



**ALJEMA**  
 P.I. Cavila Parc I-1  
 30400 Caravaca de la Cruz (Murcia)

TÉCNICO AUTOR DE LA MEMORIA

José María Polo Palau  
 Ingeniero Industrial  
 www.kningenieros.com

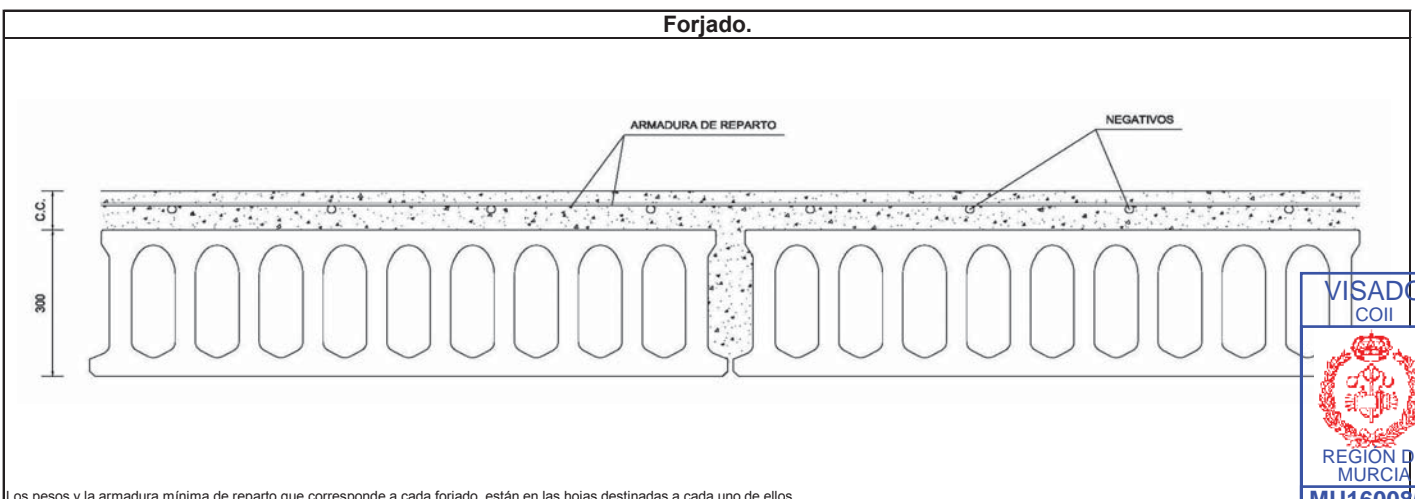
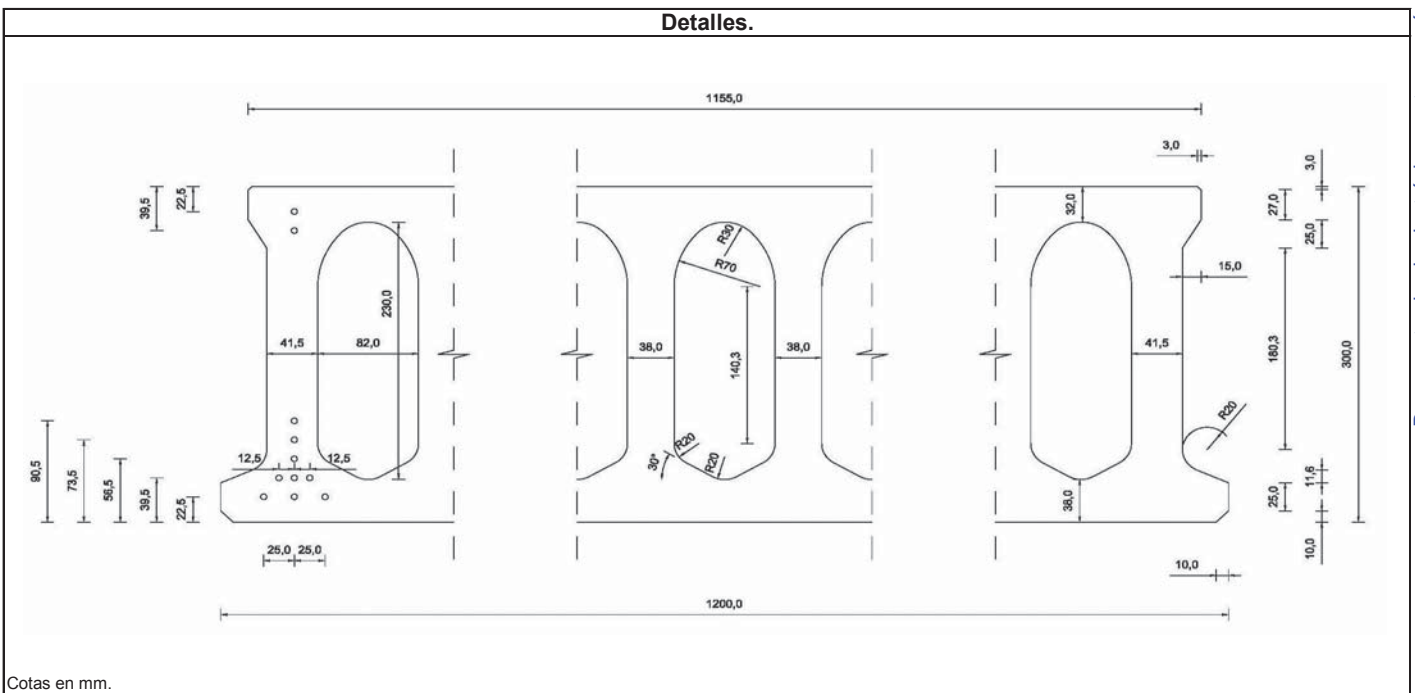
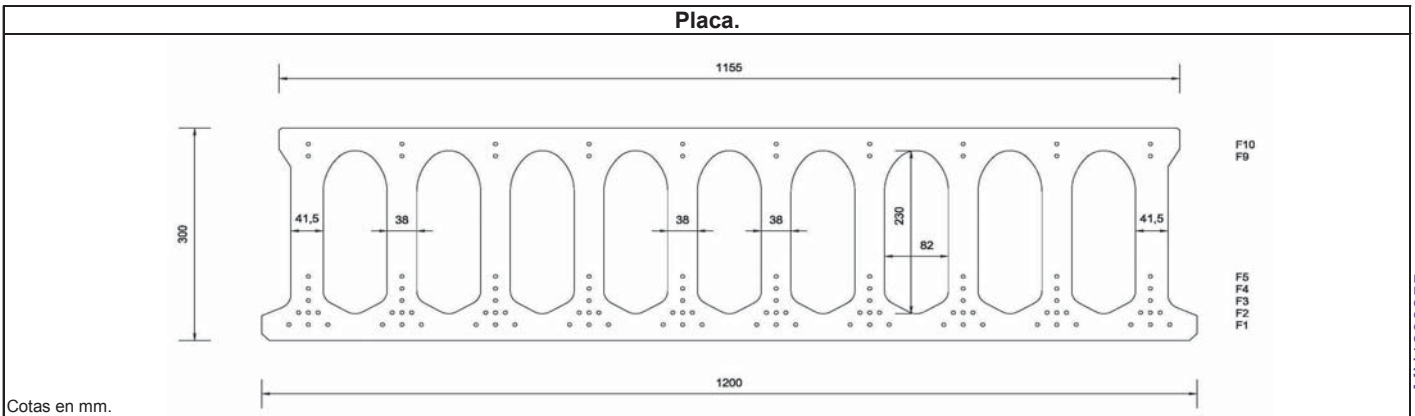
Hoja 1 de 9



0099/CPR/A87/0133  
 EN 1168:2005+A3:2011



ER-1255/2008



Los pesos y la armadura mínima de reparto que corresponde a cada forjado, están en las hojas destinadas a cada uno de ellos.



