FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS ARMADAS
MODELO VE

PREFABRICADOS NAVARRO, S.A.

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

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja nº 1 de 28

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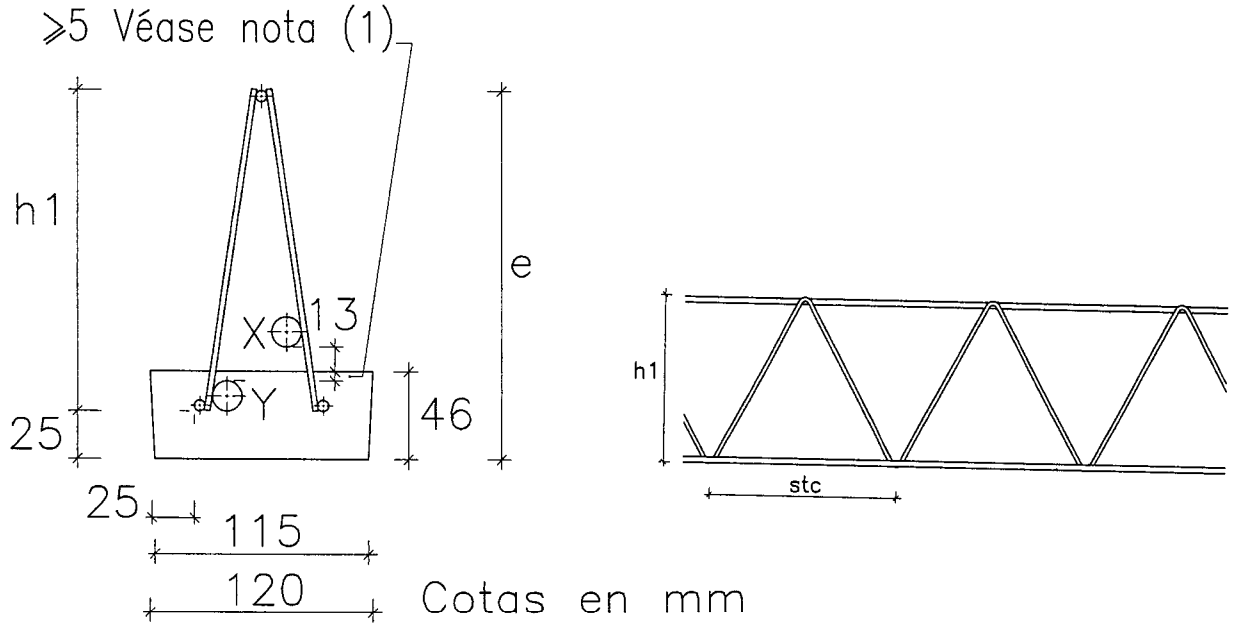
DIBUJO 1 VE.17



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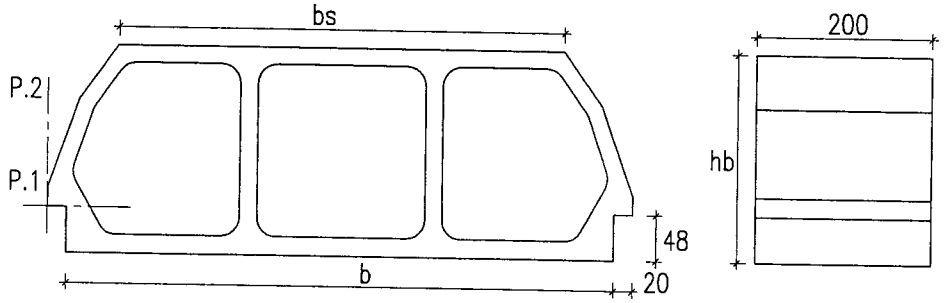
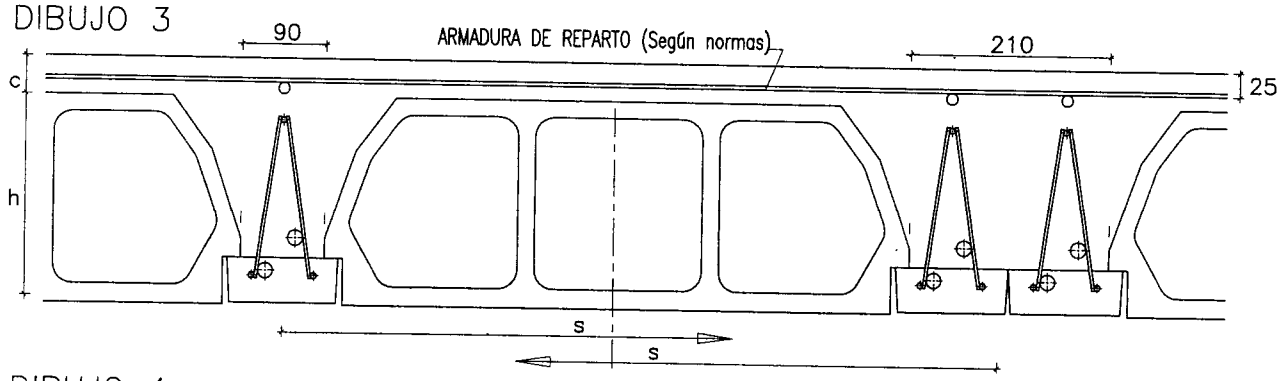
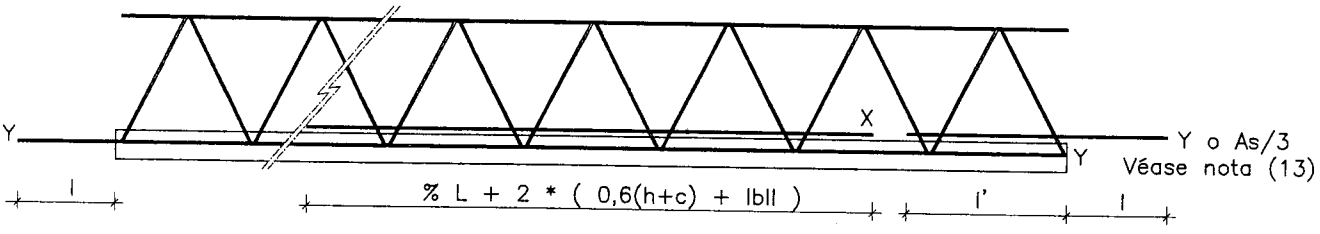


DIBUJO 3



DIBUJO 4



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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
VE15	175	0.14	1	6	150	2φ4	200	1.84	1.25	2φ 6
VE17	195	0.14	2	6	170	2φ4	200	2.09	1.41	
VE20	225	0.14	3	6	200	2φ4	200	2.46	1.67	
VE22	245	0.14	4	6	220	2φ4	200	2.71	1.82	
VE25	275	0.14	5	6	250	2φ4	200	3.07	2.07	
VE28	305	0.14	6	6	280	2φ4	200	3.44	2.32	

2.- BLOQUES ALIGERANTES (Véase dibujo 2)

Código	Cotas y coordenadas en mm hb	b	bs	P.1	P.2	PESO (N/ud) Cerámico	Hormigón	Poliest.
B20* 71	202	580	475	0; 20	33; 96	84	164	2
B22* 71	222	580	475	0; 20	33;116	88	171	2
B25* 71	252	580	475	0; 20	33;146	94	181	3
B26* 71	262	580	475	0; 20	33;156	96	185	3
B27* 71	272	580	475	0; 20	33;166	98	189	3
B30* 71	302	580	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.	VE.15 ; VE.17	2φ 6	B20* 71	2.50	3.06	
(20+ 4)* 83. D	2xVE.15 ; VE.17	2φ 6	B20* 71	2.97	3.45	
(20+ 5)* 71.	VE.17 ; VE.20	2φ 6	B20* 71	2.75	3.30	2.17
(20+ 5)* 83. D	2xVE.17 ; VE.20	2φ 6	B20* 71	3.22	3.70	2.72
(22+ 4)* 71.	VE.17 ; VE.20	2φ 6	B22* 71	2.62	3.20	
(22+ 4)* 83. D	2xVE.17 ; VE.20	2φ 6	B22* 71	3.14	3.64	
(22+ 5)* 71.	VE.20 ; VE.22	2φ 6	B22* 71	2.85	3.43	2.25
(22+ 5)* 83. D	2xVE.20 ; VE.22	2φ 6	B22* 71	3.38	3.87	2.86
(25+ 4)* 71.	VE.20 ; VE.22	2φ 6	B25* 71	2.77	3.39	
(25+ 4)* 83. D	2xVE.20 ; VE.22	2φ 6	B25* 71	3.38	3.91	
(25+ 5)* 71.	VE.22 ; VE.25	2φ 6	B25* 71	3.02	3.64	2.37
(25+ 5)* 83. D	2xVE.22 ; VE.25	2φ 6	B25* 71	3.63	4.15	3.08
(26+ 4)* 71.	VE.22 ; VE.25	2φ 6	B26* 71	2.83	3.46	
(26+ 4)* 83. D	2xVE.22 ; VE.25	2φ 6	B26* 71	3.47	4.00	
(26+ 5)* 71.	VE.22 ; VE.25	2φ 6	B26* 71	3.08	3.71	2.42
(26+ 5)* 83. D	2xVE.22 ; VE.25	2φ 6	B26* 71	3.71	4.25	3.15
(27+ 4)* 71.	VE.22 ; VE.25	2φ 6	B27* 71	2.89	3.53	
(27+ 4)* 83. D	2xVE.22 ; VE.25	2φ 6	B27* 71	3.55	4.10	
(27+ 5)* 71.	VE.22 ; VE.25	2φ 6	B27* 71	3.13	3.77	2.46
(27+ 5)* 83. D	2xVE.22 ; VE.25	2φ 6	B27* 71	3.78	4.33	3.22
(30+ 4)* 71.	VE.25 ; VE.28	2φ 6	B30* 71	3.21	3.88	
(30+ 4)* 83. D	2xVE.25 ; VE.28	2φ 6	B30* 71	3.92	4.50	
(30+ 5)* 71.	VE.25 ; VE.28	2φ 6	B30* 71	3.45	4.13	2.74
(30+ 5)* 83. D	2xVE.25 ; VE.28	2φ 6	B30* 71	4.17	4.75	3.56

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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			

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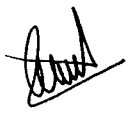

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6.- NOTAS

(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 ≤ 20 mm.

(3) L = luz de cálculo. A la longitud (en % de L) de la armadura X se le sumará 2 veces 0,6*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, Mu, 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 ≤ 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. Gamma.f serán menores que los valores últimos Mu y Vu.

(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) Wk es la abertura característica de la fisura según 49.2.4 EHE-08, debida a un momento solicitante Mu/1,4. La abertura que provocan las acciones (combinación cuasipermanentes) es proporcional a los momentos hasta un mínimo de 0,4 Wk. Según 5.1.1.2 EHE-08, los límites de Wk son: ≤ 0,4 mm en Clase de exp.ambiental I, ≤ 0,3 en Clase IIa y IIb, ≤ 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 Mu en 5,5/d y EI,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 Vcu, corresponden a la colaboración del hormigón y Vu a la suma de Vcu + Vsu <= Vu1. Vsu es la colaboración de la armadura transversal de cortante. Calculados según 44.2.3 EHE-08.

(12) El esfuerzo cortante Vsu, corresponde a la colaboración de la armadura transversal de cortante. Vu, suma de Vcu+Vsu, puede quedar limitado por Vcu,lim con b,lím a la altura de la celosía menos 20 mm; a menudo, con doble celosía, si no se alcanza 3/4·d, este límite predomina. En caso de variaciones en la anchura de b,lím, el valor de Vcu,lím a tomar es directamente proporcional. Véase 44.2.1 EHE-08, articulado, figuras y comentarios. Cuando b,lím queda en la altura 1/4·d superior (con tolerancia de 2 mm) en la ficha técnica consta el intereje. Vu1 es generalmente superior (véase la memoria del proyecto).

(13) En el dibujo l y l' corresponden a las longitudes l1, l'1, l2 y l'2 que se deducen del Anejo 12 apart. 7.1 EHE-08 y pueden organizarse en prolongación recta o inclinada, con un ángulo igual o menor a 30°. La distancia l' de solapo óptima no es menor que la necesaria para cubrir dos soldaduras.

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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 kN/m (11)	Vu = Vcu+Vsu 1*Cel	2*Cel	Wk mm (7)	CLASE POR RECUBRIM. (7)	MOMENTO DE FISURACION Mf m·kN/m (8)	RIGIDEZ TOTAL FISURADA (8) E·Ib m2·MN/m	E·If	MOMENTO SERVICIO FIS.COMP. m·kN/m(6)
(20+ 4)	VE.15	1	0φ 0	7.4	.01	18.6	37.9	57.2	.09	IIa	7.2	10.39	0.70	22.6
* 71.	VE.17	2	1φ 6	11.1	.02	18.6	37.9	57.2	.12	IIa	7.4	10.55	1.00	27.8
		3	1φ 8	13.9	.02	18.6	37.8	57.0	.16	IIa	7.5	10.67	1.23	31.1
		4	1φ 6+1φ 6	14.2	.02	18.1	36.6	55.1	.14	IIa	7.5	10.63	1.20	30.2
		5	1φ10	17.5	.03	18.5	37.7	56.9	.18	IIa	7.6	10.81	1.51	34.8
		6	1φ 8+1φ 8	19.3	.03	18.0	36.2	54.4	.16	IIa	7.6	10.80	1.56	34.5
		7	1φ12	21.8	.03	18.5	37.6	56.7	.20	IIa	7.8	10.98	1.84	38.5
		8	1φ10+1φ 8	22.9	.04	18.0	36.4	54.7	.18	IIa	7.7	10.95	1.83	37.7
		9	1φ12+1φ 6	24.9	.04	18.2	36.9	55.6	.20	IIa	7.8	11.06	2.02	40.0
		10	1φ10+1φ10	25.8	.04	17.8	35.8	53.8	.18	IIa	7.8	11.02	2.00	39.1
		11	1φ12+1φ 8	27.1	.04	18.1	36.5	54.9	.20	IIa	7.9	11.12	2.16	41.0
		12	1φ12+1φ10	30.1	.05	17.9	36.0	54.1	.20	IIa	8.0	11.20	2.31	42.3
		13	1φ16	32.6	.05	18.4	37.3	56.2	.23	IIa	8.1	11.40	2.63	46.0
		14	1φ12+1φ12	33.6	.05	17.6	35.4	53.2	.20	IIa	8.0	11.27	2.51	43.7
		15	1φ16+1φ 8	37.8	.06	18.1	36.6	55.0	.23	IIa	8.2	11.53	2.92	47.9
		16	1φ16+1φ10	40.7	.07	18.3	36.5	54.8	.23	IIa	8.3	11.60	3.07	48.9
		17	1φ16+1φ12	44.1	.07	18.5	36.5	54.5	.23	IIa	8.4	11.69	3.25	50.0
		18	1φ16+1φ16	52.6	.09	18.0	35.5	53.1	.22	IIa	8.6	11.88	3.70	52.4

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu m·kN/m (5)	Ref. inf. vig. (9)	Rel. x/d (10)	Wk mm (7)	Sección maciza Mu m·kN/m (5)	Rel. x/d (10)	Wk mm (7)	B500 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu m·kN/m (5)	Ref. inf. vig. (9)	Rel. x/d (10)	Wk mm (7)	Sección maciza Mu m·kN/m (5)	Rel. x/d (10)	Wk mm (7)	ESF.CORTANTE ULTIMO Vcu kN/m (11)	Vu 1*cel. (11)	MOMENTO FISUR. Mf m·kN/m (8)	RIGIDEZ TOTAL FIS. E·Ib m2·MN/m (8)	E·If (8)
1φ10	0.0		.00	.00	0.0	.00	.00	7.4		.10	.11	0.0	.00	.00	18.5	37.6	16.3	10.12	1.0
2φ 8	7.6		.11	.09	0.0	.00	.00	9.4		.13	.11	0.0	.00	.00	18.5	37.6	16.3	10.13	1.2
1φ12	8.4		.12	.09	0.0	.00	.00	10.4		.15	.12	0.0	.00	.00	18.4	37.5	16.3	10.13	1.3
1φ 8+1φ10	9.6		.14	.09	0.0	.00	.00	15.7		.17	.11	0.0	.00	.00	18.5	37.6	16.4	10.15	1.4
2φ10	11.5		.17	.08	0.0	.00	.00	18.8		.21	.10	0.0	.00	.00	18.5	37.6	16.4	10.16	1.6
1φ 8+1φ12	15.9		.17	.09	0.0	.00	.00	19.5		.22	.11	0.0	.00	.00	18.5	37.6	16.4	10.16	1.6
1φ10+1φ12	18.4		.20	.09	0.0	.00	.00	22.5		.25	.14	0.0	.00	.00	18.5	37.5	16.5	10.17	1.8
2φ12	21.3		.24	.10	0.0	.00	.00	25.9		.31	.16	0.0	.00	.00	18.4	37.5	16.5	10.19	2.0
1φ 8+1φ16	23.2		.27	.13	0.0	.00	.00	28.0		.35	.21	0.0	.00	.00	18.4	37.5	16.6	10.19	2.1
1φ10+1φ16	25.5		.30	.15	0.0	.00	.00	30.5		.40	.21	35.3	.06	.25	18.4	37.5	16.6	10.21	2.3
1φ12+1φ16	28.0		.35	.15	0.0	.00	.00	33.3		.46	.22	39.5	.07	.26	18.4	37.5	16.7	10.22	2.5
2φ16	33.9		.47	.16	40.2	.07	.19	39.6		.58	.22	49.9	.09	.27	19.2	38.3	16.8	10.25	2.9
4φ12	37.4		.53	.14	45.5	.08	.19	47.8	1φ12	.49	.19	56.5	.10	.26	19.3	38.4	17.0	10.28	3.2
2φ16+1φ12	40.5		.60	.17	51.2	.09	.23	51.8	1φ12	.58	.22	63.4	.12	.30	19.2	38.3	17.1	10.30	3.4
3φ16	49.6	1φ12	.54	.17	59.4	.11	.23	61.0	1φ16	.58	.22	73.5	.14	.29	19.2	38.3	17.2	10.33	3.7
4φ16	63.8	1φ16	.64	.17	78.0	.14	.22	82.4	2φ16	.58	.22	96.1	.18	.28	19.2	38.3	17.6	10.40	4.5

ESFUERZO CORTANTE Vsu (12) (kN/m)

(kN/m)

b,lím (mm) : 155

168

VE.15 (simple celosía) : 19.0

VE.15 (doble celosía) : 38.2

Vcu,lím (kN/m) (VE.15) : 31.5

(VE.17) : 34.1

VE.17 (simple celosía) : 18.8

VE.17 (doble celosía) : 37.7

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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 kN/m (11)	Vu = Vcu+Vsu 1*Cel	2*Cel	Wk mm	CLASE POR RECUBRIM. (7)	MOMENTO DE FISURACION Mf m·kN/m (8)	RIGIDEZ TOTAL FISURADA (8) E·Ib m2·MN/m	E·If	MOMENTO SERVICIO FIS.COMP. m·kN/m(6)
(20+ 4)	VE.15	1	0φ 0	12.7	.02	37.1	70.1	103.1	.10	IIa	11.6	14.99	1.14	29.2
* 83. D	VE.17	2	1φ 6	18.9	.03	37.1	70.1	103.1	.16	IIa	11.8	15.20	1.64	35.9
		3	1φ 8	23.7	.04	37.1	70.0	102.9	.21	IIa	12.0	15.35	2.01	40.1
		4	1φ 6+1φ 6	24.1	.04	36.2	67.8	99.5	.17	IIa	11.9	15.29	1.95	38.8
		5	1φ10	29.7	.04	37.0	69.8	102.6	.23	IIa	12.1	15.54	2.46	44.6
		6	1φ 8+1φ 8	32.7	.05	35.8	67.0	98.2	.20	IIa	12.1	15.51	2.53	44.2
		7	1φ12	37.0	.06	36.9	69.6	102.3	.25	IIa	12.4	15.76	2.98	49.2
		8	1φ10+1φ 8	38.6	.06	36.0	67.4	98.7	.22	IIa	12.3	15.71	2.96	48.0
		9	1φ12+1φ 6	42.0	.07	36.4	68.4	100.3	.25	IIa	12.5	15.86	3.25	51.0
		10	1φ10+1φ10	43.5	.07	35.4	66.2	97.1	.22	IIa	12.4	15.78	3.23	49.7
		11	1φ12+1φ 8	45.8	.07	36.1	67.6	99.1	.24	IIa	12.6	15.92	3.46	52.2
		12	1φ12+1φ10	50.6	.08	35.6	66.6	97.7	.23	IIa	12.7	16.01	3.72	53.6
		13	1φ16	54.8	.09	36.7	69.1	101.5	.28	IIa	13.0	16.30	4.21	58.4
		14	1φ12+1φ12	56.3	.09	35.1	65.6	96.1	.23	IIa	12.8	16.11	4.01	55.2
		15	1φ16+1φ 8	63.3	.10	36.1	67.7	99.3	.27	IIa	13.1	16.46	4.65	60.5
		16	1φ16+1φ10	68.0	.11	35.9	67.1	98.3	.26	IIa	13.2	16.54	4.88	61.6
		17	1φ16+1φ12	73.5	.12	35.5	66.3	97.1	.26	IIa	13.3	16.63	5.16	62.7
		18	1φ16+1φ16	87.0	.15	35.9	65.9	95.9	.25	IIa	13.6	16.84	5.78	65.0

