φ12	56.8	.04	46.2 94.4 142.5	.27	25.3	46.78 7.29	96.0
		8 1φ10+1φ 8	62.2	.04	46.3 94.6 142.9	.24	25.5	47.09 7.94	100.4
		9 1φ12+1φ 6	66.2	.05	46.2 94.4 142.7	.27	25.6	47.27 8.38	103.1
		10 1φ10+1φ10	71.4	.05	46.2 94.5 142.8	.24	25.8	47.55 8.98	106.9
		11 1φ12+1φ 8	73.3	.05	46.2 94.4 142.6	.26	25.9	47.65 9.21	108.1
		12 1φ12+1φ10	82.5	.06	46.2 94.4 142.5	.26	26.2	48.11 10.23	114.0
		13 1φ16	85.0	.06	46.0 93.9 141.8	.31	26.3	48.18 10.43	114.8
		14 1φ12+1φ12	93.5	.06	46.1 94.3 142.4	.25	26.6	48.66 11.44	120.5
		15 1φ16+1φ 8	101.2	.07	46.0 94.0 142.0	.29	26.9	49.01 12.24	124.3
		16 1φ16+1φ10	110.2	.08	46.0 94.0 142.0	.29	27.2	49.46 13.21	128.8
		17 1φ16+1φ12	121.0	.08	46.0 94.0 141.9	.28	27.6	50.00 14.35	133.8
		18 1φ16+1φ16	148.0	.10	46.0 93.8 141.6	.27	28.6	51.32 17.13	144.5

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERTURA FISURA						B500 MOMENTO ULTIMO-ABERTURA FISURA						ESF.CORTANTE		MOMENTO		RIGIDEZ		
	Sección tipo						Sección maciza						ULTIMO		FISUR.		TOTAL FIS.		
	Mu	Ref.	Rel.	Wk	Mu	Rel.	Wk	Mu	Ref.	Rel.	Wk	Mu	Rel.	Wk	Vcu	Vu	Mf	E·Ib	E·If
	inf. x/d				x/d				inf. x/d				x/d				1*cel		
	m·kN/m	vig.		mm	m·kN/m		mm	m·kN/m	vig.		mm	m·kN/m		mm	kN/m		m·kN/m		m2·MN/m
	(5)	(9)	(10)	(7)	(5)	(10)	(7)	(5)	(9)	(10)	(7)	(5)	(10)	(7)	(11)		(8)		(8)
1φ10	0.0	.00	.00		0.0	.00	.00	0.0	.00	.00		0.0	.00	.00	46.2	94.4	39.0	44.06	2.6
2φ 8	0.0	.00	.00		0.0	.00	.00	0.0	.00	.00		0.0	.00	.00	46.3	94.5	39.1	44.12	3.1
1φ12	0.0	.00	.00		0.0	.00	.00	0.0	.00	.00		0.0	.00	.00	46.1	94.3	39.2	44.14	3.3
1φ 8+1φ10	0.0	.00	.00		0.0	.00	.00	0.0	.00	.00		0.0	.00	.00	46.2	94.4	39.3	44.19	3.6
2φ10	0.0	.00	.00		0.0	.00	.00	0.0	.00	.00		0.0	.00	.00	46.2	94.4	39.4	44.25	4.0
1φ 8+1φ12	0.0	.00	.00		0.0	.00	.00	0.0	.00	.00		0.0	.00	.00	46.1	94.3	39.4	44.26	4.1
1φ10+1φ12	0.0	.00	.00		0.0	.00	.00	0.0	.00	.00		0.0	.00	.00	46.1	94.3	39.5	44.33	4.6
2φ12	0.0	.00	.00		0.0	.00	.00	27.8	.10	.14		0.0	.00	.00	46.1	94.3	39.6	44.41	5.2
1φ 8+1φ16	0.0	.00	.00		0.0	.00	.00	30.6	.11	.16		0.0	.00	.00	46.0	94.1	39.7	44.46	5.5
1φ10+1φ16	0.0	.00	.00		0.0	.00	.00	45.0	.12	.15		0.0	.00	.00	46.0	94.2	39.8	44.53	6.0
1φ12+1φ16	30.5	.11	.12		0.0	.00	.00	50.2	.14	.17		0.0	.00	.00	46.0	94.1	40.0	44.61	6.5
2φ16	51.2	.14	.12		0.0	.00	.00	63.1	.18	.21		0.0	.00	.00	45.9	94.1	40.3	44.80	7.7
4φ12	57.6	.16	.12		0.0	.00	.00	70.8	.20	.19		75.1	.06	.20	46.1	94.3	40.5	44.96	8.5
2φ16+1φ12	64.6	.18	.16		0.0	.00	.00	79.2	.23	.23		84.8	.06	.26	45.9	94.1	40.7	45.07	9.3
3φ16	74.5	.22	.17		79.4	.06	.18	90.8	.28	.23		98.7	.08	.28	45.9	94.1	41.1	45.25	10.4
4φ16	96.0	.30	.18		105.0	.08	.22	115.4	.38	.23		130.2	.10	.30	45.9	94.1	41.9	45.70	12.8

ESFUERZO CORTANTE Vsu (12) (kN/m) TA.20 (simple celosía) : 48.1
b,lím (mm) : 287 Vcu,lím (kN/m) (TA.20) : 65.8