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Hoja 2 de 9



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**Descripción de la placa.**

**Materiales.**

|                                |                             |                |                    |                     |
|--------------------------------|-----------------------------|----------------|--------------------|---------------------|
| HORMIGON DE PLACA              | HP-40 /S/12                 | fck=40 N/mm2   | $\gamma_{c=}$ 1.50 |                     |
| HORMIGON VERTIDO EN OBRA       | HA-25 /B/20                 | fck=25 N/mm2   | $\gamma_{c=}$ 1.50 |                     |
| ACERO DE PRETENSAR ALAMBRE 5mm | UNE 36094-97 Y1860 C 5.0 I1 | fpk=1685 N/mm2 | $\gamma_{s=}$ 1.15 | alargamiento rot 4% |
| ACERO ARMADURA SUPERIOR        | B 500S UNE 36-069-94        | fyk=500 N/mm2  | $\gamma_{s=}$ 1.15 | alargamiento rot 1% |

**Armado de la placa.**

| TIPO ARMADO                  |                   | T1          | T2          | T3          | T4          | T5          | T6          | T7          | T8          | T9          | T10         | T11         | T12         |
|------------------------------|-------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| SITUACIÓN DE LAS ARMADURAS   | F10               |             |             |             | 4 $\phi$ 5  | 4 $\phi$ 5  | 6 $\phi$ 5  | 6 $\phi$ 5  | 6 $\phi$ 5  | 8 $\phi$ 5  | 8 $\phi$ 5  | 8 $\phi$ 5  | 8 $\phi$ 5  |
|                              | F9                | 4 $\phi$ 5  | 4 $\phi$ 5  | 4 $\phi$ 5  |             |             |             |             |             |             |             |             |             |
|                              | F8                |             |             |             |             |             |             |             |             |             |             |             |             |
|                              | F7                |             |             |             |             |             |             |             |             |             |             |             |             |
|                              | F6                |             |             |             |             |             |             |             |             |             |             |             |             |
|                              | F5                |             |             |             |             |             |             |             |             |             |             |             |             |
|                              | F4                |             |             |             |             |             |             |             |             |             |             |             |             |
|                              | F3                |             |             |             |             |             |             |             |             |             |             |             |             |
|                              | F2                |             |             |             |             |             |             |             |             |             | 2 $\phi$ 5  | 6 $\phi$ 5  | 10 $\phi$ 5 |
| F1                           | 16 $\phi$ 5       | 18 $\phi$ 5 | 20 $\phi$ 5 | 22 $\phi$ 5 | 26 $\phi$ 5 | 30 $\phi$ 5 | 30 $\phi$ 5 | 30 $\phi$ 5 | 30 $\phi$ 5 | 30 $\phi$ 5 | 30 $\phi$ 5 | 30 $\phi$ 5 | 30 $\phi$ 5 |
| TENSION INICIAL              | sup               | 1324        | 1324        | 1324        | 1324        | 1324        | 1324        | 1324        | 1324        | 1324        | 1324        | 1324        | 1324        |
| N/mm2                        | inf               | 1324        | 1324        | 1324        | 1324        | 1324        | 1324        | 1324        | 1324        | 1324        | 1324        | 1324        | 1324        |
| PERDIDAS TOT. PLAZO INFINITO |                   | 16%         | 16%         | 17%         | 17%         | 17%         | 18%         | 19%         | 19%         | 20%         | 21%         | 21%         | 22%         |
| TENSIÓN AGRIETAM.            | N/mm <sup>2</sup> | 0.68        | 0.72        | 0.80        | 0.87        | 1.07        | 1.19        | 1.33        | 1.50        | 1.68        | 1.80        | 1.93        | 2.08        |
| TENSIÓN DESTESADO            | N/mm <sup>2</sup> | 25          | 25          | 25          | 25          | 25          | 25          | 25          | 25          | 25          | 26          | 29          | 33          |

| TIPO ARMADO                  |                   | T13         | T14         | T15         | T16         | T17         | T18         | T19         | T20         |
|------------------------------|-------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| SITUACIÓN DE LAS ARMADURAS   | F10               | 8 $\phi$ 5  | 8 $\phi$ 5  |             |             |             |             | 4 $\phi$ 5  | 4 $\phi$ 5  |
|                              | F9                |             |             | 4 $\phi$ 5  | 4 $\phi$ 5  | 4 $\phi$ 5  | 4 $\phi$ 5  |             |             |
|                              | F8                |             |             |             |             |             |             |             |             |
|                              | F7                |             |             |             |             |             |             |             |             |
|                              | F6                |             |             |             |             |             |             |             |             |
|                              | F5                |             |             |             |             |             |             | 4 $\phi$ 5  | 10 $\phi$ 5 |
|                              | F4                | 8 $\phi$ 5  | 10 $\phi$ 5 |             |             | 2 $\phi$ 5  | 8 $\phi$ 5  | 10 $\phi$ 5 | 10 $\phi$ 5 |
|                              | F3                | 10 $\phi$ 5 | 10 $\phi$ 5 |             | 6 $\phi$ 5  | 10 $\phi$ 5 | 10 $\phi$ 5 | 10 $\phi$ 5 | 10 $\phi$ 5 |
|                              | F2                | 10 $\phi$ 5 | 10 $\phi$ 5 | 20 $\phi$ 5 | 20 $\phi$ 5 | 20 $\phi$ 5 | 20 $\phi$ 5 | 20 $\phi$ 5 | 20 $\phi$ 5 |
| F1                           | 30 $\phi$ 5       | 30 $\phi$ 5 |             |             |             |             |             |             |             |
| TENSION INICIAL              | sup               | 1324        | 1200        | 1324        | 1324        | 1324        | 1324        | 1324        | 1324        |
| N/mm2                        | inf               | 1324        | 1200        | 1324        | 1324        | 1324        | 1324        | 1324        | 1324        |
| PERDIDAS TOT. PLAZO INFINITO |                   | 23%         | 21%         | 16%         | 17%         | 18%         | 19%         | 20%         | 21%         |
| TENSIÓN AGRIETAM.            | N/mm <sup>2</sup> | 2.22        | 2.20        | 0.90        | 1.06        | 1.24        | 1.46        | 1.77        | 2.03        |
| TENSIÓN DESTESADO            | N/mm <sup>2</sup> | 36          | 36          | 25          | 25          | 25          | 25          | 26          | 32          |

Los requisitos de dosificación del hormigón se definirán según EHE-08 art.37.3.1 en función de la clase de exposición.