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu m·kN/m (5)	Ref. inf. vig. (9)	Rel. x/d (10)	Wk mm (7)	Sección maciza Mu m·kN/m (5)	Rel. x/d (10)	Wk mm (7)	B500 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu m·kN/m (5)	Ref. inf. vig. (9)	Rel. x/d (10)	Wk mm (7)	Sección maciza Mu m·kN/m (5)	Rel. x/d (10)	Wk mm (7)	ESF.CORTANTE ULTIMO Vcu kN/m (11)	Vu 1*cel.	MOMENTO FISUR. Mf m·kN/m (8)	RIGIDEZ TOTAL FIS. E·Ib m2·MN/m (8)	E·If
1φ10	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	36.9	69.6	19.2	14.63	1.1
2φ 8	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	37.0	69.7	19.3	14.66	1.3
1φ12	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	36.8	69.5	19.3	14.66	1.4
1φ 8+1φ10	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	36.9	69.6	19.4	14.68	1.5
2φ10	0.0		.00	.00	0.0	.00	.00	12.7		.10	.11	0.0	.00	.00	36.9	69.6	19.4	14.70	1.7
1φ 8+1φ12	0.0		.00	.00	0.0	.00	.00	13.1		.11	.13	0.0	.00	.00	36.9	69.5	19.4	14.70	1.7
1φ10+1φ12	0.0		.00	.00	0.0	.00	.00	20.3		.13	.13	0.0	.00	.00	36.8	69.5	19.5	14.73	1.9
2φ12	14.4		.12	.09	0.0	.00	.00	23.7		.15	.12	0.0	.00	.00	36.8	69.5	19.5	14.75	2.1
1φ 8+1φ16	21.0		.13	.11	0.0	.00	.00	26.0		.17	.18	0.0	.00	.00	36.6	69.3	19.6	14.75	2.2
1φ10+1φ16	23.3		.15	.10	0.0	.00	.00	28.6		.19	.20	0.0	.00	.00	36.7	69.3	19.6	14.78	2.4
1φ12+1φ16	25.9		.17	.13	0.0	.00	.00	31.8		.21	.21	33.9	.06	.19	36.6	69.3	19.7	14.80	2.6
2φ16	32.4		.21	.16	34.5	.06	.14	39.5		.27	.23	42.9	.08	.23	36.6	69.2	19.9	14.86	3.1
4φ12	36.4		.24	.14	39.1	.07	.15	44.2		.30	.19	48.6	.09	.23	36.8	69.5	20.0	14.92	3.4
2φ16+1φ12	40.5		.27	.17	44.0	.08	.20	48.9		.35	.23	54.6	.10	.28	36.6	69.3	20.1	14.95	3.6
3φ16	46.2		.33	.17	51.2	.09	.20	55.3		.42	.23	63.4	.12	.28	36.6	69.2	20.3	15.00	4.0
4φ16	58.3		.45	.18	67.3	.12	.21	68.4		.56	.23	83.1	.16	.28	37.3	70.0	20.7	15.14	4.9

ESFUERZO CORTANTE Vsu (12) (kN/m)

(kN/m)

b,lím (mm) : 275
288

VE.15 (simple celosía) : 32.6
VE.15 (doble celosía) : 65.3
Vcu,lím (kN/m) (VE.15) : 47.8
(VE.17) : 50.1

VE.17 (simple celosía) : 32.2
VE.17 (doble celosía) : 64.5

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS ARMADAS
MODELO VE

PREFABRICADOS NAVARRO, S.A.

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

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja nº 7 de 28

MARCADO CE

1170/CPD/PH.00988.01

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 kN/m (11)	Vu = Vcu+Vsu 1*Cel	2*Cel	Wk mm	CLASE POR RECUBRIM. (7)	MOMENTO DE FISURACION Mf m·kN/m (8)	RIGIDEZ TOTAL FISURADA E·Ib (8)	E·If m2·MN/m	MOMENTO SERVICIO FIS.COMP. m·kN/m(6)
(20+ 5)	VE.17	1	0φ 0	7.8	.01	19.1	39.1	59.0	.09	IIa	7.9	11.89	0.75	24.2
* 71.	VE.20	2	1φ 6	11.6	.02	19.1	39.1	59.0	.12	IIa	8.0	12.07	1.09	29.9
		3	1φ 8	14.6	.02	19.1	39.0	58.9	.15	IIa	8.1	12.21	1.34	33.5
		4	1φ 6+1φ 6	14.9	.02	18.7	37.8	57.0	.13	IIa	8.1	12.17	1.31	32.5
		5	1φ10	18.4	.03	19.1	38.9	58.7	.18	IIa	8.3	12.37	1.66	37.4
		6	1φ 8+1φ 8	20.3	.03	18.5	37.4	56.3	.16	IIa	8.3	12.37	1.72	37.3
		7	1φ12	22.9	.03	19.0	38.8	58.5	.20	IIa	8.4	12.57	2.02	41.5
		8	1φ10+1φ 8	24.0	.03	18.6	37.6	56.6	.18	IIa	8.4	12.53	2.02	40.7
		9	1φ12+1φ 6	26.1	.04	18.8	38.1	57.5	.20	IIa	8.5	12.66	2.23	43.1
		10	1φ10+1φ10	27.1	.04	18.4	37.0	55.7	.18	IIa	8.5	12.62	2.22	42.3
		11	1φ12+1φ 8	28.5	.04	18.6	37.7	56.8	.20	IIa	8.6	12.73	2.37	44.3
		12	1φ12+1φ10	31.6	.05	18.4	37.2	56.0	.20	IIa	8.6	12.81	2.56	45.7
		13	1φ16	34.2	.05	18.9	38.5	58.1	.23	IIa	8.8	13.04	2.89	49.6
		14	1φ12+1φ12	35.3	.05	18.3	36.8	55.3	.20	IIa	8.7	12.92	2.78	47.3
		15	1φ16+1φ 8	39.7	.06	18.6	37.8	56.9	.23	IIa	9.0	13.21	3.23	51.8
		16	1φ16+1φ10	42.7	.06	18.7	37.6	56.5	.23	IIa	9.0	13.28	3.40	52.9
		17	1φ16+1φ12	46.4	.07	19.2	37.9	56.5	.23	IIa	9.1	13.38	3.61	54.1
		18	1φ16+1φ16	55.4	.09	18.9	37.1	55.3	.22	IIa	9.3	13.63	4.11	56.9

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu m·kN/m (5)	Ref. inf. vig. (9)	Rel. x/d (10)	Wk mm (7)	Sección maciza Mu m·kN/m (5)	Rel. x/d (10)	Wk mm (7)	B500 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu m·kN/m (5)	Ref. inf. vig. (9)	Rel. x/d (10)	Wk mm (7)	Sección maciza Mu m·kN/m (5)	Rel. x/d (10)	Wk mm (7)	ESF.CORTANTE ULTIMO Vcu kN/m (11)	Vu 1*cel. (11)	MOMENTO FISUR. Mf m·kN/m (8)	RIGIDEZ TOTAL FIS. E·Ib (8)	E·If m2·MN/m (8)
1φ10	0.0		.00	.00	0.0	.00	.00	7.8		.10	.11	0.0	.00	.00	19.0	38.8	18.3	11.58	1.2
2φ 8	8.0		.10	.09	0.0	.00	.00	9.9		.13	.11	0.0	.00	.00	19.1	38.8	18.3	11.60	1.4
1φ12	8.8		.11	.10	0.0	.00	.00	10.9		.14	.12	0.0	.00	.00	19.0	38.7	18.3	11.60	1.5
1φ 8+1φ10	10.1		.13	.09	0.0	.00	.00	12.4		.16	.11	0.0	.00	.00	19.1	38.8	18.4	11.61	1.6
2φ10	12.1		.16	.08	0.0	.00	.00	19.8		.20	.10	0.0	.00	.00	19.0	38.8	18.4	11.63	1.8
1φ 8+1φ12	12.5		.16	.09	0.0	.00	.00	20.5		.21	.11	0.0	.00	.00	19.0	38.8	18.5	11.63	1.9
1φ10+1φ12	19.3		.19	.09	0.0	.00	.00	23.6		.24	.13	0.0	.00	.00	19.0	38.8	18.5	11.64	2.1
2φ12	22.4		.23	.09	0.0	.00	.00	27.3		.29	.16	0.0	.00	.00	19.0	38.7	18.6	11.66	2.3
1φ 8+1φ16	24.5		.25	.12	0.0	.00	.00	29.6		.34	.20	0.0	.00	.00	18.9	38.7	18.6	11.66	2.4
1φ10+1φ16	26.8		.29	.14	0.0	.00	.00	32.3		.38	.21	37.0	.06	.25	18.9	38.7	18.7	11.68	2.6
1φ12+1φ16	29.6		.34	.15	0.0	.00	.00	35.3		.44	.21	41.4	.07	.26	18.9	38.7	18.7	11.69	2.8
2φ16	35.9		.45	.16	42.2	.07	.19	42.1		.56	.22	52.4	.09	.27	19.9	39.6	18.9	11.73	3.3
4φ12	39.6		.50	.14	47.8	.08	.19	50.6	1φ12	.47	.19	59.3	.10	.26	20.0	39.8	19.0	11.76	3.6
2φ16+1φ12	43.0		.57	.17	53.8	.09	.23	55.0	1φ12	.56	.22	66.6	.11	.31	19.9	39.6	19.1	11.77	3.8
3φ16	47.6		.66	.17	62.4	.10	.23	64.8	1φ16	.56	.22	77.2	.13	.30	19.9	39.6	19.2	11.81	4.2
4φ16	67.8	1φ16	.61	.17	82.0	.14	.22	87.4	2φ16	.56	.22	101.1	.17	.28	19.9	39.6	19.6	11.89	5.0

ESFUERZO CORTANTE Vsu (12) (kN/m)
(kN/m)
b,lím (mm) : 168
710

VE.17 (simple celosía) : 19.7
VE.17 (doble celosía) : 39.5
Vcu,lím (kN/m) (VE.17) : 35.2
(VE.20) : 148.8

VE.20 (simple celosía) : 19.3
VE.20 (doble celosía) : 38.7

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS ARMADAS
MODELO VE

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

MARCADO CE

1170/CPD/PH.00988.01

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 kN/m (11)	Vu = Vcu+Vsu 1*Cel	2*Cel	Wk mm	CLASE POR RECUBRIM. (7)	MOMENTO DE FISURACION Mf m·kN/m (8)	RIGIDEZ TOTAL FISURADA (8) E·Ib	E·If m2·MN/m	MOMENTO SERVICIO FIS.COMP. m·kN/m(6)
(20+ 5)	VE.17	1	0φ 0	13.3	.02	38.2	72.3	106.4	.10	IIa	12.6	17.23	1.24	31.4
* 83. D	VE.20	2	1φ 6	19.8	.03	38.2	72.3	106.4	.16	IIa	12.8	17.46	1.79	38.7
		3	1φ 8	24.8	.03	38.2	72.2	106.2	.20	IIa	13.0	17.64	2.20	43.2
		4	1φ 6+1φ 6	25.3	.04	37.3	70.1	102.9	.17	IIa	13.0	17.58	2.15	41.9
		5	1φ10	31.1	.04	38.1	72.0	105.9	.24	IIa	13.2	17.86	2.70	48.1
		6	1φ 8+1φ 8	34.4	.05	37.0	69.3	101.6	.20	IIa	13.2	17.84	2.79	47.8
		7	1φ12	38.8	.05	38.0	71.8	105.6	.26	IIa	13.5	18.13	3.27	53.1
		8	1φ10+1φ 8	40.6	.06	37.1	69.6	102.1	.22	IIa	13.4	18.06	3.26	52.0
		9	1φ12+1φ 6	44.1	.06	37.5	70.6	103.7	.25	IIa	13.6	18.24	3.60	55.1
		10	1φ10+1φ10	45.8	.07	36.7	68.6	100.6	.22	IIa	13.5	18.17	3.57	53.9
		11	1φ12+1φ 8	48.1	.07	37.2	69.8	102.4	.24	IIa	13.7	18.31	3.83	56.5
		12	1φ12+1φ10	53.2	.08	36.8	69.0	101.1	.24	IIa	13.8	18.42	4.12	58.1
		13	1φ16	57.6	.08	37.8	71.3	104.8	.28	IIa	14.1	18.75	4.65	63.1
		14	1φ12+1φ12	59.3	.09	36.5	68.1	99.7	.23	IIa	13.9	18.54	4.46	59.9
		15	1φ16+1φ 8	66.6	.10	37.2	70.0	102.7	.27	IIa	14.3	18.93	5.15	65.6
		16	1φ16+1φ10	71.5	.11	37.0	69.3	101.7	.26	IIa	14.4	19.03	5.41	66.8
		17	1φ16+1φ12	77.4	.12	36.7	68.6	100.6	.26	IIa	14.5	19.15	5.73	68.2
		18	1φ16+1φ16	91.8	.15	37.7	68.8	99.9	.25	IIa	14.8	19.42	6.46	71.3

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu m·kN/m (5)	Ref. inf. vig. (9)	Rel. x/d (10)	Wk mm (7)	Sección maciza Mu m·kN/m (5)	Rel. x/d (10)	Wk mm (7)	B500 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu m·kN/m (5)	Ref. inf. vig. (9)	Rel. x/d (10)	Wk mm (7)	Sección maciza Mu m·kN/m (5)	Rel. x/d (10)	Wk mm (7)	ESF.CORTANTE ULTIMO Vcu kN/m (11)	Vu 1*cel.	MOMENTO FISUR. Mf m·kN/m (8)	RIGIDEZ TOTAL FIS. (8) E·Ib	E·If m2·MN/m
1φ10	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	38.0	71.8	21.7	16.81	1.3
2φ 8	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	38.1	71.9	21.7	16.84	1.5
1φ12	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	37.9	71.7	21.8	16.84	1.6
1φ 8+1φ10	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	38.0	71.8	21.8	16.86	1.7
2φ10	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	38.0	71.8	21.9	16.88	2.0
1φ 8+1φ12	0.0		.00	.00	0.0	.00	.00	13.8		.10	.14	0.0	.00	.00	38.0	71.7	21.9	16.89	2.0
1φ10+1φ12	0.0		.00	.00	0.0	.00	.00	21.3		.12	.13	0.0	.00	.00	37.9	71.7	21.9	16.91	2.2
2φ12	15.1		.11	.10	0.0	.00	.00	24.9		.14	.12	0.0	.00	.00	37.9	71.7	22.0	16.94	2.4
1φ 8+1φ16	22.1		.13	.11	0.0	.00	.00	27.3		.16	.15	0.0	.00	.00	37.8	71.5	22.1	16.95	2.6
1φ10+1φ16	24.5		.14	.11	0.0	.00	.00	30.1		.18	.18	0.0	.00	.00	37.8	71.5	22.1	16.97	2.8
1φ12+1φ16	27.3		.16	.11	0.0	.00	.00	33.5		.20	.20	0.0	.00	.00	37.7	71.5	22.2	17.00	3.0
2φ16	34.1		.20	.15	36.3	.06	.13	41.7		.26	.22	45.1	.07	.22	37.7	71.5	22.4	17.06	3.5
4φ12	38.3		.23	.13	41.0	.07	.15	46.7		.29	.19	51.0	.08	.23	37.9	71.7	22.5	17.13	3.8
2φ16+1φ12	42.7		.26	.17	46.2	.08	.19	51.6		.33	.23	57.4	.09	.28	37.7	71.5	22.6	17.16	4.1
3φ16	48.8		.31	.17	53.7	.09	.20	58.5		.40	.23	66.6	.11	.28	37.7	71.5	22.8	17.22	4.6
4φ16	61.7		.43	.17	70.8	.12	.22	72.7		.53	.22	87.4	.15	.28	38.0	71.8	23.2	17.36	5.5

ESFUERZO CORTANTE Vsu (12) (kN/m)

(kN/m)

b,lím (mm) : 288
830

VE.17 (simple celosía) : 33.7
VE.17 (doble celosía) : 67.5
Vcu,lím (kN/m) (VE.17) : 51.6
(VE.20) : 148.8

VE.20 (simple celosía) : 33.1
VE.20 (doble celosía) : 66.2

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS ARMADAS
MODELO VE

PREFABRICADOS NAVARRO, S.A.

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

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja nº 9 de 28

MARCADO CE

1170/CPD/PH.00988.01

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 kN/m (11)	Vu = Vcu+Vsu 1*Cel	2*Cel	Wk mm (7)	CLASE POR RECUBRIM.	MOMENTO DE FISURACION Mf m·kN/m (8)	RIGIDEZ TOTAL FISURADA E·Ib (8) m2·MN/m	E·If	MOMENTO SERVICIO FIS.COMP. m·kN/m(6)
(22+ 4)	VE.17	1	0φ 0	8.1	.01	19.7	40.5	61.4	.09	IIa	8.4	13.04	0.82	25.9
* 71.	VE.20	2	1φ 6	12.2	.02	19.7	40.5	61.4	.11	IIa	8.6	13.23	1.20	32.0
		3	1φ 8	15.3	.02	19.7	40.5	61.2	.15	IIa	8.7	13.36	1.47	35.9
		4	1φ 6+1φ 6	15.6	.02	19.2	39.3	59.4	.13	IIa	8.7	13.33	1.45	34.9
		5	1φ10	19.2	.02	19.6	40.4	61.1	.18	IIa	8.8	13.54	1.81	40.0
		6	1φ 8+1φ 8	21.3	.03	19.1	38.9	58.7	.16	IIa	8.8	13.55	1.90	40.1
		7	1φ12	24.0	.03	19.6	40.2	60.9	.20	IIa	9.0	13.75	2.22	44.4
		8	1φ10+1φ 8	25.2	.03	19.1	39.0	58.9	.18	IIa	9.0	13.72	2.23	43.7
		9	1φ12+1φ 6	27.3	.04	19.3	39.6	59.8	.20	IIa	9.1	13.85	2.45	46.3
		10	1φ10+1φ10	28.5	.04	18.9	38.5	58.1	.18	IIa	9.1	13.81	2.45	45.5
		11	1φ12+1φ 8	29.9	.04	19.2	39.1	59.1	.20	IIa	9.1	13.92	2.62	47.6
		12	1φ12+1φ10	33.1	.04	19.0	38.7	58.4	.20	IIa	9.2	14.02	2.83	49.1
		13	1φ16	35.8	.05	19.5	40.0	60.4	.24	IIa	9.4	14.25	3.18	53.2
		14	1φ12+1φ12	37.1	.05	18.8	38.2	57.6	.20	IIa	9.3	14.14	3.08	50.9
		15	1φ16+1φ 8	41.6	.06	19.2	39.2	59.3	.23	IIa	9.6	14.43	3.56	55.6
		16	1φ16+1φ10	44.8	.06	19.1	38.9	58.7	.23	IIa	9.6	14.52	3.75	56.8
		17	1φ16+1φ12	48.7	.07	19.6	39.1	58.7	.23	IIa	9.7	14.63	3.99	58.2
		18	1φ16+1φ16	58.3	.08	19.6	38.7	57.8	.22	IIa	10.0	14.89	4.56	61.4