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Hoja 3 de 9



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ER-1255/2008

**Características mecánicas de la placa aislada.**

| TIPO DE PLACA | Tensiones debidas al pretensado |                  |                  | FLEXIÓN POSITIVA |                    |                |        |        |        | MÓDULO RESISTENTE |                 | RIGIDEZ         | FLEXIÓN NEGATIVA |                    |
|---------------|---------------------------------|------------------|------------------|------------------|--------------------|----------------|--------|--------|--------|-------------------|-----------------|-----------------|------------------|--------------------|
|               | P-e                             | $\sigma_{p,inf}$ | $\sigma_{p,sup}$ | Momento Último   | Momento Ejec. vano | CORTANTE $V_u$ | $M_o$  | $M_o'$ | $M_o2$ | inferior          | superior        |                 | Momento Último   | Momento Ejec.s/sop |
|               |                                 |                  |                  |                  |                    |                |        |        |        | cm <sup>3</sup>   | cm <sup>3</sup> | cm <sup>3</sup> |                  |                    |
| T-1           | -33.84                          | 4.77             | -0.22            | 150.83           | 66.59              | 198.27         | 66.59  | 72.49  | 143.74 | 13948             | 13353           | 75867           | 40.72            | 40.72              |
| T-2           | -39.14                          | 5.38             | -0.39            | 167.62           | 75.22              | 202.87         | 75.22  | 81.71  | 153.95 | 13974             | 13358           | 75952           | 40.69            | 40.69              |
| T-3           | -44.40                          | 5.99             | -0.56            | 180.63           | 83.83              | 207.36         | 83.83  | 90.91  | 164.10 | 14001             | 13364           | 76040           | 40.79            | 40.79              |
| T-4           | -48.20                          | 6.49             | -0.63            | 195.90           | 90.92              | 211.76         | 90.92  | 98.59  | 172.80 | 14019             | 13366           | 76091           | 43.23            | 43.23              |
| T-5           | -58.54                          | 7.68             | -0.97            | 226.85           | 108.02             | 220.31         | 108.02 | 116.88 | 192.80 | 14073             | 13378           | 76270           | 42.87            | 42.87              |
| T-6           | -63.21                          | 8.66             | -0.67            | 253.78           | 122.01             | 232.55         | 122.01 | 132.56 | 210.15 | 14081             | 13367           | 76257           | 59.75            | 52.03              |
| T-7           | -71.89                          | 9.72             | -0.90            | 278.82           | 137.32             | 240.38         | 137.32 | 149.06 | 228.31 | 14125             | 13374           | 76394           | 60.62            | 48.99              |
| T-8           | -80.46                          | 10.77            | -1.12            | 303.74           | 152.56             | 247.96         | 152.56 | 165.48 | 246.29 | 14169             | 13382           | 76533           | 61.44            | 45.99              |
| T-9           | -82.85                          | 11.57            | -0.68            | 323.65           | 163.80             | 258.93         | 163.80 | 178.34 | 261.03 | 14163             | 13366           | 76472           | 78.84            | 51.91              |
| T-10          | -89.88                          | 12.49            | -0.80            | 341.43           | 177.27             | 266.00         | 177.27 | 192.97 | 277.31 | 14197             | 13370           | 76572           | 81.22            | 50.30              |
| T-11          | -96.82                          | 13.40            | -0.92            | 361.28           | 190.67             | 272.89         | 190.67 | 207.51 | 293.45 | 14231             | 13373           | 76671           | 82.70            | 48.71              |
| T-12          | -101.73                         | 14.14            | -0.91            | 375.98           | 201.53             | 279.62         | 201.53 | 219.44 | 307.24 | 14255             | 13374           | 76736           | 86.21            | 48.84              |
| T-13          | -106.56                         | 14.86            | -0.90            | 384.70           | 212.25             | 286.20         | 212.25 | 231.23 | 320.86 | 14280             | 13374           | 76801           | 89.49            | 48.97              |
| T-14          | -100.94                         | 14.08            | -0.86            | 393.30           | 201.20             | 289.43         | 201.20 | 219.20 | 311.92 | 14292             | 13374           | 76834           | 91.20            | 49.55              |
| T-15          | -37.17                          | 5.46             | -0.02            | 169.32           | 76.25              | 207.36         | 76.25  | 90.57  | 156.99 | 13956             | 13348           | 75871           | 49.48            | 49.48              |
| T-16          | -48.55                          | 6.95             | -0.21            | 207.08           | 97.35              | 220.31         | 97.35  | 115.23 | 183.00 | 14006             | 13353           | 76021           | 53.96            | 53.96              |
| T-17          | -58.85                          | 8.34             | -0.35            | 241.47           | 117.24             | 232.55         | 117.24 | 138.61 | 207.68 | 14053             | 13357           | 76155           | 58.23            | 56.31              |
| T-18          | -67.21                          | 9.57             | -0.36            | 273.71           | 134.80             | 244.20         | 134.80 | 159.56 | 230.05 | 14090             | 13357           | 76256           | 64.25            | 56.15              |
| T-19          | -73.48                          | 10.66            | -0.19            | 298.21           | 150.48             | 255.33         | 150.48 | 178.71 | 250.73 | 14110             | 13352           | 76293           | 74.58            | 58.40              |
| T-20          | -79.46                          | 11.69            | -0.05            | 317.66           | 165.27             | 266.00         | 165.27 | 196.77 | 270.43 | 14134             | 13349           | 76346           | 82.13            | 60.29              |

Peso de la pieza (kN/ml): 4.53

Para flexión positiva los valores resistentes garantizan condición de ejecución sin sopandar, luz 10 m.

La resistencia característica del hormigón en obra estará de acuerdo con el ambiente en obra y el recubrimiento total será completado con el revestimiento adecuado para dicho ambiente.

Los momentos y cortantes provenientes de las cargas mayoradas con el coeficiente de ponderación deben ser menores que los valores últimos.

Según clase de exposición, abertura máxima de fisura:  $W_{kI}=0.2\text{mm}$   $W_{kIIa}=0.2\text{mm}$   $W_{kIIIyIV}=\text{descompresion}$

$M_o$ = momento de descompresión de la fibra inferior de la sección

$M_o'$ = momento que produce tensión nula en la fibra de la sección situada a la profundidad de la armadura inferior

$M_o2$ = momento para el que se produce fisura de ancho 0.2 mm.

Flexión negativa (hormigón armado): Según clase de exposición: abertura  $W_{kI} = 0,4 \text{ mm}$  ;  $W_{kIIa} = 0,3 \text{ mm}$  ;  $W_{kIIIa} = 0,2 \text{ mm}$  ;  $W_{kIIIc} = 0,1 \text{ mm}$

\*\*\*  $\beta = (I_b)_{\text{forjado}} / (I_b)_{\text{vigüeta}}$

\*\*  $\zeta = (S/I)_{\text{losa}} / (S/I)_{\text{forjado}}$

(1)  $V_u$  corresponde a la formulación según EHE art.44.2.3.1 y 44.2.3.2.1.1 con entrega 50mm.

(2)  $V_u$  corresponde a la formulación según EHE art.44.2.3.1 y 44.2.3.2.1.1.

(3) REI correspondiente según CTE DB-SI art.C.2.3.5

(4) REI correspondiente con recubrimiento de yeso de 5mm según CTE DB-SI art.C.2.4

A 28 días. Para otra edad se multiplicará por el factor:

| Edad                  | 7 días | 14 días | 21 días | 28 días | 3 meses | 6 meses | 1 año | >5 AÑOS |
|-----------------------|--------|---------|---------|---------|---------|---------|-------|---------|
| Rigidez               | 0.83   | 0.89    | 0.91    | 1.00    | 1.08    | 1.13    | 1.16  | 1.20    |
| Momento de fisuración | 0.78   | 0.86    | 0.96    | 1.00    | 1.10    | 1.17    | 1.22  | 1.27    |



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**Flexión positiva, esfuerzo por bandas de 1 metro.**

| TIPO DE FORJADO | TIPO DE PLACA | MOMENTO ULTIMO (m·kN/m) | Vu(kN/m)         |                      |      |                  | M límite servicio según clase de exposición (m·kN/m) |        |        | β*** | MÓDULO RESISTENTE Wh,inf (mm <sup>3</sup> ) | RIGIDEZ (m <sup>2</sup> -kN/m) |                            | REI |     |
|-----------------|---------------|-------------------------|------------------|----------------------|------|------------------|--|--------|--------|------|---|--------------------------------|----------------------------|-----|-----|
|                 |               |                         | SECCIÓN TIPO (1) | SECCIÓN MACIZADA (2) | ** ζ | RASANTE Vu(KN/m) | Mo   | Mo'    | Mo2    |      |   | HOMOG E·lh                     | FISURADA E·lf <sub>0</sub> | (3) | (4) |
|                 |               |                         |                  |                      |      |                  |  |        |        |      |   |                                |                            |     |     |
| 30 + 0          | T-1           | 125.84                  | 163              | 239                  | 0.99 | 267              | 55.43  | 60.16  | 120.12 | 1.05 | 11426210                                    | 63437                          | 3665                       | 30  | 60  |
|                 | T-2           | 138.83                  | 167              | 239                  | 0.99 | 267              | 62.50  | 67.63  | 128.85 | 1.05 | 11447483                                    | 63510                          | 4692                       | 30  | 60  |
|                 | T-3           | 153.51                  | 171              | 239                  | 0.99 | 267              | 69.55  | 75.08  | 137.57 | 1.05 | 11469077                                    | 63585                          | 5731                       | 30  | 60  |
|                 | T-4           | 165.27                  | 175              | 239                  | 0.99 | 267              | 75.35  | 81.29  | 145.01 | 1.05 | 11483022                                    | 63629                          | 6773                       | 30  | 60  |
|                 | T-5           | 190.30                  | 182              | 239                  | 0.99 | 267              | 89.36  | 96.10  | 162.36 | 1.05 | 11526898                                    | 63782                          | 8228                       | 30  | 60  |
|                 | T-6           | 214.37                  | 192              | 239                  | 0.99 | 267              | 100.82   | 108.80 | 176.99 | 1.05 | 11533287                                    | 63773                          | 9708                       | 30  | 60  |
|                 | T-7           | 234.98                  | 198              | 239                  | 0.99 | 267              | 113.36   | 122.15 | 192.83 | 1.05 | 11568686                                    | 63890                          | 11355                      | 30  | 90  |
|                 | T-8           | 255.88                  | 204              | 239                  | 0.99 | 267              | 125.84   | 135.43 | 208.62 | 1.05 | 11604250                                    | 64009                          | 13045                      | 30  | 90  |
|                 | T-9           | 272.85                  | 213              | 239                  | 0.99 | 267              | 135.04   | 145.85 | 220.94 | 1.05 | 11599909                                    | 63959                          | 14751                      | 60  | 90  |
|                 | T-10          | 290.33                  | 219              | 239                  | 0.99 | 267              | 146.08   | 157.68 | 235.24 | 1.05 | 11627364                                    | 64045                          | 16727                      | 60  | 90  |
|                 | T-11          | 303.93                  | 225              | 239                  | 0.99 | 267              | 157.04   | 169.45 | 249.48 | 1.05 | 11654814                                    | 64131                          | 18744                      | 90  | 120 |
|                 | T-12          | 316.52                  | 231              | 239                  | 0.99 | 267              | 165.94   | 179.10 | 261.60 | 1.05 | 11674765                                    | 64187                          | 20832                      | 90  | 120 |
|                 | T-13          | 329.74                  | 236              | 239                  | 0.99 | 267              | 174.72   | 188.64 | 273.62 | 1.05 | 11694692                                    | 64243                          | 23136                      | 90  | 120 |
|                 | T-14          | 333.92                  | 239              | 239                  | 0.99 | 267              | 165.66   | 178.90 | 266.18 | 1.05 | 11704645                                    | 64271                          | 24686                      | 90  | 120 |
|                 | T-15          | 141.53                  | 171              | 239                  | 0.99 | 250              | 63.34  | 74.69  | 131.19 | 1.05 | 11432507                                    | 63442                          | 16689                      | 90  | 120 |
|                 | T-16          | 174.91                  | 182              | 239                  | 0.99 | 250              | 80.63  | 94.55  | 153.38 | 1.05 | 11473499                                    | 63571                          | 18200                      | 120 | 120 |
|                 | T-17          | 204.31                  | 192              | 239                  | 0.99 | 250              | 96.91  | 113.39 | 174.55 | 1.05 | 11511083                                    | 63686                          | 19676                      | 120 | 120 |
|                 | T-18          | 229.32                  | 201              | 239                  | 0.99 | 250              | 111.30   | 130.25 | 193.79 | 1.05 | 11541414                                    | 63773                          | 21015                      | 120 | 120 |
|                 | T-19          | 250.69                  | 211              | 239                  | 0.99 | 250              | 124.14   | 145.68 | 211.42 | 1.05 | 11557537                                    | 63806                          | 22327                      | 180 | 120 |
|                 | T-20          | 270.58                  | 219              | 239                  | 0.99 | 250              | 136.26   | 160.22 | 228.34 | 1.05 | 11577367                                    | 63854                          | 23854                      | 180 | 120 |