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu m·kN/m (5)	Ref. inf. vig. (9)	Rel. x/d (10)	Wk mm (7)	Sección maciza Mu m·kN/m (5)	Rel. x/d (10)	Wk mm (7)	B500 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu m·kN/m (5)	Ref. inf. vig. (9)	Rel. x/d (10)	Wk mm (7)	Sección maciza Mu m·kN/m (5)	Rel. x/d (10)	Wk mm (7)	ESF.CORTANTE ULTIMO Vcu kN/m (11)	Vu 1*cel. (11)	MOMENTO FISUR. Mf m·kN/m (8)	RIGIDEZ TOTAL FIS. E·Ib (8) m2·MN/m	E·If (8)
1φ10	0.0		.00	.00	0.0	.00	.00	8.1		.09	.12	0.0	.00	.00	19.6	40.2	18.7	12.72	1.3
2φ 8	8.4		.10	.09	0.0	.00	.00	10.3		.12	.11	0.0	.00	.00	19.6	40.3	18.7	12.74	1.5
1φ12	9.3		.11	.10	0.0	.00	.00	11.5		.14	.12	0.0	.00	.00	19.5	40.2	18.8	12.74	1.6
1φ 8+1φ10	10.6		.12	.09	0.0	.00	.00	13.0		.15	.11	0.0	.00	.00	19.6	40.2	18.8	12.75	1.7
2φ10	12.7		.15	.08	0.0	.00	.00	20.8		.19	.11	0.0	.00	.00	19.6	40.2	18.9	12.76	2.0
1φ 8+1φ12	13.1		.16	.09	0.0	.00	.00	21.5		.20	.12	0.0	.00	.00	19.6	40.2	18.9	12.77	2.0
1φ10+1φ12	20.3		.18	.09	0.0	.00	.00	24.8		.23	.14	0.0	.00	.00	19.5	40.2	19.0	12.78	2.2
2φ12	23.5		.22	.09	0.0	.00	.00	28.7		.28	.16	0.0	.00	.00	19.5	40.2	19.0	12.80	2.5
1φ 8+1φ16	25.7		.24	.13	0.0	.00	.00	31.2		.32	.20	0.0	.00	.00	19.5	40.1	19.1	12.81	2.6
1φ10+1φ16	28.2		.28	.14	0.0	.00	.00	34.0		.37	.21	0.0	.00	.00	19.5	40.1	19.1	12.83	2.8
1φ12+1φ16	31.2		.32	.15	0.0	.00	.00	37.3		.42	.22	43.4	.06	.26	19.5	40.1	19.2	12.85	3.1
2φ16	37.9		.43	.16	44.2	.07	.19	44.5		.54	.22	54.9	.08	.27	20.4	41.1	19.4	12.90	3.6
4φ12	41.9		.48	.14	50.0	.07	.19	48.8		.59	.19	62.1	.09	.26	20.7	41.3	19.6	12.95	3.9
2φ16+1φ12	45.6		.55	.17	56.3	.08	.23	58.1	1φ12	.54	.23	69.8	.11	.31	20.6	41.2	19.7	12.97	4.2
3φ16	50.5		.64	.17	65.4	.10	.23	68.5	1φ16	.54	.23	81.0	.12	.30	20.5	41.2	19.8	13.01	4.7
4φ16	71.7	1φ16	.59	.17	86.0	.13	.22	92.4	2φ16	.54	.22	106.1	.17	.28	20.5	41.2	20.3	13.12	5.6

ESFUERZO CORTANTE Vsu (12) (kN/m)
(kN/m)
b,lím (mm) : 157
710

VE.17 (simple celosía) : 20.6
VE.17 (doble celosía) : 41.3
Vcu,lím (kN/m) (VE.17) : 33.8
(VE.20) : 153.1

VE.20 (simple celosía) : 20.2
VE.20 (doble celosía) : 40.4

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
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MODELO VE

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

MARCADO CE

1170/CPD/PH.00988.01

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	Wk mm	CLASE POR RECUBRIM. (7)	MOMENTO DE FISURACION Mf m·kN/m (8)	RIGIDEZ TOTAL FISURADA E·Ib	E·If	MOMENTO SERVICIO FIS.COMP. m·kN/m (6)
						kN/m (11)						(8) m2·MN/m		
(22+ 4)	VE.17	1	0φ 0	13.9	.02	39.3	74.9	110.6	.11	IIa	13.5	18.82	1.36	33.7
* 83. D	VE.20	2	1φ 6	20.7	.03	39.3	74.9	110.6	.16	IIa	13.7	19.07	1.97	41.4
		3	1φ 8	25.9	.03	39.2	74.8	110.4	.21	IIa	13.9	19.25	2.41	46.3
		4	1φ 6+1φ 6	26.5	.03	38.4	72.7	107.0	.17	IIa	13.9	19.20	2.36	45.0
		5	1φ10	32.6	.04	39.2	74.6	110.1	.24	IIa	14.1	19.49	2.97	51.5
		6	1φ 8+1φ 8	36.0	.05	38.0	71.9	105.8	.20	IIa	14.1	19.47	3.09	51.4
		7	1φ12	40.6	.05	39.1	74.4	109.7	.26	IIa	14.4	19.76	3.61	56.9
		8	1φ10+1φ 8	42.6	.06	38.2	72.2	106.3	.23	IIa	14.4	19.70	3.61	55.9
		9	1φ12+1φ 6	46.2	.06	38.6	73.2	107.8	.25	IIa	14.5	19.88	3.96	59.1
		10	1φ10+1φ10	48.0	.07	37.8	71.3	104.8	.22	IIa	14.5	19.81	3.95	58.0
		11	1φ12+1φ 8	50.4	.07	38.3	72.4	106.6	.24	IIa	14.6	19.97	4.23	60.7
		12	1φ12+1φ10	55.8	.08	37.9	71.6	105.3	.24	IIa	14.7	20.08	4.56	62.5
		13	1φ16	60.3	.08	38.9	73.9	109.0	.28	IIa	15.0	20.42	5.12	67.7
		14	1φ12+1φ12	62.3	.09	37.6	70.7	103.9	.23	IIa	14.9	20.21	4.94	64.5
		15	1φ16+1φ 8	69.9	.09	38.3	72.6	106.8	.27	IIa	15.3	20.62	5.69	70.3
		16	1φ16+1φ10	75.1	.10	38.1	72.0	105.8	.27	IIa	15.4	20.73	5.99	71.6
		17	1φ16+1φ12	81.4	.11	37.8	71.3	104.8	.26	IIa	15.5	20.85	6.34	73.0
		18	1φ16+1φ16	96.7	.14	39.0	71.7	104.4	.25	IIa	15.9	21.15	7.18	75.9

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu m·kN/m (5)	Ref. inf. vig. (9)	Rel. x/d (10)	Wk mm (7)	Sección maciza Mu m·kN/m (5)	Rel. x/d (10)	Wk mm (7)	B500 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu m·kN/m (5)	Ref. inf. vig. (9)	Rel. x/d (10)	Wk mm (7)	Sección maciza Mu m·kN/m (5)	Rel. x/d (10)	Wk mm (7)	ESF.CORTANTE ULTIMO Vcu kN/m (11)	Vu 1*cel.	MOMENTO FISUR. Mf m·kN/m (8)	RIGIDEZ TOTAL FIS. E·Ib (8) m2·MN/m	E·If
1φ10	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	39.1	74.4	22.1	18.40	1.4
2φ 8	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	39.2	74.5	22.2	18.43	1.6
1φ12	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	39.0	74.3	22.2	18.43	1.7
1φ 8+1φ10	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	39.1	74.5	22.3	18.46	1.8
2φ10	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	39.1	74.4	22.3	18.49	2.1
1φ 8+1φ12	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	39.0	74.4	22.3	18.49	2.1
1φ10+1φ12	0.0		.00	.00	0.0	.00	.00	16.8		.12	.13	0.0	.00	.00	39.0	74.4	22.4	18.52	2.3
2φ12	15.9		.11	.10	0.0	.00	.00	26.1		.14	.12	0.0	.00	.00	39.0	74.3	22.5	18.55	2.6
1φ 8+1φ16	23.2		.12	.11	0.0	.00	.00	28.6		.15	.17	0.0	.00	.00	38.8	74.2	22.5	18.57	2.8
1φ10+1φ16	25.6		.14	.11	0.0	.00	.00	31.6		.17	.19	0.0	.00	.00	38.9	74.2	22.6	18.60	3.0
1φ12+1φ16	28.6		.15	.12	0.0	.00	.00	35.2		.19	.21	0.0	.00	.00	38.8	74.2	22.7	18.63	3.2
2φ16	35.8		.20	.15	0.0	.00	.00	43.8		.24	.23	47.2	.07	.22	38.8	74.1	22.9	18.71	3.8
4φ12	40.2		.22	.14	43.0	.06	.15	49.1		.28	.19	53.4	.08	.22	39.0	74.3	23.0	18.78	4.2
2φ16+1φ12	44.9		.25	.17	48.4	.07	.19	54.4		.32	.23	60.1	.09	.28	38.8	74.1	23.2	18.82	4.5
3φ16	51.4		.30	.17	56.3	.08	.20	61.8		.38	.23	69.8	.11	.28	38.8	74.1	23.4	18.89	5.0
4φ16	65.1		.41	.18	74.2	.11	.22	77.0		.51	.23	91.7	.14	.28	38.8	74.1	23.8	19.08	6.1

ESFUERZO CORTANTE Vsu (12) (kN/m)

(kN/m)

b,lím (mm) : 277

830

VE.17 (simple celosía) : 35.3

VE.17 (doble celosía) : 70.6

Vcu,lím (kN/m) (VE.17) : 51.1

(VE.20) : 153.1

VE.20 (simple celosía) : 34.6

VE.20 (doble celosía) : 69.2

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
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TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja nº 11 de 28

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1170/CPD/PH.00988.01

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 kN/m (11)	Vu = Vcu+Vsu 1*Cel	2*Cel	Wk mm (7)	CLASE POR RECUBRIM. (7)	MOMENTO DE FISURACION Mf m·kN/m (8)	RIGIDEZ TOTAL FISURADA (8) E·Ib m2·MN/m	E·If	MOMENTO SERVICIO FIS.COMP. m·kN/m(6)
(22+ 5)	VE.20	1	0φ 0	8.5	.01	20.2	41.5	62.8	.09	IIa	9.1	14.82	0.88	27.7
* 71.	VE.22	2	1φ 6	12.7	.01	20.2	41.5	62.8	.11	IIa	9.3	15.03	1.29	34.3
		3	1φ 8	15.9	.02	20.2	41.5	62.7	.15	IIa	9.4	15.19	1.60	38.4
		4	1φ 6+1φ 6	16.3	.02	19.8	40.3	60.9	.13	IIa	9.4	15.16	1.57	37.5
		5	1φ10	20.0	.02	20.2	41.4	62.5	.18	IIa	9.5	15.39	1.97	42.9
		6	1φ 8+1φ 8	22.2	.03	19.6	39.9	60.2	.16	IIa	9.6	15.40	2.07	43.1
		7	1φ12	25.0	.03	20.1	41.2	62.4	.20	IIa	9.7	15.63	2.41	47.6
		8	1φ10+1φ 8	26.3	.03	19.7	40.1	60.4	.18	IIa	9.7	15.60	2.43	47.0
		9	1φ12+1φ 6	28.5	.03	19.9	40.6	61.3	.20	IIa	9.8	15.75	2.67	49.7
		10	1φ10+1φ10	29.8	.04	19.5	39.5	59.6	.18	IIa	9.8	15.72	2.68	48.9
		11	1φ12+1φ 8	31.3	.04	19.7	40.2	60.6	.20	IIa	9.9	15.83	2.86	51.1
		12	1φ12+1φ10	34.7	.04	19.5	39.7	59.9	.20	IIa	10.0	15.95	3.10	52.9
		13	1φ16	37.4	.04	20.0	41.0	61.9	.24	IIa	10.2	16.20	3.47	57.1
		14	1φ12+1φ12	38.8	.05	19.4	39.3	59.1	.20	IIa	10.1	16.08	3.38	54.8
		15	1φ16+1φ 8	43.5	.05	19.7	40.3	60.8	.23	IIa	10.3	16.40	3.89	59.8
		16	1φ16+1φ10	46.9	.06	19.6	39.9	60.2	.23	IIa	10.4	16.51	4.12	61.1
		17	1φ16+1φ12	51.0	.06	19.9	40.0	60.1	.23	IIa	10.5	16.65	4.38	62.7
		18	1φ16+1φ16	61.1	.08	20.3	39.9	59.5	.22	IIa	10.8	16.96	5.02	66.2

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu m·kN/m (5)	Ref. inf. vig. (9)	Rel. x/d (10)	Wk mm (7)	Sección maciza Mu m·kN/m (5)	Rel. x/d (10)	Wk mm (7)	B500 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu m·kN/m (5)	Ref. inf. vig. (9)	Rel. x/d (10)	Wk mm (7)	Sección maciza Mu m·kN/m (5)	Rel. x/d (10)	Wk mm (7)	ESF.CORTANTE ULTIMO Vcu kN/m (11)	Vu 1*cel. (11)	MOMENTO FISUR. Mf m·kN/m (8)	RIGIDEZ TOTAL FIS. E·Ib m2·MN/m (8)	E·If (8)
1φ10	0.0		.00	.00	0.0	.00	.00	8.5		.09	.12	0.0	.00	.00	20.1	41.2	21.0	14.45	1.5
2φ 8	8.7		.09	.09	0.0	.00	.00	10.8		.12	.11	0.0	.00	.00	20.2	41.3	21.0	14.47	1.7
1φ12	9.7		.10	.10	0.0	.00	.00	12.0		.13	.12	0.0	.00	.00	20.1	41.2	21.1	14.47	1.8
1φ 8+1φ10	11.0		.12	.09	0.0	.00	.00	13.6		.15	.12	0.0	.00	.00	20.1	41.3	21.1	14.49	2.0
2φ10	13.3		.14	.09	0.0	.00	.00	21.8		.18	.11	0.0	.00	.00	20.1	41.2	21.2	14.51	2.3
1φ 8+1φ12	13.8		.15	.10	0.0	.00	.00	22.5		.19	.12	0.0	.00	.00	20.1	41.2	21.2	14.51	2.3
1φ10+1φ12	21.2		.18	.09	0.0	.00	.00	26.0		.22	.12	0.0	.00	.00	20.1	41.2	21.3	14.53	2.5
2φ12	24.6		.21	.08	0.0	.00	.00	30.1		.27	.15	0.0	.00	.00	20.1	41.2	21.3	14.55	2.8
1φ 8+1φ16	27.0		.23	.11	0.0	.00	.00	32.7		.31	.19	0.0	.00	.00	20.0	41.1	21.4	14.56	3.0
1φ10+1φ16	29.6		.27	.13	0.0	.00	.00	35.8		.35	.20	0.0	.00	.00	20.0	41.1	21.5	14.58	3.2
1φ12+1φ16	32.7		.31	.14	0.0	.00	.00	39.2		.40	.21	45.3	.06	.26	20.0	41.1	21.5	14.60	3.5
2φ16	39.9		.41	.16	46.2	.06	.19	47.0		.52	.22	57.4	.08	.27	20.8	41.9	21.7	14.65	4.0
4φ12	44.1		.46	.14	52.3	.07	.19	51.6		.57	.19	64.9	.09	.26	21.4	42.5	21.9	14.70	4.4
2φ16+1φ12	48.1		.53	.17	58.9	.08	.23	61.4	1φ12	.52	.22	73.0	.10	.31	21.3	42.4	22.0	14.72	4.7
3φ16	53.5		.61	.17	68.4	.09	.23	68.0	1φ12	.62	.22	84.7	.12	.30	21.2	42.4	22.2	14.76	5.2
4φ16	71.1	1φ12	.66	.17	90.0	.13	.22	97.4	2φ16	.52	.22	111.1	.16	.28	21.2	42.4	22.6	14.87	6.2

ESFUERZO CORTANTE Vsu (12) (kN/m)
(kN/m)
b,lím (mm) : 180
710

VE.20 (simple celosía) : 21.1
VE.20 (doble celosía) : 42.2
Vcu,lím (kN/m) (VE.20) : 39.9
(VE.22) : 157.4

VE.22 (simple celosía) : 20.8
VE.22 (doble celosía) : 41.6

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS ARMADAS
MODELO VE

PREFABRICADOS NAVARRO, S.A.

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

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja nº 12 de 28

MARCADO CE

1170/CPD/PH.00988.01

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 kN/m (11)	Vu = Vcu+Vsu 1*Cel	2*Cel	Wk mm	CLASE POR RECUBRIM. (7)	MOMENTO DE FISURACION Mf m·kN/m (8)	RIGIDEZ TOTAL FISURADA (8) E·Ib m2·MN/m	E·If	MOMENTO SERVICIO FIS.COMP. m·kN/m(6)
(22+ 5)	VE.20	1	0φ 0	14.5	.02	40.4	76.8	113.2	.11	IIa	14.6	21.48	1.47	36.1
* 83. D	VE.22	2	1φ 6	21.6	.03	40.4	76.8	113.2	.15	IIa	14.9	21.76	2.13	44.5
		3	1φ 8	27.1	.03	40.3	76.7	113.0	.20	IIa	15.1	21.98	2.62	49.7
		4	1φ 6+1φ 6	27.7	.03	39.5	74.6	109.8	.17	IIa	15.0	21.92	2.57	48.4
		5	1φ10	34.0	.04	40.3	76.5	112.8	.24	IIa	15.3	22.25	3.23	55.3
		6	1φ 8+1φ 8	37.7	.05	39.1	73.8	108.5	.20	IIa	15.3	22.24	3.37	55.4
		7	1φ12	42.4	.05	40.2	76.3	112.4	.26	IIa	15.6	22.56	3.93	61.2
		8	1φ10+1φ 8	44.5	.05	39.3	74.1	109.0	.23	IIa	15.5	22.50	3.95	60.2
		9	1φ12+1φ 6	48.3	.06	39.7	75.1	110.6	.25	IIa	15.7	22.70	4.33	63.6
		10	1φ10+1φ10	50.3	.06	38.9	73.2	107.5	.22	IIa	15.7	22.64	4.33	62.6
		11	1φ12+1φ 8	52.8	.07	39.4	74.3	109.3	.25	IIa	15.8	22.80	4.63	65.4
		12	1φ12+1φ10	58.5	.07	39.0	73.5	108.0	.24	IIa	16.0	22.94	5.00	67.4
		13	1φ16	63.0	.08	40.0	75.8	111.6	.29	IIa	16.3	23.31	5.60	72.8
		14	1φ12+1φ12	65.3	.08	38.6	72.7	106.7	.23	IIa	16.1	23.10	5.43	69.7
		15	1φ16+1φ 8	73.2	.09	39.4	74.5	109.6	.27	IIa	16.5	23.56	6.25	75.9
		16	1φ16+1φ10	78.7	.10	39.1	73.9	108.6	.27	IIa	16.6	23.69	6.58	77.5
		17	1φ16+1φ12	85.3	.11	38.9	73.2	107.5	.26	IIa	16.8	23.83	6.98	79.3
		18	1φ16+1φ16	101.6	.14	40.2	73.7	107.2	.25	IIa	17.2	24.20	7.94	83.2

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu m·kN/m (5)	Ref. inf. vig. (9)	Rel. x/d (10)	Wk mm (7)	Sección maciza Mu m·kN/m (5)	Rel. x/d (10)	Wk mm (7)	B500 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu m·kN/m (5)	Ref. inf. vig. (9)	Rel. x/d (10)	Wk mm (7)	Sección maciza Mu m·kN/m (5)	Rel. x/d (10)	Wk mm (7)	ESF.CORTANTE ULTIMO Vcu kN/m (11)	Vu 1*cel.	MOMENTO FISUR. Mf m·kN/m (8)	RIGIDEZ TOTAL FIS. (8) E·Ib m2·MN/m	E·If
1φ10	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	40.2	76.3	24.9	21.00	1.7
2φ 8	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	40.3	76.4	24.9	21.03	1.9
1φ12	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	40.1	76.2	25.0	21.04	2.0
1φ 8+1φ10	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	40.2	76.3	25.0	21.06	2.2
2φ10	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	40.2	76.3	25.1	21.09	2.4
1φ 8+1φ12	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	40.1	76.3	25.1	21.10	2.5
1φ10+1φ12	0.0		.00	.00	0.0	.00	.00	17.5		.11	.13	0.0	.00	.00	40.1	76.2	25.2	21.13	2.7
2φ12	0.0		.00	.00	0.0	.00	.00	27.3		.13	.12	0.0	.00	.00	40.1	76.2	25.3	21.16	3.0
1φ 8+1φ16	18.2		.12	.11	0.0	.00	.00	30.0		.15	.14	0.0	.00	.00	39.9	76.1	25.3	21.18	3.2
1φ10+1φ16	26.8		.13	.11	0.0	.00	.00	33.1		.16	.17	0.0	.00	.00	39.9	76.1	25.4	21.21	3.4
1φ12+1φ16	29.9		.15	.10	0.0	.00	.00	36.9		.18	.19	0.0	.00	.00	39.9	76.1	25.5	21.25	3.7
2φ16	37.5		.19	.14	0.0	.00	.00	46.0		.23	.22	49.4	.07	.21	39.8	76.0	25.7	21.32	4.3
4φ12	42.2		.21	.13	44.9	.06	.14	51.5		.26	.19	55.8	.08	.22	40.1	76.2	25.8	21.40	4.7
2φ16+1φ12	47.1		.24	.17	50.6	.07	.19	57.2		.31	.23	62.9	.09	.28	39.9	76.0	26.0	21.44	5.1
3φ16	54.0		.29	.17	58.9	.08	.20	65.0		.37	.23	73.0	.10	.28	39.8	76.0	26.2	21.52	5.6
4φ16	68.6		.39	.18	77.6	.11	.22	81.2		.49	.23	96.0	.14	.29	39.8	76.0	26.6	21.72	6.8

ESFUERZO CORTANTE Vsu (12) (kN/m)
(kN/m)
b,lím (mm) : 300
830

VE.20 (simple celosía) : 36.1
VE.20 (doble celosía) : 72.2
Vcu,lím (kN/m) (VE.20) : 56.9
(VE.22) : 157.4

VE.22 (simple celosía) : 35.6
VE.22 (doble celosía) : 71.3

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS ARMADAS
MODELO VE

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

MARCADO CE

1170/CPD/PH.00988.01

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 kN/m (11)	Vu = Vcu+Vsu 1*Cel	2*Cel	Wk mm	CLASE POR RECUBRIM. (7)	MOMENTO DE FISURACION Mf m·kN/m (8)	RIGIDEZ TOTAL FISURADA E·Ib (8) m2·MN/m	E·If	MOMENTO SERVICIO FIS.COMP. m·kN/m(6)
(25+ 4)	VE.20	1	0φ 0	0.0	.00	21.3	44.4	67.4	.00	IIa	10.4	17.75	1.05	0.0
* 71.	VE.22	2	1φ 6	13.7	.01	21.3	44.4	67.4	.10	IIa	10.5	17.98	1.53	38.7
		3	1φ 8	17.3	.02	21.3	44.3	67.3	.15	IIa	10.7	18.17	1.89	43.4
		4	1φ 6+1φ 6	17.7	.02	20.8	43.2	65.5	.13	IIa	10.6	18.13	1.87	42.5
		5	1φ10	21.7	.02	21.2	44.2	67.1	.18	IIa	10.8	18.39	2.33	48.5
		6	1φ 8+1φ 8	24.2	.03	20.7	42.7	64.8	.16	IIa	10.8	18.41	2.47	48.9
		7	1φ12	27.1	.03	21.2	44.1	67.0	.21	IIa	11.0	18.66	2.86	53.8
		8	1φ10+1φ 8	28.6	.03	20.7	42.9	65.0	.19	IIa	11.0	18.64	2.90	53.3
		9	1φ12+1φ 6	31.0	.03	21.0	43.4	65.9	.21	IIa	11.1	18.79	3.18	56.3
		10	1φ10+1φ10	32.5	.03	20.5	42.4	64.2	.19	IIa	11.1	18.77	3.20	55.7
		11	1φ12+1φ 8	34.0	.04	20.8	43.0	65.2	.20	IIa	11.2	18.90	3.41	58.1
		12	1φ12+1φ10	37.8	.04	20.6	42.5	64.5	.20	IIa	11.3	19.04	3.71	60.2
		13	1φ16	40.6	.04	21.1	43.8	66.5	.24	IIa	11.5	19.31	4.12	64.7
		14	1φ12+1φ12	42.4	.05	20.4	42.1	63.7	.20	IIa	11.4	19.20	4.05	62.5
		15	1φ16+1φ 8	47.4	.05	20.8	43.1	65.4	.23	IIa	11.7	19.55	4.64	67.9
		16	1φ16+1φ10	51.1	.05	20.7	42.7	64.8	.23	IIa	11.8	19.68	4.91	69.6
		17	1φ16+1φ12	55.6	.06	20.7	42.5	64.3	.23	IIa	11.9	19.83	5.25	71.5
		18	1φ16+1φ16	66.8	.07	21.6	43.0	64.3	.23	IIa	12.2	20.21	6.04	75.6

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu m·kN/m (5)	Ref. inf. vig. (9)	Rel. x/d (10)	Wk mm (7)	Sección maciza Mu m·kN/m (5)	Rel. x/d (10)	Wk mm (7)	B500 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu m·kN/m (5)	Ref. inf. vig. (9)	Rel. x/d (10)	Wk mm (7)	Sección maciza Mu m·kN/m (5)	Rel. x/d (10)	Wk mm (7)	ESF.CORTANTE ULTIMO Vcu kN/m (11)	Vu 1*cel.	MOMENTO FISUR. Mf m·kN/m (8)	RIGIDEZ TOTAL FIS. E·Ib (8) m2·MN/m	E·If
1φ10	0.0		.00	.00	0.0	.00	.00	9.2		.08	.12	0.0	.00	.00	21.2	44.1	22.5	17.34	1.7
2φ 8	0.0		.00	.00	0.0	.00	.00	11.8		.11	.11	0.0	.00	.00	21.2	44.1	22.6	17.37	2.0
1φ12	10.5		.10	.10	0.0	.00	.00	13.0		.12	.13	0.0	.00	.00	21.1	44.0	22.6	17.37	2.1
1φ 8+1φ10	12.0		.11	.10	0.0	.00	.00	14.8		.14	.12	0.0	.00	.00	21.2	44.1	22.7	17.40	2.3
2φ10	14.5		.13	.09	0.0	.00	.00	23.7		.17	.11	0.0	.00	.00	21.2	44.1	22.7	17.42	2.6
1φ 8+1φ12	15.0		.14	.10	0.0	.00	.00	24.6		.17	.12	0.0	.00	.00	21.2	44.0	22.8	17.43	2.7
1φ10+1φ12	23.1		.16	.09	0.0	.00	.00	28.4		.20	.13	0.0	.00	.00	21.2	44.0	22.8	17.45	3.0
2φ12	26.9		.19	.09	0.0	.00	.00	32.9		.25	.16	0.0	.00	.00	21.1	44.0	22.9	17.49	3.3
1φ 8+1φ16	29.5		.22	.12	0.0	.00	.00	35.9		.28	.20	0.0	.00	.00	21.1	44.0	23.0	17.50	3.5
1φ10+1φ16	32.4		.24	.14	0.0	.00	.00	39.3		.32	.21	0.0	.00	.00	21.1	44.0	23.1	17.53	3.8
1φ12+1φ16	35.9		.28	.15	0.0	.00	.00	43.2		.37	.22	0.0	.00	.00	21.1	44.0	23.2	17.56	4.1
2φ16	43.9		.38	.16	50.2	.06	.18	52.0		.48	.22	62.4	.07	.27	21.6	44.4	23.4	17.63	4.8
4φ12	48.6		.43	.14	56.8	.07	.19	57.2		.53	.19	70.5	.08	.26	22.5	45.4	23.6	17.70	5.2
2φ16+1φ12	53.2		.49	.17	64.0	.07	.23	62.0		.60	.22	79.5	.09	.32	22.6	45.5	23.7	17.73	5.6
3φ16	59.5		.57	.17	74.4	.09	.23	75.4	1φ12	.58	.23	92.3	.11	.31	22.6	45.5	24.0	17.79	6.2
4φ16	78.9	1φ12	.62	.17	98.0	.12	.22	107.4	2φ16	.48	.23	121.1	.15	.29	22.6	45.5	24.5	17.95	7.5

ESFUERZO CORTANTE Vsu (12) (kN/m)

(kN/m)

b,lím (mm) : 157

710

VE.20 (simple celosía) : 22.8

VE.20 (doble celosía) : 45.7

Vcu,lím (kN/m) (VE.20) : 36.6

(VE.22) : 165.9

VE.22 (simple celosía) : 22.5

VE.22 (doble celosía) : 45.1

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS ARMADAS
MODELO VE

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

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja nº 14 de 28

MARCADO CE

1170/CPD/PH.00988.01

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 kN/m (11)	Vu = Vcu+Vsu 1*Cel	2*Cel	Wk mm	CLASE POR RECUBRIM. (7)	MOMENTO DE FISURACION Mf m·kN/m (8)	RIGIDEZ TOTAL FISURADA E·Ib (8) m2·MN/m	E·If	MOMENTO SERVICIO FIS.COMP. m·kN/m(6)
(25+ 4)	VE.20	1	0φ 0	15.7	.02	42.5	82.0	121.4	.11	IIa	16.6	25.65	1.75	40.8
* 83. D	VE.22	2	1φ 6	23.4	.02	42.5	82.0	121.4	.15	IIa	16.9	25.96	2.53	50.2
		3	1φ 8	29.4	.03	42.5	81.8	121.2	.20	IIa	17.1	26.21	3.11	56.1
		4	1φ 6+1φ 6	30.1	.03	41.6	79.8	117.9	.17	IIa	17.1	26.14	3.07	54.9
		5	1φ10	36.9	.04	42.4	81.6	120.9	.24	IIa	17.4	26.50	3.82	62.5
		6	1φ 8+1φ 8	41.1	.04	41.3	79.0	116.7	.21	IIa	17.4	26.51	4.03	63.0
		7	1φ12	46.0	.05	42.3	81.4	120.6	.26	IIa	17.7	26.85	4.67	69.2
		8	1φ10+1φ 8	48.5	.05	41.4	79.3	117.2	.23	IIa	17.6	26.80	4.72	68.4
		9	1φ12+1φ 6	52.5	.05	41.8	80.3	118.7	.26	IIa	17.8	27.02	5.16	72.2
		10	1φ10+1φ10	54.9	.06	41.0	78.4	115.7	.23	IIa	17.8	26.96	5.19	71.3
		11	1φ12+1φ 8	57.5	.06	41.5	79.5	117.5	.25	IIa	17.9	27.15	5.52	74.3
		12	1φ12+1φ10	63.8	.07	41.1	78.7	116.2	.24	IIa	18.1	27.31	5.98	76.7
		13	1φ16	68.5	.07	42.1	81.0	119.8	.29	IIa	18.4	27.71	6.66	82.3
		14	1φ12+1φ12	71.3	.08	40.8	77.8	114.9	.24	IIa	18.3	27.50	6.52	79.3
		15	1φ16+1φ 8	79.7	.08	41.5	79.6	117.7	.28	IIa	18.7	28.00	7.45	85.8
		16	1φ16+1φ10	85.9	.09	41.3	79.0	116.8	.27	IIa	18.8	28.15	7.87	87.4
		17	1φ16+1φ12	93.2	.10	41.0	78.4	115.7	.27	IIa	19.0	28.32	8.36	89.3
		18	1φ16+1φ16	111.4	.13	41.7	78.2	114.8	.26	IIa	19.5	28.76	9.55	93.2

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu m·kN/m (5)	Ref. inf. vig. (9)	Rel. x/d (10)	Wk mm (7)	Sección maciza Mu m·kN/m (5)	Rel. x/d (10)	Wk mm (7)	B500 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu m·kN/m (5)	Ref. inf. vig. (9)	Rel. x/d (10)	Wk mm (7)	Sección maciza Mu m·kN/m (5)	Rel. x/d (10)	Wk mm (7)	ESF.CORTANTE ULTIMO Vcu kN/m (11)	Vu 1*cel. (11)	MOMENTO FISUR. Mf m·kN/m (8)	RIGIDEZ TOTAL FIS. E·Ib (8) m2·MN/m	E·If (8)
1φ10	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	42.3	81.4	26.7	25.13	1.8
2φ 8	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	42.4	81.5	26.8	25.16	2.1
1φ12	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	42.2	81.3	26.8	25.18	2.2
1φ 8+1φ10	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	42.3	81.5	26.9	25.21	2.4
2φ10	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	42.3	81.4	26.9	25.25	2.7
1φ 8+1φ12	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	42.3	81.4	27.0	25.25	2.8
1φ10+1φ12	0.0		.00	.00	0.0	.00	.00	19.1		.10	.14	0.0	.00	.00	42.2	81.4	27.0	25.29	3.1
2φ12	0.0		.00	.00	0.0	.00	.00	29.7		.12	.13	0.0	.00	.00	42.2	81.3	27.1	25.34	3.4
1φ 8+1φ16	19.8		.11	.12	0.0	.00	.00	32.6		.13	.15	0.0	.00	.00	42.1	81.2	27.2	25.36	3.6
1φ10+1φ16	29.2		.12	.11	0.0	.00	.00	36.1		.15	.18	0.0	.00	.00	42.1	81.2	27.3	25.41	3.9
1φ12+1φ16	32.6		.13	.11	0.0	.00	.00	40.2		.17	.20	0.0	.00	.00	42.0	81.2	27.4	25.45	4.2
2φ16	40.9		.17	.15	0.0	.00	.00	50.3		.22	.23	53.6	.06	.21	42.0	81.1	27.6	25.57	5.0
4φ12	46.0		.19	.14	0.0	.00	.00	56.4		.24	.20	60.6	.07	.22	42.2	81.3	27.8	25.67	5.5
2φ16+1φ12	51.5		.22	.17	55.0	.06	.18	62.7		.28	.24	68.4	.08	.28	42.0	81.2	28.0	25.74	6.0
3φ16	59.1		.26	.18	64.0	.07	.20	71.5		.34	.24	79.4	.09	.28	42.0	81.1	28.2	25.84	6.6
4φ16	75.4		.36	.18	84.5	.10	.22	89.8		.45	.23	104.5	.12	.29	42.0	81.1	28.8	26.11	8.1

ESFUERZO CORTANTE Vsu (12) (kN/m)
(kN/m)
b,lím (mm) : 277
830

VE.20 (simple celosía) : 39.1
VE.20 (doble celosía) : 78.2
Vcu,lím (kN/m) (VE.20) : 55.3
(VE.22) : 165.9

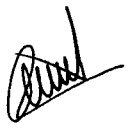
VE.22 (simple celosía) : 38.6
VE.22 (doble celosía) : 77.2

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS ARMADAS
MODELO VE

PREFABRICADOS NAVARRO, S.A.

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

TECNICO AUTOR DE LA MEMORIA : Jordi Amat



Hoja nº 15 de 28

MARCADO CE

1170/CPD/PH.00988.01

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 kN/m (11)	Vu = Vcu+Vsu 1*Cel	2*Cel	Wk mm (7)	CLASE POR RECUBRIM. (7)	MOMENTO DE FISURACION Mf m·kN/m (8)	RIGIDEZ TOTAL FISURADA (8) E·Ib m2·MN/m	E·If	MOMENTO SERVICIO FIS.COMP. m·kN/m(6)
(25+ 5)	VE.22	1	0φ 0	0.0	.00	21.8	45.4	69.1	.00	IIa	11.1	20.01	1.13	0.0
* 71.	VE.25	2	1φ 6	14.3	.01	21.8	45.4	69.1	.09	IIa	11.3	20.28	1.65	41.1
		3	1φ 8	17.9	.02	21.8	45.4	69.0	.14	IIa	11.5	20.48	2.03	46.0
		4	1φ 6+1φ 6	18.4	.02	21.4	44.3	67.1	.12	IIa	11.4	20.45	2.02	45.2
		5	1φ10	22.6	.02	21.8	45.3	68.8	.18	IIa	11.6	20.74	2.52	51.5
		6	1φ 8+1φ 8	25.2	.02	21.2	43.8	66.5	.16	IIa	11.7	20.77	2.67	52.1
		7	1φ12	28.2	.03	21.7	45.2	68.6	.21	IIa	11.8	21.04	3.09	57.2
		8	1φ10+1φ 8	29.8	.03	21.3	44.0	66.7	.19	IIa	11.8	21.02	3.14	56.8
		9	1φ12+1φ 6	32.2	.03	21.5	44.5	67.6	.21	IIa	11.9	21.20	3.43	59.9
		10	1φ10+1φ10	33.8	.03	21.1	43.5	65.9	.19	IIa	11.9	21.18	3.47	59.4
		11	1φ12+1φ 8	35.4	.03	21.3	44.1	66.9	.20	IIa	12.0	21.32	3.69	61.8
		12	1φ12+1φ10	39.3	.04	21.1	43.7	66.2	.20	IIa	12.1	21.48	4.01	64.1
		13	1φ16	42.2	.04	21.6	44.9	68.2	.24	IIa	12.3	21.77	4.45	68.7
		14	1φ12+1φ12	44.1	.04	21.0	43.2	65.4	.20	IIa	12.3	21.66	4.40	66.7
		15	1φ16+1φ 8	49.3	.05	21.4	44.2	67.0	.24	IIa	12.5	22.05	5.03	72.3
		16	1φ16+1φ10	53.2	.05	21.2	43.9	66.5	.23	IIa	12.6	22.21	5.33	74.1
		17	1φ16+1φ12	57.9	.06	21.1	43.5	65.9	.23	IIa	12.8	22.38	5.70	76.2
		18	1φ16+1φ16	69.7	.07	22.3	44.2	66.2	.23	IIa	13.1	22.81	6.58	80.9

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu m·kN/m (5)	Ref. inf. vig. (9)	Rel. x/d (10)	Wk mm (7)	Sección maciza Mu m·kN/m (5)	Rel. x/d (10)	Wk mm (7)	B500 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu m·kN/m (5)	Ref. inf. vig. (9)	Rel. x/d (10)	Wk mm (7)	Sección maciza Mu m·kN/m (5)	Rel. x/d (10)	Wk mm (7)	ESF.CORTANTE ULTIMO Vcu kN/m (11)	Vu 1*cel. (11)	MOMENTO FISUR. Mf m·kN/m (8)	RIGIDEZ TOTAL FIS. E·Ib m2·MN/m (8)	E·If (8)
1φ10	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	21.7	45.2	25.3	19.56	1.9
2φ 8	0.0		.00	.00	0.0	.00	.00	12.2		.10	.11	0.0	.00	.00	21.8	45.2	25.3	19.59	2.2
1φ12	11.0		.09	.10	0.0	.00	.00	13.6		.12	.13	0.0	.00	.00	21.7	45.1	25.4	19.59	2.4
1φ 8+1φ10	12.5		.11	.10	0.0	.00	.00	15.4		.13	.12	0.0	.00	.00	21.7	45.2	25.4	19.61	2.6
2φ10	15.0		.13	.09	0.0	.00	.00	18.6		.16	.11	0.0	.00	.00	21.7	45.2	25.5	19.64	2.9
1φ 8+1φ12	15.6		.13	.10	0.0	.00	.00	25.6		.17	.12	0.0	.00	.00	21.7	45.1	25.5	19.65	3.0
1φ10+1φ12	18.1		.16	.09	0.0	.00	.00	29.6		.20	.12	0.0	.00	.00	21.7	45.1	25.6	19.67	3.3
2φ12	28.0		.19	.09	0.0	.00	.00	34.3		.24	.14	0.0	.00	.00	21.7	45.1	25.7	19.71	3.6
1φ 8+1φ16	30.7		.21	.10	0.0	.00	.00	37.5		.27	.19	0.0	.00	.00	21.6	45.0	25.8	19.72	3.9
1φ10+1φ16	33.8		.24	.12	0.0	.00	.00	41.0		.31	.20	0.0	.00	.00	21.6	45.1	25.9	19.75	4.2
1φ12+1φ16	37.5		.27	.14	0.0	.00	.00	45.1		.36	.21	0.0	.00	.00	21.6	45.0	26.0	19.77	4.5
2φ16	45.9		.37	.16	0.0	.00	.00	54.5		.46	.22	64.9	.07	.27	21.9	45.4	26.2	19.84	5.3
4φ12	50.9		.41	.14	59.0	.06	.19	60.0		.51	.19	73.4	.08	.26	22.9	46.3	26.4	19.92	5.8
2φ16+1φ12	55.8		.48	.17	66.6	.07	.23	65.2		.58	.22	82.7	.09	.32	23.3	46.7	26.5	19.95	6.2
3φ16	62.5		.55	.17	77.4	.08	.23	79.1	1φ12	.56	.22	96.0	.11	.31	23.3	46.7	26.8	20.02	6.9
4φ16	82.9	1φ12	.60	.17	102.0	.11	.23	112.4	2φ16	.47	.23	126.1	.14	.29	23.3	46.7	27.3	20.19	8.3