**Flexión negativa, esfuerzo por bandas de 1 metro.**

| TIPO DE FORJADO | TIPO DE PLACA | MOMENTO ULTIMO (m·kN/m) | Vu(kN/m)         |                      |      |                  | M límite servicio según clase de exposición (m·kN/m) |       |       | β*** | MÓDULO RESISTENTE Wh,sup (mm <sup>3</sup> ) | RIGIDEZ (m <sup>2</sup> -kN/m) |                            | REI (3) |
|-----------------|---------------|-------------------------|------------------|----------------------|------|------------------|--|-------|-------|------|---|--------------------------------|----------------------------|---------|
|                 |               |                         | SECCIÓN TIPO (1) | SECCIÓN MACIZADA (2) | ** ζ | RASANTE Vu(KN/m) | Mo   | Mo'   | Mo2   |      |   | HOMOG E·lh                     | FISURADA E·lf <sub>0</sub> |         |
|                 |               |                         |                  |                      |      |                  |  |       |       |      |   |                                |                            |         |
| 30 + 0          | T-1           | 33.94                   | 68.27            | 211.71               | --   | --               | 0.00   | 7.03  | 28.28 | 1.05 | 11391378                                    | 63437.19                       | 852                        | 240     |
|                 | T-2           | 33.90                   | 68.27            | 211.71               | --   | --               | 0.00   | 5.90  | 28.25 | 1.05 | 11396417                                    | 63510.17                       | 854                        | 240     |
|                 | T-3           | 33.99                   | 68.27            | 211.71               | --   | --               | 0.00   | 4.78  | 28.32 | 1.05 | 11401763                                    | 63584.84                       | 844                        | 240     |
|                 | T-4           | 36.02                   | 71.15            | 220.62               | --   | --               | 0.00   | 0.00  | 30.02 | 1.05 | 11403817                                    | 63629.10                       | 959                        | 240     |
|                 | T-5           | 35.72                   | 71.15            | 220.62               | --   | --               | 0.00   | 0.00  | 29.77 | 1.05 | 11415155                                    | 63781.86                       | 966                        | 240     |
|                 | T-6           | 49.80                   | 71.15            | 220.62               | --   | --               | 0.00   | 0.43  | 41.50 | 1.05 | 11405641                                    | 63772.71                       | 1426                       | 240     |
|                 | T-7           | 50.52                   | 71.15            | 220.62               | --   | --               | 0.00   | 0.00  | 42.10 | 1.05 | 11412934                                    | 63890.44                       | 1445                       | 240     |
|                 | T-8           | 51.20                   | 71.15            | 220.62               | --   | --               | 0.00   | 0.00  | 42.66 | 1.05 | 11420379                                    | 64008.87                       | 1468                       | 240     |
|                 | T-9           | 65.70                   | 71.15            | 220.62               | --   | --               | 0.00   | 3.36  | 54.75 | 1.05 | 11406944                                    | 63959.03                       | 1925                       | 240     |
|                 | T-10          | 67.68                   | 71.15            | 220.62               | --   | --               | 0.00   | 2.77  | 56.40 | 1.05 | 11410775                                    | 64044.85                       | 1964                       | 240     |
|                 | T-11          | 68.92                   | 71.15            | 220.62               | --   | --               | 0.00   | 2.18  | 57.43 | 1.05 | 11414613                                    | 64130.54                       | 2004                       | 240     |
|                 | T-12          | 71.84                   | 71.15            | 220.62               | --   | --               | 0.00   | 3.09  | 59.87 | 1.05 | 11415388                                    | 64187.02                       | 2064                       | 240     |
|                 | T-13          | 74.58                   | 71.15            | 220.62               | --   | --               | 0.00   | 3.99  | 62.15 | 1.05 | 11416167                                    | 64243.35                       | 2124                       | 240     |
|                 | T-14          | 76.00                   | 71.15            | 220.62               | --   | --               | 0.00   | 3.73  | 63.33 | 1.05 | 11416558                                    | 64271.46                       | 2132                       | 240     |
|                 | T-15          | 41.24                   | 68.27            | 211.71               | --   | --               | 0.00   | 11.24 | 34.36 | 1.05 | 11386935                                    | 63442.24                       | 901                        | 240     |
|                 | T-16          | 44.97                   | 68.27            | 211.71               | --   | --               | 0.00   | 11.71 | 37.48 | 1.05 | 11392340                                    | 63570.68                       | 950                        | 240     |
|                 | T-17          | 48.53                   | 68.27            | 211.71               | --   | --               | 0.00   | 12.86 | 40.44 | 1.05 | 11396550                                    | 63686.09                       | 1017                       | 240     |
|                 | T-18          | 53.54                   | 68.27            | 211.71               | --   | --               | 0.00   | 15.33 | 44.62 | 1.05 | 11397926                                    | 63773.33                       | 1070                       | 240     |
|                 | T-19          | 62.15                   | 71.15            | 220.62               | --   | --               | 0.00   | 8.74  | 51.79 | 1.05 | 11393903                                    | 63806.23                       | 1304                       | 240     |
|                 | T-20          | 68.44                   | 71.15            | 220.62               | --   | --               | 0.00   | 11.68 | 57.03 | 1.05 | 11391478                                    | 63853.67                       | 1440                       | 240     |

Peso del forjado (kN/m<sup>2</sup>): 4.14  
 Acero armadura superior: B 500S o B 500SD UNE 36-069-94  
 Armadura de reparto mínima: No aplica  
 Área armado mínima: 0 mm<sup>2</sup>