ESFUERZO CORTANTE Vsu (12) (kN/m)

(kN/m)

b,lím (mm) : 169

710

VE.22 (simple celosía) : 23.4

VE.22 (doble celosía) : 46.9

Vcu,lím (kN/m) (VE.22) : 40.4

(VE.25) : 170.0

VE.25 (simple celosía) : 23.0

VE.25 (doble celosía) : 46.0

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS ARMADAS
MODELO VE

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

MARCADO CE

1170/CPD/PH.00988.01

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	CLASE POR RECUBRIM. (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)
(25+ 5)	VE.22	1	0φ 0	16.3	.02	43.6	84.0	124.4	.11	IIa	17.9	29.03	1.87	43.3
* 83. D	VE.25	2	1φ 6	24.3	.02	43.6	84.0	124.4	.14	IIa	18.2	29.39	2.72	53.4
		3	1φ 8	30.5	.03	43.5	83.9	124.2	.20	IIa	18.4	29.66	3.34	59.7
		4	1φ 6+1φ 6	31.3	.03	42.7	81.8	121.0	.16	IIa	18.4	29.60	3.31	58.5
		5	1φ10	38.3	.04	43.4	83.7	123.9	.24	IIa	18.7	29.99	4.13	66.5
		6	1φ 8+1φ 8	42.7	.04	42.3	81.0	119.8	.21	IIa	18.7	30.02	4.36	67.1
		7	1φ12	47.8	.05	43.3	83.5	123.6	.27	IIa	19.0	30.39	5.04	73.6
		8	1φ10+1φ 8	50.5	.05	42.5	81.4	120.2	.23	IIa	19.0	30.35	5.11	73.0
		9	1φ12+1φ 6	54.6	.05	42.9	82.3	121.7	.26	IIa	19.2	30.59	5.59	76.9
		10	1φ10+1φ10	57.1	.06	42.1	80.4	118.8	.23	IIa	19.2	30.54	5.63	76.1
		11	1φ12+1φ 8	59.8	.06	42.5	81.5	120.5	.25	IIa	19.3	30.75	5.99	79.2
		12	1φ12+1φ10	66.4	.07	42.2	80.7	119.3	.25	IIa	19.5	30.93	6.49	81.9
		13	1φ16	71.3	.07	43.1	83.0	122.8	.29	IIa	19.8	31.36	7.21	87.9
		14	1φ12+1φ12	74.4	.08	41.9	79.9	118.0	.24	IIa	19.7	31.16	7.09	85.0
		15	1φ16+1φ 8	83.0	.08	42.6	81.7	120.8	.28	IIa	20.1	31.71	8.09	92.1
		16	1φ16+1φ10	89.4	.09	42.4	81.1	119.8	.28	IIa	20.3	31.88	8.56	94.2
		17	1φ16+1φ12	97.2	.10	42.1	80.4	118.8	.27	IIa	20.5	32.10	9.12	96.6
		18	1φ16+1φ16	116.3	.12	42.4	80.0	117.5	.26	IIa	21.0	32.62	10.44	101.7

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu m·kN/m (5)	Ref. inf. vig. (9)	Rel. x/d (10)	Wk mm (7)	Sección maciza Mu m·kN/m (5)	Rel. x/d (10)	Wk mm (7)	B500 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu m·kN/m (5)	Ref. inf. vig. (9)	Rel. x/d (10)	Wk mm (7)	Sección maciza Mu m·kN/m (5)	Rel. x/d (10)	Wk mm (7)	ESF.CORTANTE ULTIMO Vcu kN/m (11)	Vu 1*cel.	MOMENTO FISUR. Mf m·kN/m (8)	RIGIDEZ TOTAL FIS. E·Ib m2·MN/m (8)	E·If
1φ10	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	43.3	83.5	29.9	28.43	2.1
2φ 8	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	43.5	83.6	30.0	28.47	2.4
1φ12	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	43.2	83.4	30.0	28.48	2.5
1φ 8+1φ10	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	43.4	83.5	30.1	28.51	2.7
2φ10	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	43.3	83.5	30.2	28.56	3.1
1φ 8+1φ12	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	43.3	83.4	30.2	28.56	3.1
1φ10+1φ12	0.0		.00	.00	0.0	.00	.00	19.9		.10	.14	0.0	.00	.00	43.3	83.4	30.3	28.61	3.5
2φ12	0.0		.00	.00	0.0	.00	.00	30.9		.12	.13	0.0	.00	.00	43.2	83.4	30.4	28.66	3.8
1φ 8+1φ16	0.0		.00	.00	0.0	.00	.00	34.0		.13	.15	0.0	.00	.00	43.1	83.2	30.5	28.69	4.1
1φ10+1φ16	22.9		.12	.11	0.0	.00	.00	37.6		.14	.16	0.0	.00	.00	43.1	83.2	30.5	28.73	4.4
1φ12+1φ16	33.9		.13	.11	0.0	.00	.00	41.9		.16	.18	0.0	.00	.00	43.1	83.2	30.6	28.77	4.7
2φ16	42.7		.17	.14	0.0	.00	.00	52.4		.21	.22	55.8	.06	.20	43.0	83.1	30.9	28.89	5.5
4φ12	47.9		.19	.13	0.0	.00	.00	58.8		.23	.19	63.0	.07	.22	43.2	83.4	31.1	29.00	6.1
2φ16+1φ12	53.7		.21	.16	57.2	.06	.18	65.5		.27	.23	71.1	.08	.28	43.1	83.2	31.3	29.06	6.6
3φ16	61.7		.25	.17	66.6	.07	.20	74.7		.32	.23	82.6	.09	.28	43.0	83.1	31.5	29.17	7.3
4φ16	78.9		.35	.18	87.9	.10	.22	94.1		.44	.23	108.8	.12	.29	43.0	83.1	32.1	29.44	8.9

ESFUERZO CORTANTE Vsu (12) (kN/m)

(kN/m)

b,lím (mm) : 289
830

VE.22 (simple celosía) : 40.1
VE.22 (doble celosía) : 80.2
Vcu,lím (kN/m) (VE.22) : 59.2
(VE.25) : 170.0

VE.25 (simple celosía) : 39.3
VE.25 (doble celosía) : 78.7

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
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TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja n° 17 de 28

MARCADO CE

1170/CPD/PH.00988.01

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	CLASE POR RECUBRIM. (7)	MOMENTO DE FISURACION Mf m·kN/m (8)	RIGIDEZ TOTAL FISURADA E·Ib (8)	E·If m2·MN/m	MOMENTO SERVICIO FIS.COMP. m·kN/m(6)
(26+ 4)	VE.22	1	0φ 0	0.0	.00	21.8	45.4	69.1	.00	IIa	11.0	19.52	1.13	0.0
* 71.	VE.25	2	1φ 6	14.3	.01	21.8	45.4	69.1	.10	IIa	11.2	19.78	1.65	41.1
		3	1φ 8	17.9	.02	21.8	45.4	69.0	.15	IIa	11.4	19.97	2.03	46.1
		4	1φ 6+1φ 6	18.4	.02	21.4	44.3	67.1	.13	IIa	11.3	19.94	2.02	45.2
		5	1φ10	22.6	.02	21.8	45.3	68.8	.18	IIa	11.5	20.22	2.52	51.5
		6	1φ 8+1φ 8	25.2	.02	21.2	43.8	66.5	.16	IIa	11.6	20.25	2.67	52.1
		7	1φ12	28.2	.03	21.7	45.2	68.6	.21	IIa	11.7	20.51	3.09	57.2
		8	1φ10+1φ 8	29.8	.03	21.3	44.0	66.7	.19	IIa	11.7	20.49	3.14	56.8
		9	1φ12+1φ 6	32.2	.03	21.5	44.5	67.6	.21	IIa	11.8	20.66	3.43	59.9
		10	1φ10+1φ10	33.8	.03	21.1	43.5	65.9	.19	IIa	11.8	20.64	3.47	59.4
		11	1φ12+1φ 8	35.4	.03	21.3	44.1	66.9	.20	IIa	11.9	20.77	3.69	61.8
		12	1φ12+1φ10	39.3	.04	21.1	43.7	66.2	.20	IIa	12.0	20.92	4.01	64.1
		13	1φ16	42.2	.04	21.6	44.9	68.2	.24	IIa	12.2	21.22	4.45	68.7
		14	1φ12+1φ12	44.1	.04	21.0	43.2	65.4	.20	IIa	12.2	21.10	4.40	66.7
		15	1φ16+1φ 8	49.3	.05	21.4	44.2	67.0	.24	IIa	12.4	21.48	5.03	72.3
		16	1φ16+1φ10	53.2	.05	21.2	43.9	66.5	.23	IIa	12.5	21.62	5.33	74.1
		17	1φ16+1φ12	57.9	.06	21.1	43.5	65.9	.23	IIa	12.7	21.78	5.70	76.1
		18	1φ16+1φ16	69.7	.07	22.3	44.2	66.2	.23	IIa	13.0	22.20	6.58	80.6

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu m·kN/m (5)	Ref. inf. vig. (9)	Rel. x/d (10)	Wk mm (7)	Sección maciza Mu m·kN/m (5)	Rel. x/d (10)	Wk mm (7)	B500 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu m·kN/m (5)	Ref. inf. vig. (9)	Rel. x/d (10)	Wk mm (7)	Sección maciza Mu m·kN/m (5)	Rel. x/d (10)	Wk mm (7)	ESF.CORTANTE ULTIMO Vcu kN/m (11)	Vu 1*cel.	MOMENTO FISUR. Mf m·kN/m (8)	RIGIDEZ TOTAL FIS. E·Ib (8)	E·If m2·MN/m (8)
1φ10	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	21.7	45.2	23.8	19.10	1.9
2φ 8	0.0		.00	.00	0.0	.00	.00	12.2		.10	.11	0.0	.00	.00	21.8	45.2	23.9	19.13	2.2
1φ12	11.0		.09	.10	0.0	.00	.00	13.6		.12	.13	0.0	.00	.00	21.7	45.1	23.9	19.13	2.3
1φ 8+1φ10	12.5		.11	.10	0.0	.00	.00	15.4		.13	.12	0.0	.00	.00	21.7	45.2	24.0	19.16	2.5
2φ10	15.0		.13	.09	0.0	.00	.00	24.7		.16	.11	0.0	.00	.00	21.7	45.2	24.1	19.19	2.8
1φ 8+1φ12	15.6		.13	.10	0.0	.00	.00	25.6		.17	.12	0.0	.00	.00	21.7	45.1	24.1	19.19	2.9
1φ10+1φ12	18.1		.16	.09	0.0	.00	.00	29.6		.20	.12	0.0	.00	.00	21.7	45.1	24.2	19.22	3.2
2φ12	28.0		.19	.09	0.0	.00	.00	34.3		.24	.16	0.0	.00	.00	21.7	45.1	24.3	19.25	3.6
1φ 8+1φ16	30.7		.21	.12	0.0	.00	.00	37.5		.27	.20	0.0	.00	.00	21.6	45.0	24.3	19.27	3.8
1φ10+1φ16	33.8		.24	.14	0.0	.00	.00	41.0		.31	.21	0.0	.00	.00	21.6	45.1	24.4	19.30	4.1
1φ12+1φ16	37.5		.27	.15	0.0	.00	.00	45.1		.36	.22	0.0	.00	.00	21.6	45.0	24.5	19.33	4.5
2φ16	45.9		.37	.16	0.0	.00	.00	54.5		.46	.22	64.9	.07	.27	21.9	45.4	24.8	19.41	5.2
4φ12	50.9		.42	.14	59.0	.06	.19	60.0		.52	.19	73.4	.08	.26	22.9	46.3	25.0	19.49	5.7
2φ16+1φ12	55.8		.48	.17	66.6	.07	.23	65.2		.58	.22	82.7	.09	.32	23.3	46.7	25.1	19.53	6.2
3φ16	62.4		.55	.17	77.4	.08	.23	79.1	1φ12	.56	.23	96.0	.11	.31	23.3	46.7	25.4	19.61	6.8
4φ16	82.9	1φ12	.60	.17	102.0	.11	.23	112.4	2φ16	.47	.23	126.1	.14	.29	23.3	46.7	26.0	19.78	8.2

ESFUERZO CORTANTE Vsu (12) (kN/m)

(kN/m)

b,lím (mm) : 162
710

VE.22 (simple celosía) : 23.4
VE.22 (doble celosía) : 46.9
Vcu,lím (kN/m) (VE.22) : 38.8
(VE.25) : 170.0

VE.25 (simple celosía) : 23.0
VE.25 (doble celosía) : 46.0

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS ARMADAS
MODELO VE

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

MARCADO CE

1170/CPD/PH.00988.01

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 kN/m (11)	Vu = Vcu+Vsu 1*Cel	2*Cel	Wk mm	CLASE POR RECUBRIM. (7)	MOMENTO DE FISURACION Mf m·kN/m (8)	RIGIDEZ TOTAL FISURADA E·Ib (8) m2·MN/m	E·If	MOMENTO SERVICIO FIS.COMP. m·kN/m(6)
(26+ 4)	VE.22	1	0φ 0	16.3	.02	43.6	84.0	124.4	.11	IIa	17.7	28.23	1.87	43.3
* 83. D	VE.25	2	1φ 6	24.3	.02	43.6	84.0	124.4	.14	IIa	18.0	28.57	2.72	53.4
		3	1φ 8	30.5	.03	43.5	83.9	124.2	.20	IIa	18.2	28.82	3.34	59.7
		4	1φ 6+1φ 6	31.3	.03	42.7	81.8	121.0	.16	IIa	18.2	28.76	3.31	58.5
		5	1φ10	38.3	.04	43.4	83.7	123.9	.24	IIa	18.5	29.15	4.13	66.5
		6	1φ 8+1φ 8	42.7	.04	42.3	81.0	119.8	.21	IIa	18.5	29.17	4.36	67.1
		7	1φ12	47.8	.05	43.3	83.5	123.6	.27	IIa	18.8	29.53	5.04	73.6
		8	1φ10+1φ 8	50.5	.05	42.5	81.4	120.2	.23	IIa	18.8	29.48	5.11	72.9
		9	1φ12+1φ 6	54.6	.05	42.9	82.3	121.7	.26	IIa	19.0	29.72	5.59	76.9
		10	1φ10+1φ10	57.1	.06	42.1	80.4	118.8	.23	IIa	19.0	29.66	5.63	76.1
		11	1φ12+1φ 8	59.8	.06	42.5	81.5	120.5	.25	IIa	19.1	29.85	5.99	79.1
		12	1φ12+1φ10	66.4	.07	42.2	80.7	119.3	.25	IIa	19.3	30.03	6.49	81.8
		13	1φ16	71.3	.07	43.1	83.0	122.8	.30	IIa	19.6	30.45	7.21	87.5
		14	1φ12+1φ12	74.4	.08	41.9	79.9	118.0	.24	IIa	19.5	30.25	7.09	84.6
		15	1φ16+1φ 8	83.0	.08	42.6	81.7	120.8	.28	IIa	19.9	30.77	8.09	91.3
		16	1φ16+1φ10	89.4	.09	42.4	81.1	119.8	.28	IIa	20.1	30.94	8.55	93.1
		17	1φ16+1φ12	97.2	.10	42.1	80.4	118.8	.27	IIa	20.3	31.14	9.10	95.1
		18	1φ16+1φ16	116.3	.12	42.4	80.0	117.5	.26	IIa	20.7	31.63	10.41	99.3

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu m·kN/m (5)	Ref. inf. vig. (9)	Rel. x/d (10)	Wk mm (7)	Sección maciza Mu m·kN/m (5)	Rel. x/d (10)	Wk mm (7)	B500 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu m·kN/m (5)	Ref. inf. vig. (9)	Rel. x/d (10)	Wk mm (7)	Sección maciza Mu m·kN/m (5)	Rel. x/d (10)	Wk mm (7)	ESF.CORTANTE ULTIMO Vcu kN/m (11)	Vu 1*cel. (11)	MOMENTO FISUR. Mf m·kN/m (8)	RIGIDEZ TOTAL FIS. E·Ib (8) m2·MN/m	E·If (8)
1φ10	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	43.3	83.5	28.3	27.67	2.0
2φ 8	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	43.5	83.6	28.4	27.71	2.3
1φ12	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	43.2	83.4	28.4	27.72	2.5
1φ 8+1φ10	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	43.4	83.5	28.5	27.75	2.7
2φ10	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	43.3	83.5	28.5	27.80	3.0
1φ 8+1φ12	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	43.3	83.4	28.6	27.80	3.1
1φ10+1φ12	0.0		.00	.00	0.0	.00	.00	19.9		.10	.14	0.0	.00	.00	43.3	83.4	28.7	27.85	3.4
2φ12	0.0		.00	.00	0.0	.00	.00	30.9		.12	.13	0.0	.00	.00	43.2	83.4	28.8	27.91	3.8
1φ 8+1φ16	0.0		.00	.00	0.0	.00	.00	34.0		.13	.15	0.0	.00	.00	43.1	83.2	28.8	27.94	4.0
1φ10+1φ16	30.4		.12	.11	0.0	.00	.00	37.6		.14	.18	0.0	.00	.00	43.1	83.2	28.9	27.98	4.3
1φ12+1φ16	33.9		.13	.11	0.0	.00	.00	41.9		.16	.20	0.0	.00	.00	43.1	83.2	29.0	28.04	4.6
2φ16	42.7		.17	.15	0.0	.00	.00	52.4		.21	.23	55.8	.06	.20	43.0	83.1	29.3	28.17	5.5
4φ12	47.9		.19	.14	0.0	.00	.00	58.8		.23	.20	63.0	.07	.22	43.2	83.4	29.5	28.27	6.0
2φ16+1φ12	53.7		.21	.17	57.2	.06	.18	65.5		.27	.24	71.1	.08	.28	43.1	83.2	29.7	28.34	6.5
3φ16	61.7		.25	.18	66.6	.07	.20	74.7		.32	.24	82.6	.09	.28	43.0	83.1	29.9	28.47	7.3
4φ16	78.9		.35	.18	87.9	.10	.22	94.1		.44	.23	108.8	.12	.29	43.0	83.1	30.5	28.76	8.8

ESFUERZO CORTANTE Vsu (12) (kN/m)
(kN/m)
b,lím (mm) : 282
830

VE.22 (simple celosía) : 40.1
VE.22 (doble celosía) : 80.2
Vcu,lím (kN/m) (VE.22) : 57.7
(VE.25) : 170.0

VE.25 (simple celosía) : 39.3
VE.25 (doble celosía) : 78.7

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS ARMADAS
MODELO VE

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

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja nº 19 de 28

MARCADO CE

1170/CPD/PH.00988.01

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 kN/m (11)	Vu = Vcu+Vsu 1*Cel	2*Cel	Wk mm	CLASE POR RECUBRIM. (7)	MOMENTO DE FISURACION Mf m·kN/m (8)	RIGIDEZ TOTAL FISURADA E·Ib (8) m2·MN/m	E·If	MOMENTO SERVICIO FIS.COMP. m·kN/m(6)
(26+ 5)	VE.22	1	0φ 0	0.0	.00	22.3	46.8	71.3	.00	IIa	11.9	21.97	1.22	0.0
* 71.	VE.25	2	1φ 6	14.8	.01	22.3	46.8	71.3	.09	IIa	12.0	22.25	1.77	43.4
		3	1φ 8	18.6	.02	22.3	46.8	71.2	.14	IIa	12.2	22.47	2.20	48.7
		4	1φ 6+1φ 6	19.1	.02	21.9	45.7	69.4	.12	IIa	12.2	22.44	2.19	47.8
		5	1φ10	23.4	.02	22.3	46.7	71.1	.18	IIa	12.4	22.75	2.72	54.4
		6	1φ 8+1φ 8	26.2	.02	21.7	45.2	68.7	.16	IIa	12.4	22.79	2.89	55.2
		7	1φ12	29.2	.03	22.2	46.6	70.9	.21	IIa	12.6	23.07	3.33	60.5
		8	1φ10+1φ 8	30.9	.03	21.8	45.4	69.0	.19	IIa	12.6	23.06	3.39	60.2
		9	1φ12+1φ 6	33.5	.03	22.0	45.9	69.8	.21	IIa	12.7	23.25	3.71	63.4
		10	1φ10+1φ10	35.1	.03	21.6	44.9	68.2	.19	IIa	12.7	23.24	3.75	63.0
		11	1φ12+1φ 8	36.7	.03	21.8	45.5	69.2	.20	IIa	12.8	23.38	3.99	65.5
		12	1φ12+1φ10	40.9	.04	21.7	45.1	68.4	.20	IIa	12.9	23.55	4.35	68.0
		13	1φ16	43.8	.04	22.1	46.3	70.5	.24	IIa	13.1	23.86	4.81	72.7
		14	1φ12+1φ12	45.9	.04	21.5	44.6	67.7	.20	IIa	13.0	23.75	4.77	70.8
		15	1φ16+1φ 8	51.2	.05	21.9	45.6	69.3	.24	IIa	13.3	24.17	5.44	76.6
		16	1φ16+1φ10	55.3	.05	21.7	45.3	68.8	.23	IIa	13.4	24.33	5.77	78.6
		17	1φ16+1φ12	60.2	.06	21.6	44.9	68.2	.23	IIa	13.6	24.53	6.18	80.8
		18	1φ16+1φ16	72.5	.07	22.7	45.6	68.4	.23	IIa	13.9	25.01	7.15	86.0