Documento visado electrónicamente con número: MU1600855



**ALJEMA**  
 P.I. Cavila Parc I-1  
 30400 Caravaca de la Cruz (Murcia)

TÉCNICO AUTOR DE LA MEMORIA

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 Hoja 5 de 9



ER-1255/2008

**Flexión positiva, esfuerzo por bandas de 1 metro.**

| TIPO DE FORJADO | TIPO DE PLACA | MOMENTO ULTIMO (m·kN/m) | Vu(kN/m)         |                      |      |                  | M límite servicio según clase de exposición (m·kN/m) |        |        | β*** | MÓDULO RESISTENTE Wh,inf (mm <sup>3</sup> ) | RIGIDEZ (m <sup>2</sup> ·kN/m) |                            | REI |     |
|-----------------|---------------|-------------------------|------------------|----------------------|------|------------------|--|--------|--------|------|---|--------------------------------|----------------------------|-----|-----|
|                 |               |                         | SECCIÓN TIPO (1) | SECCIÓN MACIZADA (2) | ** ζ | RASANTE Vu(KN/m) | Mo   | Mo'    | Mo2    |      |   | HOMOG E·lh                     | FISURADA E·lf <sub>0</sub> | (3) | (4) |
|                 |               |                         |                  |                      |      |                  |  |        |        |      |   |                                |                            |     |     |
| 30 + 5          | T-1           | 146.20                  | 189              | 279                  | 1.13 | 314              | 55.49  | 61.41  | 134.33 | 1.76 | 14630753                                    | 105547                         | 20733                      | 30  | 60  |
|                 | T-2           | 161.28                  | 194              | 279                  | 1.13 | 314              | 62.69  | 69.20  | 143.47 | 1.76 | 14657117                                    | 105675                         | 21900                      | 30  | 60  |
|                 | T-3           | 175.99                  | 199              | 279                  | 1.13 | 314              | 70.68  | 77.62  | 153.41 | 1.76 | 14683727                                    | 105805                         | 23076                      | 30  | 60  |
|                 | T-4           | 188.74                  | 204              | 279                  | 1.13 | 314              | 78.11  | 85.32  | 162.75 | 1.76 | 14702595                                    | 105891                         | 24243                      | 30  | 60  |
|                 | T-5           | 218.32                  | 213              | 279                  | 1.13 | 314              | 96.04  | 103.68 | 184.59 | 1.76 | 14756346                                    | 106154                         | 26107                      | 30  | 60  |
|                 | T-6           | 245.48                  | 226              | 279                  | 1.13 | 314              | 110.74   | 119.46 | 203.05 | 1.76 | 14777307                                    | 106210                         | 27982                      | 30  | 60  |
|                 | T-7           | 270.94                  | 234              | 279                  | 1.13 | 314              | 126.82   | 136.01 | 222.98 | 1.76 | 14822673                                    | 106424                         | 30030                      | 30  | 90  |
|                 | T-8           | 294.76                  | 242              | 279                  | 1.13 | 314              | 142.80   | 152.49 | 242.84 | 1.76 | 14868167                                    | 106639                         | 32067                      | 30  | 90  |
|                 | T-9           | 319.49                  | 254              | 279                  | 1.13 | 314              | 154.69   | 165.51 | 258.43 | 1.76 | 14878038                                    | 106635                         | 33928                      | 60  | 90  |
|                 | T-10          | 340.56                  | 261              | 279                  | 1.13 | 314              | 168.85   | 180.22 | 276.42 | 1.76 | 14915419                                    | 106803                         | 35950                      | 60  | 90  |
|                 | T-11          | 360.70                  | 268              | 279                  | 1.13 | 314              | 182.94   | 194.84 | 294.34 | 1.76 | 14952794                                    | 106971                         | 37964                      | 90  | 120 |
|                 | T-12          | 378.19                  | 275              | 279                  | 1.13 | 314              | 194.39   | 206.87 | 309.58 | 1.76 | 14982528                                    | 107097                         | 39897                      | 90  | 120 |
|                 | T-13          | 397.07                  | 282              | 279                  | 1.13 | 314              | 205.70   | 218.75 | 324.68 | 1.76 | 15012239                                    | 107223                         | 41853                      | 90  | 120 |
|                 | T-14          | 402.38                  | 285              | 279                  | 1.13 | 314              | 194.09   | 206.67 | 314.98 | 1.76 | 15027085                                    | 107285                         | 43355                      | 90  | 120 |
|                 | T-15          | 166.76                  | 199              | 279                  | 1.13 | 297              | 63.54  | 77.32  | 146.10 | 1.76 | 14646305                                    | 105597                         | 34534                      | 90  | 120 |
|                 | T-16          | 203.04                  | 213              | 279                  | 1.13 | 297              | 84.87  | 100.56 | 173.18 | 1.76 | 14702251                                    | 105850                         | 36431                      | 120 | 120 |
|                 | T-17          | 239.17                  | 226              | 279                  | 1.13 | 297              | 105.75   | 123.06 | 199.79 | 1.76 | 14754641                                    | 106084                         | 38245                      | 120 | 120 |
|                 | T-18          | 270.68                  | 238              | 279                  | 1.13 | 297              | 124.22   | 143.23 | 223.95 | 1.76 | 14799581                                    | 106277                         | 39942                      | 120 | 120 |
|                 | T-19          | 296.97                  | 250              | 279                  | 1.13 | 297              | 140.73   | 161.72 | 246.09 | 1.76 | 14829848                                    | 106388                         | 41510                      | 180 | 120 |
|                 | T-20          | 324.03                  | 261              | 279                  | 1.13 | 297              | 156.33   | 179.16 | 267.34 | 1.76 | 14863884                                    | 106520                         | 43051                      | 180 | 120 |

**Flexión negativa, esfuerzo por bandas de 1 metro.**

| TIPO DE FORJADO | TIPO DE ARMADO | ARMADO POR NERVIOS | ÁREA ARMADO (mm <sup>2</sup> ) | Mu (m·kN/m) | Vu(kN/m) (2)                       |                                    |                                    | M límite servicio según clase de exposición (m·kN/m) |         |              |        | Mfis (m·kN/m) | RIGIDEZ (m <sup>2</sup> ·kN/m) |                            | REI (3) |
|-----------------|----------------|--------------------|--------------------------------|-------------|------------------------------------|------------------------------------|------------------------------------|--|---------|--------------|--------|---------------|--------------------------------|----------------------------|---------|
|                 |                |                    |                                |             | SECCIÓN TIPO                       |                                    | MACIZADA                           | I  | IIa-IIb | IIIa-IIIb-IV | IIIC   |               | HOMOG E·lh                     | FISURADA E·lf <sub>0</sub> |         |
|                 |                |                    |                                |             | M <sub>d</sub> >M <sub>fis,d</sub> | M <sub>d</sub> <M <sub>fis,d</sub> | M <sub>d</sub> >M <sub>fis,d</sub> |  |         |              |        |               |                                |                            |         |
| 30 + 5          | N-1            | 4 φ 8              | 279.60                         | 32.51       | 68.27                              | 99.22                              | 192.08                             | 32.51  | 32.51   | 32.51        | 32.51  | 32.51         | 105175                         | 3769                       | 90      |
|                 | N-2            | 5 φ 8              | 329.87                         | 38.35       | 68.27                              | 99.22                              | 192.08                             | 38.35  | 38.35   | 38.35        | 38.35  | 38.35         | 105309                         | 4449                       | 90      |
|                 | N-3            | 4 φ 10             | 392.70                         | 45.49       | 68.27                              | 99.22                              | 191.68                             | 45.49  | 45.49   | 45.49        | 45.49  | 45.49         | 105464                         | 5227                       | 90      |
|                 | N-4            | 5 φ 10             | 471.24                         | 53.26       | 68.27                              | 99.22                              | 191.68                             | 53.26  | 53.26   | 53.26        | 53.26  | 53.26         | 105670                         | 6879                       | 90      |
|                 | N-5            | 4 φ 12             | 530.93                         | 59.62       | 68.27                              | 99.22                              | 191.28                             | 59.62  | 59.62   | 59.62        | 59.62  | 59.62         | 105809                         | 7640                       | 90      |
|                 | N-6            | 5 φ 12             | 644.03                         | 72.18       | 68.27                              | 99.22                              | 191.28                             | 62.31  | 62.31   | 62.31        | 62.31  | 62.31         | 106100                         | 9113                       | 90      |
|                 | N-7            | 6 φ 12             | 757.12                         | 84.72       | 68.27                              | 99.22                              | 191.28                             | 75.10  | 62.61   | 62.61        | 62.61  | 62.61         | 106389                         | 10542                      | 90      |
|                 | N-8            | 4 φ 16             | 882.79                         | 97.60       | 68.27                              | 99.22                              | 190.48                             | 85.34  | 63.37   | 62.90        | 62.90  | 62.90         | 106650                         | 11974                      | 90      |
|                 | N-9            | 5 φ 16             | 1083.85                        | 119.28      | 68.27                              | 99.22                              | 190.48                             | 115.55   | 85.96   | 63.43        | 63.43  | 63.43         | 107146                         | 14381                      | 90      |
|                 | N-10           | 6 φ 16             | 1284.91                        | 140.83      | 68.27                              | 99.22                              | 198.47                             | 140.83   | 109.80  | 74.82        | 63.95  | 63.95         | 107639                         | 16700                      | 90      |
|                 | N-11           | 5 φ 20             | 1649.34                        | 178.51      | 69.70                              | 99.22                              | 216.11                             | 178.51   | 142.83  | 93.42        | 64.81  | 64.81         | 108412                         | 20440                      | 120     |
|                 | N-12           | 6 φ 20             | 1963.50                        | 211.09      | 74.06                              | 99.22                              | 229.65                             | 211.09   | 181.12  | 115.12       | 65.62  | 65.62         | 109146                         | 23703                      | 120     |
|                 | N-13           | 8 φ 20             | 2591.81                        | 275.92      | 80.70                              | 99.22                              | 250.22                             | 275.92   | 262.51  | 160.50       | 81.04  | 67.23         | 110594                         | 29780                      | 120     |
|                 | N-14           | 10 φ 20            | 3220.13                        | 338.76      | 80.70                              | 99.22                              | 250.22                             | 338.76   | 338.76  | 232.04       | 105.27 | 68.85         | 112016                         | 35385                      | 120     |
|                 | N-15           | 8 φ 25             | 4005.53                        | 408.74      | 80.20                              | 99.22                              | 248.67                             | 408.74   | 408.74  | 244.39       | 125.65 | 70.58         | 113430                         | 41091                      | 120     |
|                 | N-16           | 10 φ 25            | 4987.28                        | 489.80      | 80.20                              | 99.22                              | 248.67                             | 489.80   | 489.80  | 377.05       | 162.88 | 73.04         | 115478                         | 48307                      | 120     |

Peso del forjado (kN/m<sup>2</sup>): 5.34  
 Acero armadura superior: B 500S o B 500SD UNE 36-069-94  
 Armadura de reparto mínima: ME 20 x 30 A r 5 - 5 B 500 T 5x2.30 UNE 36092:1995  
 Área armado mínima: 480 mm<sup>2</sup>



Documento visado electrónicamente con número: MU1600855



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0099/CPR/A87/0133  
 EN 1168:2005+A3:2011



ER-1255/2008

**Flexión positiva, esfuerzo por bandas de 1 metro.**

| TIPO DE FORJADO | TIPO DE PLACA | MOMENTO ULTIMO (m·kN/m) | Vu(kN/m)         |                      |      |                  | M límite servicio según clase de exposición (m·kN/m) |        |        | β*** | MÓDULO RESISTENTE Wh,inf (mm <sup>3</sup> ) | RIGIDEZ (m <sup>2</sup> ·kN/m) |                            | REI |     |
|-----------------|---------------|-------------------------|------------------|----------------------|------|------------------|--|--------|--------|------|---|--------------------------------|----------------------------|-----|-----|
|                 |               |                         | SECCIÓN TIPO (1) | SECCIÓN MACIZADA (2) | ** ζ | RASANTE Vu(kN/m) | Mo   | Mo'    | Mo2    |      |   | HOMOG E·lh                     | FISURADA E·lf <sub>0</sub> | (3) | (4) |
|                 |               |                         |                  |                      |      |                  |  |        |        |      |   |                                |                            |     |     |
| 30 + 8          | T-1           | 163.97                  | 205              | 303                  | 1.21 | 342              | 55.49  | 62.15  | 142.89 | 2.25 | 16698194                                    | 135260                         | 38275                      | 30  | 60  |
|                 | T-2           | 180.31                  | 210              | 303                  | 1.21 | 342              | 62.69  | 70.02  | 152.20 | 2.25 | 16727276                                    | 135424                         | 39556                      | 30  | 60  |
|                 | T-3           | 196.49                  | 216              | 303                  | 1.21 | 342              | 69.86  | 77.86  | 161.49 | 2.25 | 16756579                                    | 135589                         | 40843                      | 30  | 60  |
|                 | T-4           | 211.40                  | 221              | 303                  | 1.21 | 342              | 75.80  | 84.45  | 169.51 | 2.25 | 16778077                                    | 135704                         | 42106                      | 30  | 60  |
|                 | T-5           | 242.66                  | 231              | 303                  | 1.21 | 342              | 96.26  | 105.10 | 194.20 | 2.25 | 16837156                                    | 136037                         | 44169                      | 30  | 60  |
|                 | T-6           | 272.82                  | 246              | 303                  | 1.21 | 342              | 113.03   | 122.85 | 215.08 | 2.25 | 16865814                                    | 136147                         | 46288                      | 30  | 60  |
|                 | T-7           | 301.32                  | 255              | 303                  | 1.21 | 342              | 131.37   | 141.48 | 237.61 | 2.25 | 16916515                                    | 136424                         | 48560                      | 30  | 90  |
|                 | T-8           | 326.79                  | 264              | 303                  | 1.21 | 342              | 149.62   | 160.01 | 260.05 | 2.25 | 16967329                                    | 136703                         | 50901                      | 30  | 90  |
|                 | T-9           | 350.82                  | 277              | 303                  | 1.21 | 342              | 163.20   | 174.68 | 277.69 | 2.25 | 16984734                                    | 136740                         | 53310                      | 60  | 90  |
|                 | T-10          | 373.60                  | 285              | 303                  | 1.21 | 342              | 179.37   | 191.23 | 298.02 | 2.25 | 17027410                                    | 136964                         | 55843                      | 60  | 90  |
|                 | T-11          | 396.85                  | 293              | 303                  | 1.21 | 342              | 195.44   | 207.68 | 318.26 | 2.25 | 17070080                                    | 137189                         | 58342                      | 90  | 120 |
|                 | T-12          | 419.06                  | 301              | 303                  | 1.21 | 342              | 208.52   | 221.22 | 335.46 | 2.25 | 17105032                                    | 137363                         | 60769                      | 90  | 120 |
|                 | T-13          | 438.30                  | 309              | 303                  | 1.21 | 342              | 221.43   | 234.59 | 352.51 | 2.25 | 17139962                                    | 137538                         | 62938                      | 90  | 120 |
|                 | T-14          | 444.87                  | 312              | 303                  | 1.21 | 342              | 208.18   | 220.99 | 341.32 | 2.25 | 17157419                                    | 137625                         | 64532                      | 90  | 120 |
|                 | T-15          | 187.17                  | 216              | 303                  | 1.21 | 326              | 63.54  | 78.84  | 155.00 | 2.25 | 16718707                                    | 135345                         | 53076                      | 90  | 120 |
|                 | T-16          | 228.88                  | 231              | 303                  | 1.21 | 326              | 83.51  | 101.76 | 181.21 | 2.25 | 16782614                                    | 135684                         | 55242                      | 120 | 120 |
|                 | T-17          | 265.91                  | 246              | 303                  | 1.21 | 326              | 107.34   | 126.74 | 211.27 | 2.25 | 16842897                                    | 135999                         | 57341                      | 120 | 120 |
|                 | T-18          | 300.43                  | 259              | 303                  | 1.21 | 326              | 128.41   | 149.14 | 238.54 | 2.25 | 16895635                                    | 136266                         | 59364                      | 120 | 120 |
|                 | T-19          | 331.32                  | 272              | 303                  | 1.21 | 326              | 147.27   | 169.68 | 263.53 | 2.25 | 16933479                                    | 136437                         | 61397                      | 180 | 120 |
|                 | T-20          | 359.02                  | 285              | 303                  | 1.21 | 326              | 165.10   | 189.06 | 287.50 | 2.25 | 16975129                                    | 136632                         | 63433                      | 180 | 120 |