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu m·kN/m (5)	Ref. inf. vig. (9)	Rel. x/d (10)	Wk mm (7)	Sección maciza Mu m·kN/m (5)	Rel. x/d (10)	Wk mm (7)	B500 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu m·kN/m (5)	Ref. inf. vig. (9)	Rel. x/d (10)	Wk mm (7)	Sección maciza Mu m·kN/m (5)	Rel. x/d (10)	Wk mm (7)	ESF.CORTANTE ULTIMO Vcu kN/m (11)	Vu 1*cel. (11)	MOMENTO FISUR. Mf m·kN/m (8)	RIGIDEZ TOTAL FIS. E·Ib (8) m2·MN/m	E·If (8)
1φ10	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	22.2	46.6	26.7	21.48	2.0
2φ 8	0.0		.00	.00	0.0	.00	.00	12.7		.10	.11	0.0	.00	.00	22.3	46.6	26.8	21.51	2.4
1φ12	11.4		.09	.11	0.0	.00	.00	14.1		.11	.13	0.0	.00	.00	22.2	46.5	26.9	21.52	2.5
1φ 8+1φ10	13.0		.10	.10	0.0	.00	.00	16.0		.13	.12	0.0	.00	.00	22.3	46.6	26.9	21.55	2.8
2φ10	15.6		.12	.09	0.0	.00	.00	19.3		.15	.11	0.0	.00	.00	22.2	46.6	27.0	21.58	3.1
1φ 8+1φ12	16.2		.13	.10	0.0	.00	.00	26.6		.16	.13	0.0	.00	.00	22.2	46.5	27.0	21.58	3.2
1φ10+1φ12	18.8		.15	.09	0.0	.00	.00	30.8		.19	.12	0.0	.00	.00	22.2	46.5	27.1	21.61	3.5
2φ12	29.1		.18	.09	0.0	.00	.00	35.8		.23	.14	0.0	.00	.00	22.2	46.5	27.2	21.65	3.9
1φ 8+1φ16	32.0		.20	.10	0.0	.00	.00	39.1		.26	.19	0.0	.00	.00	22.1	46.5	27.3	21.67	4.2
1φ10+1φ16	35.2		.23	.12	0.0	.00	.00	42.8		.30	.20	0.0	.00	.00	22.1	46.5	27.4	21.70	4.5
1φ12+1φ16	39.0		.26	.14	0.0	.00	.00	47.1		.34	.21	0.0	.00	.00	22.1	46.4	27.5	21.73	4.9
2φ16	47.9		.36	.16	0.0	.00	.00	57.1		.45	.22	67.4	.07	.27	22.3	46.6	27.7	21.80	5.7
4φ12	53.1		.40	.14	61.3	.06	.19	62.8		.50	.19	76.2	.08	.26	23.2	47.6	28.0	21.88	6.3
2φ16+1φ12	58.4		.46	.17	69.1	.07	.23	68.4		.56	.22	85.9	.09	.32	24.0	48.3	28.1	21.92	6.7
3φ16	65.4		.53	.17	80.4	.08	.23	82.9	1φ12	.54	.23	99.8	.10	.31	23.9	48.3	28.3	22.00	7.5
4φ16	86.9	1φ12	.58	.17	106.0	.11	.23	107.5	2φ12	.62	.22	131.1	.14	.29	23.9	48.3	28.9	22.19	9.0

ESFUERZO CORTANTE Vsu (12) (kN/m)

(kN/m)

b,lím (mm) : 162

710

VE.22 (simple celosía) : 24.3

VE.22 (doble celosía) : 48.6

Vcu,lím (kN/m) (VE.22) : 39.7

(VE.25) : 174.2

VE.25 (simple celosía) : 23.8

VE.25 (doble celosía) : 47.7

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS ARMADAS
MODELO VE

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

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja nº 20 de 28

MARCADO CE

1170/CPD/PH.00988.01

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 kN/m (11)	Vu = Vcu+Vsu 1*Cel	2*Cel	Wk mm	CLASE POR RECUBRIM. (7)	MOMENTO DE FISURACION Mf m·kN/m (8)	RIGIDEZ TOTAL FISURADA (8) E·Ib m2·MN/m	E·If	MOMENTO SERVICIO FIS.COMP. m·kN/m(6)
(26+ 5)	VE.22	1	0φ 0	0.0	.00	44.6	86.5	128.4	.00	IIa	19.1	31.87	2.02	0.0
* 83. D	VE.25	2	1φ 6	25.2	.02	44.6	86.5	128.4	.13	IIa	19.4	32.25	2.94	56.4
		3	1φ 8	31.6	.03	44.5	86.4	128.2	.20	IIa	19.6	32.55	3.62	63.1
		4	1φ 6+1φ 6	32.5	.03	43.7	84.4	125.0	.16	IIa	19.6	32.48	3.59	62.0
		5	1φ10	39.8	.03	44.5	86.2	127.9	.24	IIa	19.9	32.90	4.46	70.3
		6	1φ 8+1φ 8	44.4	.04	43.4	83.6	123.8	.21	IIa	19.9	32.94	4.73	71.2
		7	1φ12	49.6	.04	44.4	86.0	127.6	.27	IIa	20.2	33.33	5.44	77.9
		8	1φ10+1φ 8	52.5	.05	43.5	83.9	124.3	.23	IIa	20.2	33.29	5.54	77.3
		9	1φ12+1φ 6	56.7	.05	43.9	84.8	125.8	.26	IIa	20.4	33.56	6.04	81.4
		10	1φ10+1φ10	59.4	.06	43.1	83.0	122.8	.23	IIa	20.4	33.51	6.11	80.7
		11	1φ12+1φ 8	62.2	.06	43.6	84.1	124.6	.25	IIa	20.5	33.73	6.49	83.9
		12	1φ12+1φ10	69.1	.06	43.3	83.3	123.3	.25	IIa	20.7	33.93	7.04	86.9
		13	1φ16	74.0	.07	44.2	85.5	126.8	.30	IIa	21.0	34.38	7.79	93.0
		14	1φ12+1φ12	77.4	.07	42.9	82.5	122.0	.24	IIa	20.9	34.18	7.70	90.3
		15	1φ16+1φ 8	86.3	.08	43.7	84.2	124.8	.28	IIa	21.4	34.75	8.76	97.6
		16	1φ16+1φ10	93.0	.09	43.4	83.6	123.8	.28	IIa	21.6	34.96	9.28	99.9
		17	1φ16+1φ12	101.1	.10	43.1	83.0	122.8	.27	IIa	21.8	35.20	9.89	102.5
		18	1φ16+1φ16	121.1	.12	43.1	82.2	121.2	.26	IIa	22.3	35.77	11.35	108.0

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu m·kN/m (5)	Ref. inf. vig. (9)	Rel. x/d (10)	Wk mm (7)	Sección maciza Mu m·kN/m (5)	Rel. x/d (10)	Wk mm (7)	B500 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu m·kN/m (5)	Ref. inf. vig. (9)	Rel. x/d (10)	Wk mm (7)	Sección maciza Mu m·kN/m (5)	Rel. x/d (10)	Wk mm (7)	ESF.CORTANTE ULTIMO Vcu kN/m (11)	Vu 1*cel. (11)	MOMENTO FISUR. Mf m·kN/m (8)	RIGIDEZ TOTAL FIS. E·Ib m2·MN/m (8)	E·If
1φ10	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	44.4	86.0	31.7	31.24	2.2
2φ 8	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	44.5	86.1	31.8	31.27	2.5
1φ12	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	44.3	85.9	31.8	31.28	2.7
1φ 8+1φ10	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	44.4	86.0	31.9	31.32	2.9
2φ10	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	44.4	86.0	32.0	31.37	3.3
1φ 8+1φ12	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	44.4	86.0	32.0	31.38	3.3
1φ10+1φ12	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	44.3	85.9	32.1	31.42	3.7
2φ12	0.0		.00	.00	0.0	.00	.00	24.1		.11	.13	0.0	.00	.00	44.3	85.9	32.2	31.48	4.1
1φ 8+1φ16	0.0		.00	.00	0.0	.00	.00	35.3		.12	.15	0.0	.00	.00	44.2	85.8	32.2	31.51	4.4
1φ10+1φ16	23.8		.11	.12	0.0	.00	.00	39.1		.14	.15	0.0	.00	.00	44.2	85.8	32.3	31.56	4.7
1φ12+1φ16	35.3		.12	.11	0.0	.00	.00	43.5		.16	.18	0.0	.00	.00	44.2	85.8	32.4	31.62	5.0
2φ16	44.4		.16	.14	0.0	.00	.00	54.5		.20	.22	57.9	.06	.19	44.1	85.7	32.7	31.75	6.0
4φ12	49.9		.18	.13	0.0	.00	.00	61.2		.23	.19	65.5	.06	.21	44.3	85.9	32.9	31.85	6.5
2φ16+1φ12	55.8		.20	.16	59.4	.06	.17	68.2		.26	.23	73.8	.07	.27	44.1	85.7	33.1	31.93	7.1
3φ16	64.3		.25	.17	69.1	.07	.19	78.0		.31	.23	85.9	.09	.28	44.1	85.7	33.4	32.06	7.9
4φ16	82.3		.34	.18	91.3	.09	.22	98.4		.42	.23	113.1	.12	.29	44.1	85.7	34.0	32.36	9.6

ESFUERZO CORTANTE Vsu (12) (kN/m)
(kN/m)
b,lím (mm) : 282
830

VE.22 (simple celosía) : 41.6
VE.22 (doble celosía) : 83.2
Vcu,lím (kN/m) (VE.22) : 59.1
(VE.25) : 174.2

VE.25 (simple celosía) : 40.8
VE.25 (doble celosía) : 81.6

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS ARMADAS
MODELO VE

PREFABRICADOS NAVARRO, S.A.

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

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja nº 21 de 28

MARCADO CE

1170/CPD/PH.00988.01

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 kN/m (11)	Vu = Vcu+Vsu 1*Cel	2*Cel	Wk mm (7)	CLASE POR RECUBRIM.	MOMENTO DE FISURACION Mf m·kN/m (8)	RIGIDEZ TOTAL FISURADA E·Ib (8) m2·MN/m	E·If	MOMENTO SERVICIO FIS.COMP. m·kN/m(6)
(27+ 4)	VE.22	1	0φ 0	0.0	.00	22.3	46.8	71.3	.00	IIa	11.7	21.41	1.22	0.0
* 71.	VE.25	2	1φ 6	14.8	.01	22.3	46.8	71.3	.09	IIa	11.9	21.69	1.77	43.4
		3	1φ 8	18.6	.02	22.3	46.8	71.2	.14	IIa	12.1	21.89	2.20	48.7
		4	1φ 6+1φ 6	19.1	.02	21.9	45.7	69.4	.12	IIa	12.0	21.86	2.19	47.9
		5	1φ10	23.4	.02	22.3	46.7	71.1	.18	IIa	12.2	22.16	2.72	54.4
		6	1φ 8+1φ 8	26.2	.02	21.7	45.2	68.7	.16	IIa	12.3	22.20	2.89	55.2
		7	1φ12	29.2	.03	22.2	46.6	70.9	.21	IIa	12.5	22.46	3.33	60.5
		8	1φ10+1φ 8	30.9	.03	21.8	45.4	69.0	.19	IIa	12.5	22.45	3.39	60.2
		9	1φ12+1φ 6	33.5	.03	22.0	45.9	69.8	.21	IIa	12.6	22.64	3.71	63.4
		10	1φ10+1φ10	35.1	.03	21.6	44.9	68.2	.19	IIa	12.6	22.62	3.75	63.0
		11	1φ12+1φ 8	36.7	.03	21.8	45.5	69.2	.21	IIa	12.7	22.76	3.99	65.5
		12	1φ12+1φ10	40.9	.04	21.7	45.1	68.4	.20	IIa	12.8	22.92	4.35	68.0
		13	1φ16	43.8	.04	22.1	46.3	70.5	.24	IIa	13.0	23.23	4.81	72.7
		14	1φ12+1φ12	45.9	.04	21.5	44.6	67.7	.20	IIa	12.9	23.12	4.77	70.8
		15	1φ16+1φ 8	51.2	.05	21.9	45.6	69.3	.24	IIa	13.2	23.52	5.44	76.6
		16	1φ16+1φ10	55.3	.05	21.7	45.3	68.8	.23	IIa	13.3	23.67	5.77	78.6
		17	1φ16+1φ12	60.2	.06	21.6	44.9	68.2	.23	IIa	13.5	23.85	6.18	80.8
		18	1φ16+1φ16	72.5	.07	22.7	45.6	68.4	.23	IIa	13.8	24.31	7.15	85.5

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu m·kN/m (5)	Ref. inf. vig. (9)	Rel. x/d (10)	Wk mm (7)	Sección maciza Mu m·kN/m (5)	Rel. x/d (10)	Wk mm (7)	B500 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu m·kN/m (5)	Ref. inf. vig. (9)	Rel. x/d (10)	Wk mm (7)	Sección maciza Mu m·kN/m (5)	Rel. x/d (10)	Wk mm (7)	ESF.CORTANTE ULTIMO Vcu kN/m (11)	Vu 1*cel.	MOMENTO FISUR. Mf m·kN/m (8)	RIGIDEZ TOTAL FIS. E·Ib (8) m2·MN/m	E·If
1φ10	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	22.2	46.6	25.2	20.95	2.0
2φ 8	0.0		.00	.00	0.0	.00	.00	12.7		.10	.11	0.0	.00	.00	22.3	46.6	25.2	20.99	2.3
1φ12	11.4		.09	.11	0.0	.00	.00	14.1		.11	.13	0.0	.00	.00	22.2	46.5	25.3	20.99	2.5
1φ 8+1φ10	13.0		.10	.10	0.0	.00	.00	16.0		.13	.12	0.0	.00	.00	22.3	46.6	25.3	21.02	2.7
2φ10	15.6		.12	.09	0.0	.00	.00	25.7		.15	.11	0.0	.00	.00	22.2	46.6	25.4	21.06	3.1
1φ 8+1φ12	16.2		.13	.10	0.0	.00	.00	26.6		.16	.13	0.0	.00	.00	22.2	46.5	25.5	21.06	3.1
1φ10+1φ12	18.8		.15	.09	0.0	.00	.00	30.8		.19	.12	0.0	.00	.00	22.2	46.5	25.5	21.10	3.5
2φ12	29.1		.18	.09	0.0	.00	.00	35.8		.23	.15	0.0	.00	.00	22.2	46.5	25.7	21.14	3.9
1φ 8+1φ16	32.0		.20	.12	0.0	.00	.00	39.1		.26	.20	0.0	.00	.00	22.1	46.5	25.7	21.16	4.1
1φ10+1φ16	35.2		.23	.13	0.0	.00	.00	42.8		.30	.21	0.0	.00	.00	22.1	46.5	25.8	21.19	4.4
1φ12+1φ16	39.0		.26	.15	0.0	.00	.00	47.1		.34	.22	0.0	.00	.00	22.1	46.4	25.9	21.23	4.8
2φ16	47.9		.36	.17	0.0	.00	.00	57.0		.45	.23	67.4	.07	.27	22.3	46.6	26.2	21.31	5.7
4φ12	53.1		.40	.14	61.3	.06	.19	62.8		.50	.19	76.2	.08	.26	23.2	47.6	26.4	21.40	6.2
2φ16+1φ12	58.4		.46	.17	69.1	.07	.23	68.4		.57	.23	85.9	.09	.32	24.0	48.3	26.6	21.44	6.7
3φ16	65.4		.54	.17	80.4	.08	.23	82.8	1φ12	.54	.23	99.8	.10	.31	23.9	48.3	26.8	21.53	7.4
4φ16	86.8	1φ12	.58	.18	106.0	.11	.23	117.4	2φ16	.45	.23	131.1	.14	.29	23.9	48.3	27.5	21.74	9.0

ESFUERZO CORTANTE Vsu (12) (kN/m)

(kN/m)

b,lím (mm) : 157
710

VE.22 (simple celosía) : 24.3
VE.22 (doble celosía) : 48.6
Vcu,lím (kN/m) (VE.22) : 38.5
(VE.25) : 174.2

VE.25 (simple celosía) : 23.8
VE.25 (doble celosía) : 47.7

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS ARMADAS
MODELO VE

PREFABRICADOS NAVARRO, S.A.

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

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja nº 22 de 28

MARCADO CE

1170/CPD/PH.00988.01

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 1*Cel kN/m (11)	Vu = Vcu+Vsu 2*Cel		Wk mm (7)	CLASE POR RECUBRIM. (7)	MOMENTO DE FISURACION Mf m·kN/m (8)	RIGIDEZ TOTAL FISURADA (8) E·Ib m2·MN/m	E·If	MOMENTO SERVICIO FIS.COMP. m·kN/m(6)
(27+ 4)	VE.22	1	0φ 0	0.0	.00	44.6	86.5	128.4	.00	IIa	18.9	30.96	2.02	0.0
* 83. D	VE.25	2	1φ 6	25.2	.02	44.6	86.5	128.4	.13	IIa	19.2	31.33	2.94	56.4
		3	1φ 8	31.6	.03	44.5	86.4	128.2	.20	IIa	19.4	31.61	3.62	63.1
		4	1φ 6+1φ 6	32.5	.03	43.7	84.4	125.0	.16	IIa	19.3	31.55	3.59	61.9
		5	1φ10	39.8	.03	44.5	86.2	127.9	.24	IIa	19.7	31.95	4.46	70.3
		6	1φ 8+1φ 8	44.4	.04	43.4	83.6	123.8	.21	IIa	19.7	31.98	4.73	71.1
		7	1φ12	49.6	.04	44.4	86.0	127.6	.27	IIa	20.0	32.36	5.44	77.9
		8	1φ10+1φ 8	52.5	.05	43.5	83.9	124.3	.23	IIa	20.0	32.32	5.54	77.3
		9	1φ12+1φ 6	56.7	.05	43.9	84.8	125.8	.26	IIa	20.2	32.57	6.04	81.4
		10	1φ10+1φ10	59.4	.06	43.1	83.0	122.8	.23	IIa	20.2	32.52	6.11	80.7
		11	1φ12+1φ 8	62.2	.06	43.6	84.1	124.6	.25	IIa	20.3	32.73	6.49	83.8
		12	1φ12+1φ10	69.1	.06	43.3	83.3	123.3	.25	IIa	20.5	32.92	7.04	86.6
		13	1φ16	74.0	.07	44.2	85.5	126.8	.30	IIa	20.8	33.36	7.79	92.5
		14	1φ12+1φ12	77.4	.07	42.9	82.5	122.0	.24	IIa	20.7	33.16	7.70	89.7
		15	1φ16+1φ 8	86.3	.08	43.7	84.2	124.8	.28	IIa	21.1	33.72	8.75	96.6
		16	1φ16+1φ10	93.0	.09	43.4	83.6	123.8	.28	IIa	21.3	33.90	9.27	98.5
		17	1φ16+1φ12	101.1	.10	43.1	83.0	122.8	.27	IIa	21.5	34.13	9.87	100.7
		18	1φ16+1φ16	121.1	.12	43.1	82.2	121.2	.26	IIa	22.0	34.66	11.32	105.3

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu m·kN/m (5)	Ref. inf. vig. (9)	Rel. x/d (10)	Wk mm (7)	Sección maciza Mu m·kN/m (5)	Rel. x/d (10)	Wk mm (7)	B500 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu m·kN/m (5)	Ref. inf. vig. (9)	Rel. x/d (10)	Wk mm (7)	Sección maciza Mu m·kN/m (5)	Rel. x/d (10)	Wk mm (7)	ESF.CORTANTE ULTIMO Vcu 1*cel. kN/m (11)	Vu	MQMENTO FISUR. Mf m·kN/m (8)	RIGIDEZ TOTAL FIS. (8) E·Ib m2·MN/m	E·If
1φ10	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	44.4	86.0	29.9	30.36	2.2
2φ 8	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	44.5	86.1	30.0	30.41	2.5
1φ12	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	44.3	85.9	30.0	30.43	2.6
1φ 8+1φ10	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	44.4	86.0	30.1	30.46	2.8
2φ10	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	44.4	86.0	30.2	30.52	3.2
1φ 8+1φ12	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	44.4	86.0	30.2	30.52	3.3
1φ10+1φ12	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	44.3	85.9	30.3	30.58	3.6
2φ12	0.0		.00	.00	0.0	.00	.00	32.1		.11	.13	0.0	.00	.00	44.3	85.9	30.4	30.64	4.0
1φ 8+1φ16	0.0		.00	.00	0.0	.00	.00	35.3		.12	.15	0.0	.00	.00	44.2	85.8	30.5	30.67	4.3
1φ10+1φ16	31.6		.11	.12	0.0	.00	.00	39.1		.14	.17	0.0	.00	.00	44.2	85.8	30.6	30.72	4.6
1φ12+1φ16	35.3		.12	.11	0.0	.00	.00	43.5		.16	.20	0.0	.00	.00	44.2	85.8	30.7	30.77	5.0
2φ16	44.4		.16	.15	0.0	.00	.00	54.5		.20	.23	57.9	.06	.19	44.1	85.7	31.0	30.92	5.9
4φ12	49.9		.18	.13	0.0	.00	.00	61.2		.23	.20	65.5	.06	.21	44.3	85.9	31.2	31.04	6.5
2φ16+1φ12	55.8		.20	.17	59.4	.06	.17	68.2		.26	.24	73.8	.07	.27	44.1	85.7	31.4	31.12	7.0
3φ16	64.3		.25	.18	69.1	.07	.19	78.0		.31	.24	85.9	.09	.28	44.1	85.7	31.6	31.25	7.8
4φ16	82.3		.34	.18	91.3	.09	.22	98.4		.42	.23	113.1	.12	.29	44.1	85.7	32.3	31.59	9.6

ESFUERZO CORTANTE Vsu (12) (kN/m)

(kN/m)

b,lím (mm) : 277

830

VE.22 (simple celosía) : 41.6

VE.22 (doble celosía) : 83.2

Vcu,lím (kN/m) (VE.22) : 58.1

(VE.25) : 174.2

VE.25 (simple celosía) : 40.8

VE.25 (doble celosía) : 81.6

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TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja nº 23 de 28

MARCADO CE

1170/CPD/PH.00988.01

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	Wk mm	CLASE POR RECUBRIM. (7)	MOMENTO DE FISURACION Mf m·kN/m (8)	RIGIDEZ TOTAL FISURADA E·Ib (8)	E·If m2·MN/m	MOMENTO SERVICIO FIS.COMP. m·kN/m(6)
						kN/m (11)								
(27+ 5)	VE.22	1	0φ 0	0.0	.00	22.9	48.2	73.6	.00	IIa	12.6	24.04	1.31	0.0
* 71.	VE.25	2	1φ 6	15.3	.01	22.9	48.2	73.6	.08	IIa	12.8	24.35	1.91	45.8
		3	1φ 8	19.2	.02	22.8	48.2	73.5	.14	IIa	12.9	24.58	2.36	51.3
		4	1φ 6+1φ 6	19.8	.02	22.4	47.0	71.7	.12	IIa	12.9	24.55	2.35	50.6
		5	1φ10	24.2	.02	22.8	48.1	73.3	.18	IIa	13.1	24.87	2.92	57.5
		6	1φ 8+1φ 8	27.1	.02	22.3	46.6	71.0	.16	IIa	13.2	24.93	3.12	58.4
		7	1φ12	30.3	.02	22.8	48.0	73.1	.21	IIa	13.3	25.23	3.59	63.8
		8	1φ10+1φ 8	32.1	.03	22.3	46.8	71.3	.19	IIa	13.3	25.22	3.67	63.6
		9	1φ12+1φ 6	34.7	.03	22.5	47.3	72.1	.21	IIa	13.5	25.42	4.00	67.0
		10	1φ10+1φ10	36.4	.03	22.1	46.3	70.4	.19	IIa	13.5	25.40	4.06	66.6
		11	1φ12+1φ 8	38.1	.03	22.4	46.9	71.4	.21	IIa	13.6	25.57	4.31	69.2
		12	1φ12+1φ10	42.4	.04	22.2	46.5	70.7	.20	IIa	13.7	25.75	4.70	71.9
		13	1φ16	45.4	.04	22.7	47.7	72.7	.24	IIa	13.9	26.08	5.19	76.8
		14	1φ12+1φ12	47.6	.04	22.0	46.0	70.0	.20	IIa	13.8	25.97	5.16	75.0
		15	1φ16+1φ 8	53.1	.04	22.4	47.0	71.6	.24	IIa	14.1	26.41	5.87	81.0
		16	1φ16+1φ10	57.4	.05	22.3	46.6	71.0	.23	IIa	14.2	26.59	6.24	83.2
		17	1φ16+1φ12	62.5	.05	22.1	46.3	70.4	.23	IIa	14.4	26.80	6.68	85.6
		18	1φ16+1φ16	75.4	.07	23.1	46.8	70.5	.23	IIa	14.8	27.33	7.74	91.2

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu m·kN/m (5)	Ref. inf. vig. (9)	Rel. x/d (10)	Wk mm (7)	Sección maciza Mu m·kN/m (5)	Rel. x/d (10)	Wk mm (7)	B500 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu m·kN/m (5)	Ref. inf. vig. (9)	Rel. x/d (10)	Wk mm (7)	Sección maciza Mu m·kN/m (5)	Rel. x/d (10)	Wk mm (7)	ESF.CORTANTE ULTIMO Vcu kN/m (11)	Vu 1*cel.	MOMENTO FISUR. Mf m·kN/m (8)	RIGIDEZ TOTAL FIS. E·Ib (8)	E·If m2·MN/m (8)
1φ10	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	22.8	47.9	28.2	23.53	2.2
2φ 8	0.0		.00	.00	0.0	.00	.00	13.2		.10	.11	0.0	.00	.00	22.8	48.0	28.3	23.56	2.5
1φ12	0.0		.00	.00	0.0	.00	.00	14.6		.11	.13	0.0	.00	.00	22.7	47.9	28.4	23.57	2.7
1φ 8+1φ10	13.4		.10	.10	0.0	.00	.00	16.6		.12	.12	0.0	.00	.00	22.8	48.0	28.4	23.60	2.9
2φ10	16.2		.12	.09	0.0	.00	.00	20.0		.15	.11	0.0	.00	.00	22.8	47.9	28.5	23.63	3.3
1φ 8+1φ12	16.8		.12	.10	0.0	.00	.00	20.8		.16	.13	0.0	.00	.00	22.7	47.9	28.5	23.64	3.4
1φ10+1φ12	19.5		.15	.10	0.0	.00	.00	32.0		.18	.12	0.0	.00	.00	22.7	47.9	28.6	23.67	3.8
2φ12	30.3		.17	.09	0.0	.00	.00	37.2		.22	.14	0.0	.00	.00	22.7	47.9	28.8	23.71	4.2
1φ 8+1φ16	33.2		.19	.10	0.0	.00	.00	40.6		.25	.19	0.0	.00	.00	22.6	47.8	28.8	23.73	4.5
1φ10+1φ16	36.6		.22	.12	0.0	.00	.00	44.5		.29	.20	0.0	.00	.00	22.6	47.8	28.9	23.75	4.8
1φ12+1φ16	40.6		.25	.14	0.0	.00	.00	49.1		.33	.21	0.0	.00	.00	22.6	47.8	29.0	23.79	5.2
2φ16	49.9		.34	.16	0.0	.00	.00	59.6		.43	.22	70.0	.07	.27	22.6	47.8	29.3	23.88	6.2
4φ12	55.4		.39	.14	63.5	.06	.18	65.6		.48	.19	79.0	.07	.26	23.6	48.8	29.5	23.97	6.8
2φ16+1φ12	60.9		.44	.17	71.7	.07	.23	71.6		.55	.22	89.1	.08	.32	24.6	49.8	29.7	24.02	7.3
3φ16	68.4		.52	.17	83.4	.08	.23	86.6	1φ12	.52	.23	103.5	.10	.31	24.6	49.8	30.0	24.10	8.1
4φ16	83.2		.67	.17	110.0	.10	.23	112.5	2φ12	.61	.22	136.1	.13	.30	24.6	49.8	30.6	24.31	9.8

ESFUERZO CORTANTE Vsu (12) (kN/m)

(kN/m)

b,lím (mm) : 157

710

VE.22 (simple celosía) : 25.1

VE.22 (doble celosía) : 50.3

Vcu,lím (kN/m) (VE.22) : 39.4

(VE.25) : 178.3

VE.25 (simple celosía) : 24.7

VE.25 (doble celosía) : 49.4

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS ARMADAS
MODELO VE

PREFABRICADOS NAVARRO, S.A.

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

TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja nº 24 de 28

MARCADO CE

1170/CPD/PH.00988.01

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 kN/m (11)	Vu = Vcu+Vsu 1*Cel	2*Cel	Wk mm	CLASE POR RECUBRIM. (7)	MOMENTO DE FISURACION Mf m·kN/m (8)	RIGIDEZ TOTAL FISURADA E·Ib (8) m2·MN/m	E·If	MOMENTO SERVICIO FIS.COMP. m·kN/m (6)
(27+ 5)	VE.22	1	0φ 0	0.0	.00	45.6	89.0	132.4	.00	IIa	20.3	34.88	2.19	0.0
* 83. D	VE.25	2	1φ 6	26.1	.02	45.6	89.0	132.4	.12	IIa	20.6	35.29	3.17	59.5
		3	1φ 8	32.8	.03	45.6	88.9	132.2	.20	IIa	20.8	35.61	3.90	66.6
		4	1φ 6+1φ 6	33.7	.03	44.8	86.9	129.0	.16	IIa	20.8	35.55	3.87	65.5
		5	1φ10	41.2	.03	45.5	88.7	132.0	.24	IIa	21.1	35.99	4.80	74.3
		6	1φ 8+1φ 8	46.1	.04	44.4	86.1	127.8	.21	IIa	21.2	36.04	5.11	75.3
		7	1φ12	51.4	.04	45.4	88.5	131.6	.27	IIa	21.5	36.45	5.87	82.2
		8	1φ10+1φ 8	54.4	.05	44.6	86.4	128.3	.23	IIa	21.5	36.42	5.98	81.8
		9	1φ12+1φ 6	58.8	.05	45.0	87.4	129.8	.26	IIa	21.7	36.70	6.52	86.1
		10	1φ10+1φ10	61.7	.05	44.2	85.5	126.8	.23	IIa	21.6	36.66	6.61	85.5
		11	1φ12+1φ 8	64.5	.05	44.6	86.6	128.6	.26	IIa	21.8	36.88	7.01	88.8
		12	1φ12+1φ10	71.7	.06	44.3	85.8	127.3	.25	IIa	22.0	37.11	7.62	92.0
		13	1φ16	76.8	.06	45.2	88.0	130.9	.30	IIa	22.3	37.58	8.40	98.3
		14	1φ12+1φ12	80.4	.07	44.0	85.0	126.0	.24	IIa	22.2	37.38	8.33	95.7
		15	1φ16+1φ 8	89.6	.08	44.7	86.8	128.8	.29	IIa	22.7	37.99	9.47	103.3
		16	1φ16+1φ10	96.6	.08	44.5	86.1	127.8	.28	IIa	22.9	38.22	10.03	105.8
		17	1φ16+1φ12	105.1	.09	44.2	85.5	126.8	.27	IIa	23.1	38.47	10.71	108.5
		18	1φ16+1φ16	126.0	.11	43.8	84.3	124.9	.26	IIa	23.6	39.11	12.31	114.5

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu m·kN/m (5)	Ref. inf. vig. (9)	Rel. x/d (10)	Wk mm (7)	Sección maciza Mu m·kN/m (5)	Rel. x/d (10)	Wk mm (7)	B500 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu m·kN/m (5)	Ref. inf. vig. (9)	Rel. x/d (10)	Wk mm (7)	Sección maciza Mu m·kN/m (5)	Rel. x/d (10)	Wk mm (7)	ESF.CORTANTE ULTIMO Vcu kN/m (11)	Vu 1*cel. (11)	MOMENTO FISUR. Mf m·kN/m (8)	RIGIDEZ TOTAL FIS. E·Ib m2·MN/m (8)	E·If (8)
1φ10	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	45.4	88.5	33.5	34.21	2.4
2φ 8	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	45.5	88.6	33.6	34.25	2.7
1φ12	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	45.3	88.4	33.6	34.26	2.8
1φ 8+1φ10	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	45.5	88.6	33.7	34.30	3.1
2φ10	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	45.4	88.5	33.8	34.35	3.5
1φ 8+1φ12	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	45.4	88.5	33.8	34.36	3.5
1φ10+1φ12	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	45.4	88.5	33.9	34.41	3.9
2φ12	0.0		.00	.00	0.0	.00	.00	25.0		.11	.13	0.0	.00	.00	45.3	88.4	34.0	34.48	4.4
1φ 8+1φ16	0.0		.00	.00	0.0	.00	.00	36.6		.12	.15	0.0	.00	.00	45.2	88.3	34.1	34.51	4.7
1φ10+1φ16	24.6		.11	.12	0.0	.00	.00	40.5		.13	.15	0.0	.00	.00	45.2	88.3	34.2	34.56	5.0
1φ12+1φ16	36.6		.12	.11	0.0	.00	.00	45.2		.15	.18	0.0	.00	.00	45.2	88.3	34.3	34.63	5.4
2φ16	46.1		.15	.13	0.0	.00	.00	56.7		.19	.22	0.0	.00	.00	45.1	88.2	34.6	34.76	6.4
4φ12	51.8		.17	.13	0.0	.00	.00	63.6		.22	.19	67.9	.06	.21	45.3	88.4	34.8	34.89	7.0
2φ16+1φ12	58.0		.20	.16	61.6	.06	.17	71.0		.25	.23	76.6	.07	.27	45.2	88.3	35.0	34.97	7.6
3φ16	66.8		.24	.17	71.7	.07	.19	81.2		.30	.23	89.1	.08	.28	45.1	88.2	35.2	35.11	8.5
4φ16	85.7		.32	.18	94.7	.09	.22	102.7		.41	.23	117.4	.11	.29	45.1	88.2	35.9	35.45	10.4

ESFUERZO CORTANTE Vsu (12) (kN/m) (kN/m)

b,lím (mm) : 277 830

VE.22 (simple celosía) : 43.0
VE.22 (doble celosía) : 86.1
Vcu,lím (kN/m) (VE.22) : 59.5
(VE.25) : 178.3

VE.25 (simple celosía) : 42.3
VE.25 (doble celosía) : 84.5

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS ARMADAS
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Ctra. Alicante-Cartagena, km 18
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TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja n° 25 de 28

MARCADO CE

1170/CPD/PH.00988.01

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	Wk mm	CLASE POR RECUBRIM. (7)	MOMENTO DE FISURACION Mf m·kN/m (8)	RIGIDEZ TOTAL FISURADA E·Ib (8)	E·If m2·MN/m	MOMENTO SERVICIO FIS.COMP. m·kN/m(6)
						kN/m (11)								
(30+ 4)	VE.25	1	0φ 0	0.0	.00	23.9	50.5	77.1	.00	IIa	14.4	28.28	1.49	0.0
* 71.	VE.28	2	1φ 6	16.4	.01	23.9	50.5	77.1	.08	IIa	14.6	28.62	2.19	50.9
		3	1φ 8	20.6	.01	23.9	50.4	77.0	.13	IIa	14.7	28.86	2.70	57.0
		4	1φ 6+1φ 6	21.2	.02	23.5	49.3	75.2	.11	IIa	14.7	28.83	2.70	56.3
		5	1φ10	25.9	.02	23.8	50.3	76.8	.17	IIa	14.9	29.18	3.34	63.8
		6	1φ 8+1φ 8	29.1	.02	23.3	48.9	74.5	.16	IIa	15.0	29.25	3.59	65.1
		7	1φ12	32.4	.02	23.8	50.2	76.6	.20	IIa	15.2	29.55	4.11	70.9
		8	1φ10+1φ 8	34.4	.03	23.4	49.1	74.8	.18	IIa	15.2	29.56	4.22	70.9
		9	1φ12+1φ 6	37.2	.03	23.6	49.6	75.6	.21	IIa	15.3	29.76	4.60	74.6
		10	1φ10+1φ10	39.1	.03	23.2	48.6	74.0	.19	IIa	15.3	29.76	4.69	74.4
		11	1φ12+1φ 8	40.8	.03	23.4	49.2	75.0	.21	IIa	15.4	29.93	4.96	77.1
		12	1φ12+1φ10	45.5	.03	23.2	48.7	74.3	.20	IIa	15.5	30.13	5.42	80.2
		13	1φ16	48.6	.04	23.7	50.0	76.2	.24	IIa	15.7	30.47	5.96	85.5
		14	1φ12+1φ12	51.2	.04	23.1	48.3	73.5	.20	IIa	15.7	30.37	5.96	83.7
		15	1φ16+1φ 8	57.0	.04	23.4	49.3	75.1	.24	IIa	16.0	30.83	6.76	90.3
		16	1φ16+1φ10	61.6	.05	23.3	48.9	74.6	.24	IIa	16.1	31.04	7.21	92.6
		17	1φ16+1φ12	67.2	.05	23.2	48.6	74.0	.23	IIa	16.3	31.27	7.73	95.3
		18	1φ16+1φ16	81.1	.06	23.8	48.8	73.8	.23	IIa	16.7	31.85	8.98	100.9

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu m·kN/m (5)	Ref. inf. vig. (9)	Rel. x/d (10)	Wk mm (7)	Sección maciza Mu m·kN/m (5)	Rel. x/d (10)	Wk mm (7)	B500 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu m·kN/m (5)	Ref. inf. vig. (9)	Rel. x/d (10)	Wk mm (7)	Sección maciza Mu m·kN/m (5)	Rel. x/d (10)	Wk mm (7)	ESF.CORTANTE ULTIMO Vcu kN/m (11)	Vu 1*cel.	MOMENTO FISUR. Mf m·kN/m (8)	RIGIDEZ TOTAL FIS. E·Ib (8)	E·If m2·MN/m
1φ10	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	23.8	50.2	29.4	27.76	2.5
2φ 8	0.0		.00	.00	0.0	.00	.00	14.1		.09	.11	0.0	.00	.00	23.8	50.3	29.5	27.81	2.9
1φ12	0.0		.00	.00	0.0	.00	.00	15.7		.10	.14	0.0	.00	.00	23.7	50.2	29.5	27.82	3.1
1φ 8+1φ10	14.4		.09	.10	0.0	.00	.00	17.9		.11	.12	0.0	.00	.00	23.8	50.2	29.6	27.86	3.4
2φ10	17.4		.11	.09	0.0	.00	.00	21.5		.14	.11	0.0	.00	.00	23.8	50.2	29.7	27.91	3.8
1φ 8+1φ12	18.0		.12	.10	0.0	.00	.00	22.3		.15	.13	0.0	.00	.00	23.8	50.2	29.7	27.92	3.9
1φ10+1φ12	21.0		.14	.10	0.0	.00	.00	34.4		.17	.12	0.0	.00	.00	23.8	50.2	29.8	27.97	4.4
2φ12	32.5		.16	.09	0.0	.00	.00	40.0		.21	.15	0.0	.00	.00	23.7	50.2	30.0	28.03	4.9
1φ 8+1φ16	35.7		.18	.11	0.0	.00	.00	43.8		.24	.20	0.0	.00	.00	23.7	50.1	30.1	28.06	5.2
1φ10+1φ16	39.4		.21	.13	0.0	.00	.00	48.0		.27	.21	0.0	.00	.00	23.7	50.1	30.2	28.11	5.6
1φ12+1φ16	43.7		.24	.14	0.0	.00	.00	53.0		.31	.22	0.0	.00	.00	23.7	50.1	30.3	28.16	6.1
2φ16	54.0		.32	.16	0.0	.00	.00	64.6		.40	.23	75.0	.06	.26	23.6	50.1	30.6	28.29	7.2
4φ12	59.9		.36	.14	0.0	.00	.00	71.4		.45	.19	84.6	.07	.26	24.3	50.7	30.9	28.41	7.9
2φ16+1φ12	66.1		.41	.17	76.8	.06	.23	78.1		.50	.23	95.5	.08	.32	25.3	51.8	31.1	28.48	8.6
3φ16	74.5		.48	.17	89.4	.07	.24	87.2		.57	.23	111.0	.09	.32	25.9	52.3	31.4	28.61	9.6
4φ16	91.5		.61	.17	118.0	.10	.23	121.0	1φ16	.57	.23	146.1	.12	.30	25.9	52.3	32.1	28.91	11.8

ESFUERZO CORTANTE Vsu (12) (kN/m) VE.25 (simple celosía) : 26.4 VE.28 (simple celosía) : 25.9

(kN/m) VE.25 (doble celosía) : 52.8 VE.28 (doble celosía) : 51.9

b,lím (mm) : 194 Vcu,lím (kN/m) (VE.25) : 50.9

710 (VE.28) : 186.4

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS ARMADAS
MODELO VE

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

MARCADO CE

1170/CPD/PH.00988.01

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 kN/m (11)	Vu = Vcu+Vsu 1*Cel	2*Cel	Wk mm	CLASE POR RECUBRIM. (7)	MOMENTO DE FISURACION Mf m·kN/m (8)	RIGIDEZ TOTAL FISURADA (8) E·Ib m2·MN/m	E·If	MOMENTO SERVICIO FIS.COMP. m·kN/m(6)
(30+ 4)	VE.25	1	0φ 0	0.0	.00	47.7	93.2	138.7	.00	IIa	22.7	40.51	2.48	0.0
* 83. D	VE.28	2	1φ 6	27.9	.02	47.7	93.2	138.7	.11	IIa	23.0	40.96	3.61	66.2
		3	1φ 8	35.0	.03	47.6	93.1	138.5	.19	IIa	23.3	41.30	4.46	74.0
		4	1φ 6+1φ 6	36.1	.03	46.8	91.1	135.4	.15	IIa	23.3	41.25	4.45	73.1
		5	1φ10	44.1	.03	47.6	92.9	138.2	.24	IIa	23.6	41.73	5.50	82.6
		6	1φ 8+1φ 8	49.4	.04	46.5	90.3	134.2	.21	IIa	23.7	41.78	5.88	84.1
		7	1φ12	55.0	.04	47.5	92.7	137.9	.27	IIa	24.0	42.23	6.74	91.5
		8	1φ10+1φ 8	58.4	.04	46.6	90.6	134.6	.24	IIa	24.0	42.21	6.89	91.3
		9	1φ12+1φ 6	63.0	.05	47.0	91.6	136.1	.27	IIa	24.2	42.50	7.51	95.8
		10	1φ10+1φ10	66.2	.05	46.3	89.7	133.2	.23	IIa	24.2	42.46	7.64	95.4
		11	1φ12+1φ 8	69.2	.05	46.7	90.8	134.9	.26	IIa	24.3	42.71	8.08	98.8
		12	1φ12+1φ10	77.0	.06	46.4	90.0	133.7	.25	IIa	24.5	42.96	8.80	102.2
		13	1φ16	82.3	.06	47.3	92.2	137.2	.31	IIa	24.9	43.46	9.68	108.5
		14	1φ12+1φ12	86.4	.07	46.0	89.2	132.4	.25	IIa	24.8	43.26	9.65	105.9
		15	1φ16+1φ 8	96.1	.07	46.8	91.0	135.2	.29	IIa	25.3	43.92	10.92	113.4
		16	1φ16+1φ10	103.7	.08	46.5	90.4	134.2	.29	IIa	25.5	44.17	11.59	115.8
		17	1φ16+1φ12	113.0	.09	46.3	89.7	133.2	.28	IIa	25.7	44.46	12.38	118.4
		18	1φ16+1φ16	135.8	.11	45.7	88.4	131.1	.27	IIa	26.3	45.18	14.26	124.1

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu m·kN/m (5)	Ref. inf. vig. (9)	Rel. x/d (10)	Wk mm (7)	Sección maciza Mu m·kN/m (5)	Rel. x/d (10)	Wk mm (7)	B500 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu m·kN/m (5)	Ref. inf. vig. (9)	Rel. x/d (10)	Wk mm (7)	Sección maciza Mu m·kN/m (5)	Rel. x/d (10)	Wk mm (7)	ESF.CORTANTE ULTIMO Vcu kN/m (11)	Vu 1*cel. (11)	MOMENTO FISUR. Mf m·kN/m (8)	RIGIDEZ TOTAL FIS. E·Ib m2·MN/m (8)	E·If
1φ10	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	47.5	92.7	35.2	39.81	2.7
2φ 8	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	47.6	92.8	35.3	39.87	3.1
1φ12	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	47.4	92.6	35.4	39.89	3.3
1φ 8+1φ10	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	47.5	92.7	35.4	39.94	3.5
2φ10	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	47.5	92.7	35.5	40.01	4.0
1φ 8+1φ12	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	47.4	92.7	35.6	40.02	4.1
1φ10+1φ12	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	47.4	92.6	35.7	40.09	4.5
2φ12	0.0		.00	.00	0.0	.00	.00	26.8		.10	.14	0.0	.00	.00	47.4	92.6	35.8	40.17	5.0
1φ 8+1φ16	0.0		.00	.00	0.0	.00	.00	39.3		.11	.16	0.0	.00	.00	47.3	92.5	35.9	40.22	5.4
1φ10+1φ16	0.0		.00	.00	0.0	.00	.00	43.5		.13	.16	0.0	.00	.00	47.3	92.5	36.0	40.28	5.8
1φ12+1φ16	39.3		.11	.11	0.0	.00	.00	48.6		.14	.19	0.0	.00	.00	47.2	92.5	36.1	40.36	6.3
2φ16	49.5		.14	.14	0.0	.00	.00	61.0		.18	.22	0.0	.00	.00	47.2	92.4	36.5	40.56	7.4
4φ12	55.6		.16	.13	0.0	.00	.00	68.4		.20	.19	72.7	.06	.20	47.4	92.6	36.7	40.72	8.2
2φ16+1φ12	62.4		.18	.17	0.0	.00	.00	76.5		.24	.24	82.1	.07	.27	47.2	92.4	36.9	40.82	8.9
3φ16	72.0		.22	.18	76.8	.06	.19	87.7		.28	.24	95.5	.08	.28	47.2	92.4	37.2	41.01	9.9
4φ16	92.6		.30	.18	101.6	.08	.22	111.4		.38	.24	126.0	.10	.30	47.2	92.4	38.0	41.45	12.1

ESFUERZO CORTANTE Vsu (12) (kN/m)
(kN/m)
b,lím (mm) : 314
830

VE.25 (simple celosía) : 45.2
VE.25 (doble celosía) : 90.4
Vcu,lím (kN/m) (VE.25) : 70.5
(VE.28) : 186.4

VE.28 (simple celosía) : 44.4
VE.28 (doble celosía) : 88.9

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
DEL FORJADO DE VIGUETAS ARMADAS
MODELO VE

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

MARCADO CE

1170/CPD/PH.00988.01

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 kN/m (11)	Vu = Vcu+Vsu 1*Cel	2*Cel	Wk mm	CLASE POR RECUBRIM. (7)	MOMENTO DE FISURACION Mf m·kN/m (8)	RIGIDEZ TOTAL FISURADA (8) E·Ib m2·MN/m	E·If	MOMENTO SERVICIO FIS.COMP. m·kN/m(6)
(30+ 5)	VE.25	1	0φ 0	0.0	.00	24.4	51.9	79.3	.00	IIa	15.4	31.66	1.60	0.0
* 71.	VE.28	2	1φ 6	16.9	.01	24.4	51.9	79.3	.08	IIa	15.6	32.03	2.33	53.3
		3	1φ 8	21.2	.01	24.4	51.8	79.2	.12	IIa	15.8	32.30	2.88	59.8
		4	1φ 6+1φ 6	21.9	.02	24.0	50.7	77.4	.10	IIa	15.7	32.27	2.89	59.2
		5	1φ10	26.8	.02	24.3	51.7	79.0	.17	IIa	16.0	32.65	3.58	67.0
		6	1φ 8+1φ 8	30.1	.02	23.8	50.3	76.8	.16	IIa	16.0	32.74	3.84	68.5
		7	1φ12	33.5	.02	24.3	51.6	78.9	.20	IIa	16.2	33.06	4.39	74.5
		8	1φ10+1φ 8	35.5	.02	23.9	50.4	77.0	.18	IIa	16.2	33.08	4.52	74.6
		9	1φ12+1φ 6	38.4	.03	24.1	51.0	77.9	.20	IIa	16.4	33.30	4.92	78.4
		10	1φ10+1φ10	40.4	.03	23.7	50.0	76.2	.18	IIa	16.4	33.30	5.02	78.3
		11	1φ12+1φ 8	42.2	.03	23.9	50.5	77.2	.20	IIa	16.5	33.49	5.31	81.1
		12	1φ12+1φ10	47.0	.03	23.7	50.1	76.5	.20	IIa	16.6	33.72	5.81	84.5
		13	1φ16	50.2	.03	24.2	51.3	78.4	.24	IIa	16.8	34.09	6.37	89.8
		14	1φ12+1φ12	52.9	.04	23.6	49.7	75.8	.20	IIa	16.8	33.99	6.40	88.2
		15	1φ16+1φ 8	58.9	.04	23.9	50.6	77.3	.24	IIa	17.1	34.50	7.25	95.0
		16	1φ16+1φ10	63.7	.04	23.8	50.3	76.8	.24	IIa	17.2	34.73	7.72	97.6
		17	1φ16+1φ12	69.5	.05	23.7	49.9	76.2	.23	IIa	17.4	35.00	8.28	100.7
		18	1φ16+1φ16	84.0	.06	24.2	50.0	75.8	.23	IIa	17.8	35.66	9.66	107.6

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu m·kN/m (5)	Ref. inf. vig. (9)	Rel. x/d (10)	Wk mm (7)	Sección maciza Mu m·kN/m (5)	Rel. x/d (10)	Wk mm (7)	B500 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu m·kN/m (5)	Ref. inf. vig. (9)	Rel. x/d (10)	Wk mm (7)	Sección maciza Mu m·kN/m (5)	Rel. x/d (10)	Wk mm (7)	ESF.CORTANTE ULTIMO Vcu kN/m (11)	Vu 1*cel.	MOMENTO FISUR. Mf m·kN/m (8)	RIGIDEZ TOTAL FIS. E·Ib m2·MN/m (8)	E·If
1φ10	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	24.3	51.6	32.9	31.08	2.7
2φ 8	0.0		.00	.00	0.0	.00	.00	14.6		.09	.11	0.0	.00	.00	24.4	51.6	33.0	31.12	3.1
1φ12	0.0		.00	.00	0.0	.00	.00	16.2		.10	.14	0.0	.00	.00	24.2	51.5	33.1	31.13	3.3
1φ 8+1φ10	14.9		.09	.10	0.0	.00	.00	18.5		.11	.12	0.0	.00	.00	24.3	51.6	33.1	31.17	3.7
2φ10	18.0		.11	.09	0.0	.00	.00	22.2		.14	.11	0.0	.00	.00	24.3	51.6	33.3	31.22	4.1
1φ 8+1φ12	18.6		.11	.11	0.0	.00	.00	23.0		.14	.13	0.0	.00	.00	24.3	51.6	33.3	31.23	4.2
1φ10+1φ12	21.7		.13	.10	0.0	.00	.00	35.6		.17	.12	0.0	.00	.00	24.3	51.5	33.4	31.27	4.7
2φ12	25.3		.16	.09	0.0	.00	.00	41.4		.20	.13	0.0	.00	.00	24.2	51.5	33.5	31.33	5.3
1φ 8+1φ16	37.0		.17	.11	0.0	.00	.00	45.3		.23	.18	0.0	.00	.00	24.2	51.5	33.6	31.36	5.6
1φ10+1φ16	40.8		.20	.11	0.0	.00	.00	49.8		.26	.19	0.0	.00	.00	24.2	51.5	33.7	31.41	6.1
1φ12+1φ16	45.3		.23	.13	0.0	.00	.00	55.0		.30	.21	0.0	.00	.00	24.2	51.5	33.9	31.46	6.6
2φ16	56.0		.31	.16	0.0	.00	.00	67.1		.39	.22	77.5	.06	.26	24.1	51.4	34.2	31.60	7.8
4φ12	62.2		.35	.14	0.0	.00	.00	74.2		.43	.19	87.4	.07	.26	24.7	51.9	34.4	31.72	8.6
2φ16+1φ12	68.7		.40	.17	79.4	.06	.23	81.4		.49	.22	98.7	.08	.33	25.7	53.0	34.6	31.78	9.3
3φ16	77.5		.46	.17	92.4	.07	.24	91.0		.56	.22	114.8	.09	.32	26.6	53.8	35.0	31.91	10.4
4φ16	95.5		.59	.17	122.0	.09	.23	119.5	1φ12	.62	.22	151.2	.12	.30	26.6	53.8	35.7	32.22	12.8

ESFUERZO CORTANTE Vsu (12) (kN/m)
(kN/m)
b,lím (mm) : 194
710

VE.25 (simple celosía) : 27.2
VE.25 (doble celosía) : 54.5
Vcu,lím (kN/m) (VE.25) : 52.0
(VE.28) : 190.4

VE.28 (simple celosía) : 26.8
VE.28 (doble celosía) : 53.6

FICHA DE CARACTERISTICAS TECNICAS, SEGUN EHE-08,
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TECNICO AUTOR DE LA MEMORIA : Jordi Amat

Hoja n° 28 de 28

MARCADO CE

1170/CPD/PH.00988.01

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 kN/m (11)	Vu = Vcu+Vsu 1*Cel	2*Cel	Wk mm	CLASE POR RECUBRIM. (7)	MOMENTO DE FISURACION Mf m·kN/m (8)	RIGIDEZ TOTAL FISURADA (8) E·Ib m2·MN/m	E·If	MOMENTO SERVICIO FIS.COMP. m·kN/m(6)
(30+ 5)	VE.25	1	0φ 0	0.0	.00	48.7	95.7	142.6	.00	IIa	24.3	45.36	2.66	0.0
* 83. D	VE.28	2	1φ 6	28.8	.02	48.7	95.7	142.6	.10	IIa	24.7	45.85	3.86	69.5
		3	1φ 8	36.2	.02	48.7	95.5	142.5	.18	IIa	24.9	46.23	4.76	77.7
		4	1φ 6+1φ 6	37.3	.03	47.8	93.6	139.3	.14	IIa	24.9	46.18	4.77	76.8
		5	1φ10	45.5	.03	48.6	95.4	142.2	.24	IIa	25.3	46.70	5.89	86.8
		6	1φ 8+1φ 8	51.1	.04	47.5	92.8	138.1	.20	IIa	25.3	46.78	6.31	88.5
		7	1φ12	56.8	.04	48.5	95.2	141.9	.27	IIa	25.7	47.25	7.21	96.2
		8	1φ10+1φ 8	60.3	.04	47.6	93.1	138.6	.24	IIa	25.7	47.25	7.39	96.1
		9	1φ12+1φ 6	65.1	.05	48.0	94.0	140.0	.27	IIa	25.9	47.57	8.04	100.9
		10	1φ10+1φ10	68.5	.05	47.3	92.2	137.1	.23	IIa	25.9	47.54	8.20	100.6
		11	1φ12+1φ 8	71.5	.05	47.7	93.3	138.9	.26	IIa	26.1	47.80	8.67	104.3
		12	1φ12+1φ10	79.6	.06	47.4	92.5	137.6	.25	IIa	26.3	48.10	9.44	108.3
		13	1φ16	85.0	.06	48.3	94.7	141.1	.31	IIa	26.6	48.63	10.36	115.1
		14	1φ12+1φ12	89.4	.06	47.1	91.7	136.3	.25	IIa	26.5	48.44	10.37	112.8
		15	1φ16+1φ 8	99.4	.07	47.8	93.5	139.1	.29	IIa	27.0	49.16	11.73	121.3
		16	1φ16+1φ10	107.3	.08	47.5	92.8	138.2	.29	IIa	27.3	49.44	12.46	124.3
		17	1φ16+1φ12	116.9	.08	47.3	92.2	137.1	.28	IIa	27.5	49.78	13.32	127.6
		18	1φ16+1φ16	140.7	.10	46.7	90.9	135.0	.27	IIa	28.2	50.61	15.41	134.7

FLEXION NEGATIVA (por m)

REFUERZO SUPERIOR POR NERVIO	B400 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu m·kN/m (5)	Ref. inf. vig. (9)	Rel. x/d (10)	Wk mm (7)	Sección maciza Mu m·kN/m (5)	Rel. x/d (10)	Wk mm (7)	B500 MOMENTO ULTIMO-ABERTURA FISURA Sección tipo Mu m·kN/m (5)	Ref. inf. vig. (9)	Rel. x/d (10)	Wk mm (7)	Sección maciza Mu m·kN/m (5)	Rel. x/d (10)	Wk mm (7)	ESF.CORTANTE ULTIMO Vcu kN/m (11)	Vu 1*cel.	MOMENTO FISUR. Mf m·kN/m (8)	RIGIDEZ TOTAL FIS. E·Ib m2·MN/m (8)	E·If
1φ10	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	48.5	95.2	39.2	44.56	2.9
2φ 8	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	48.6	95.3	39.3	44.62	3.3
1φ12	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	48.4	95.1	39.3	44.65	3.5
1φ 8+1φ10	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	48.5	95.2	39.4	44.70	3.8
2φ10	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	48.5	95.2	39.5	44.76	4.3
1φ 8+1φ12	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	48.5	95.1	39.5	44.77	4.4
1φ10+1φ12	0.0		.00	.00	0.0	.00	.00	0.0		.00	.00	0.0	.00	.00	48.4	95.1	39.7	44.84	4.9
2φ12	0.0		.00	.00	0.0	.00	.00	27.8		.10	.14	0.0	.00	.00	48.4	95.1	39.8	44.92	5.4
1φ 8+1φ16	0.0		.00	.00	0.0	.00	.00	30.6		.11	.16	0.0	.00	.00	48.3	95.0	39.9	44.97	5.8
1φ10+1φ16	0.0		.00	.00	0.0	.00	.00	45.0		.12	.15	0.0	.00	.00	48.3	95.0	40.0	45.04	6.2
1φ12+1φ16	30.5		.11	.12	0.0	.00	.00	50.2		.14	.16	0.0	.00	.00	48.3	94.9	40.1	45.13	6.7
2φ16	51.2		.14	.12	0.0	.00	.00	63.1		.18	.21	0.0	.00	.00	48.2	94.9	40.5	45.32	8.0
4φ12	57.6		.16	.12	0.0	.00	.00	70.8		.20	.19	75.1	.06	.20	48.4	95.1	40.7	45.48	8.8
2φ16+1φ12	64.6		.18	.16	0.0	.00	.00	79.2		.23	.23	84.8	.06	.26	48.2	94.9	40.9	45.59	9.5
3φ16	74.5		.21	.17	79.4	.06	.18	90.9		.27	.23	98.7	.08	.28	48.2	94.9	41.2	45.78	10.6
4φ16	96.1		.29	.18	105.0	.08	.22	115.7		.37	.23	130.2	.10	.30	48.2	94.9	42.0	46.24	13.0

ESFUERZO CORTANTE Vsu (12) (kN/m) : 830

b,lím (mm) : 314 (kN/m)

VE.25 (simple celosía) : 46.6
VE.25 (doble celosía) : 93.3
Vcu,lím (kN/m) (VE.25) : 72.0
(VE.28) : 190.4

VE.28 (simple celosía) : 45.8
VE.28 (doble celosía) : 91.7