**Flexión negativa, esfuerzo por bandas de 1 metro.**

| TIPO DE FORJADO | TIPO DE ARMADO | ARMADO POR NERVIOS | ÁREA ARMADO (mm <sup>2</sup> ) | Mu (m·kN/m) | Vu(kN/m) (2)                       |                                    |                                    | M límite servicio según clase de exposición (m·kN/m) |         |              |        | Mfis (m·kN/m) | RIGIDEZ (m <sup>2</sup> ·kN/m) |                            | REI (3) |
|-----------------|----------------|--------------------|--------------------------------|-------------|------------------------------------|------------------------------------|------------------------------------|--|---------|--------------|--------|---------------|--------------------------------|----------------------------|---------|
|                 |                |                    |                                |             | SECCIÓN TIPO                       |                                    | MACIZADA                           | I  | IIa-IIb | IIIa-IIIb-IV | IIc    |               | HOMOG E·lh                     | FISURADA E·lf <sub>0</sub> |         |
|                 |                |                    |                                |             | M <sub>d</sub> >M <sub>fis,d</sub> | M <sub>d</sub> <M <sub>fis,d</sub> | M <sub>d</sub> >M <sub>fis,d</sub> |  |         |              |        |               |                                |                            |         |
| 30 + 8          | N-1            | 4 φ 8              | 279.60                         | 35.55       | 68.27                              | 106.33                             | 203.99                             | 35.55  | 35.55   | 35.55        | 35.55  | 35.55         | 134687                         | 4513                       | 90      |
|                 | N-2            | 5 φ 8              | 329.87                         | 41.93       | 68.27                              | 106.33                             | 203.99                             | 41.93  | 41.93   | 41.93        | 41.93  | 41.93         | 134843                         | 5328                       | 90      |
|                 | N-3            | 4 φ 10             | 392.70                         | 49.78       | 68.27                              | 106.33                             | 203.60                             | 49.78  | 49.78   | 49.78        | 49.78  | 49.78         | 135026                         | 6264                       | 90      |
|                 | N-4            | 5 φ 10             | 471.24                         | 58.38       | 68.27                              | 106.33                             | 203.60                             | 58.38  | 58.38   | 58.38        | 58.38  | 58.38         | 135267                         | 8274                       | 90      |
|                 | N-5            | 4 φ 12             | 530.93                         | 65.39       | 68.27                              | 106.33                             | 203.20                             | 65.39  | 65.39   | 65.39        | 65.39  | 65.39         | 135432                         | 9200                       | 90      |
|                 | N-6            | 5 φ 12             | 644.03                         | 79.18       | 68.27                              | 106.33                             | 203.20                             | 76.68  | 76.68   | 76.68        | 76.68  | 76.68         | 135773                         | 10980                      | 90      |
|                 | N-7            | 6 φ 12             | 757.12                         | 92.63       | 68.27                              | 106.33                             | 203.20                             | 87.65  | 77.02   | 77.02        | 77.02  | 77.02         | 136113                         | 12752                      | 90      |
|                 | N-8            | 4 φ 16             | 882.79                         | 107.20      | 68.27                              | 106.33                             | 202.41                             | 99.03  | 77.34   | 77.34        | 77.34  | 77.34         | 136425                         | 14463                      | 90      |
|                 | N-9            | 5 φ 16             | 1083.85                        | 131.06      | 68.27                              | 106.33                             | 202.41                             | 131.06   | 99.12   | 77.94        | 77.94  | 77.94         | 137009                         | 17386                      | 90      |
|                 | N-10           | 6 φ 16             | 1284.91                        | 154.79      | 68.27                              | 106.33                             | 206.67                             | 154.79   | 125.82  | 84.16        | 78.53  | 78.53         | 137590                         | 20204                      | 90      |
|                 | N-11           | 5 φ 20             | 1649.34                        | 195.88      | 72.59                              | 106.33                             | 225.09                             | 195.88   | 162.67  | 105.27       | 79.50  | 79.50         | 138512                         | 24821                      | 120     |
|                 | N-12           | 6 φ 20             | 1963.50                        | 232.43      | 77.14                              | 106.33                             | 239.20                             | 232.43   | 205.43  | 129.81       | 80.41  | 80.41         | 139380                         | 28768                      | 120     |
|                 | N-13           | 8 φ 20             | 2591.81                        | 303.16      | 84.91                              | 106.33                             | 263.27                             | 303.16   | 296.14  | 180.95       | 91.27  | 82.23         | 141095                         | 36213                      | 120     |
|                 | N-14           | 10 φ 20            | 3220.13                        | 373.38      | 86.64                              | 106.33                             | 268.64                             | 373.38   | 373.38  | 261.08       | 118.38 | 84.05         | 142781                         | 43065                      | 120     |
|                 | N-15           | 8 φ 25             | 4005.53                        | 453.05      | 86.15                              | 106.33                             | 267.12                             | 453.05   | 453.05  | 275.36       | 141.20 | 86.03         | 144483                         | 50154                      | 120     |
|                 | N-16           | 10 φ 25            | 4987.28                        | 543.47      | 86.15                              | 106.33                             | 267.12                             | 543.47   | 543.47  | 421.70       | 182.81 | 88.81         | 146925                         | 58998                      | 120     |

Peso del forjado (kN/m<sup>2</sup>): 6.06  
 Acero armadura superior: B 500S o B 500SD UNE 36-069-94  
 Armadura de reparto mínima: ME 20 x 30 A r 5 - 5 B 500 T 5x2.30 UNE 36092:1995  
 Área armado mínima: 545 mm<sup>2</sup>



Documento visado electrónicamente con número: MU1600855



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 EN 1168:2005+A3:2011



ER-1255/2008

**Flexión positiva, esfuerzo por bandas de 1 metro.**

| TIPO DE FORJADO | TIPO DE PLACA | MOMENTO ULTIMO (m·kN/m) | Vu(kN/m)         |                      |      |                  | M límite servicio según clase de exposición (m·kN/m) |        |        | β*** | MÓDULO RESISTENTE Wh,inf (mm³) | RIGIDEZ (m²·kN/m) |                | REI |     |
|-----------------|---------------|-------------------------|------------------|----------------------|------|------------------|--|--------|--------|------|--------------------------------|-------------------|----------------|-----|-----|
|                 |               |                         | SECCIÓN TIPO (1) | SECCIÓN MACIZADA (2) | ** ζ | RASANTE Vu(kN/m) | Mo   | Mo'    | Mo2    |      |                                | HOMOG E·lh        | FISURADA E·lf₀ | (3) | (4) |
|                 |               |                         |                  |                      |      |                  |  |        |        |      |                                |                   |                |     |     |
| 30 + 10         | T-1           | 176.28                  | 215              | 319                  | 1.26 | 361              | 55.49  | 62.69  | 148.75 | 2.60 | 18169170                       | 157447            | 56577          | 30  | 60  |
|                 | T-2           | 194.05                  | 221              | 319                  | 1.26 | 361              | 62.69  | 70.60  | 158.17 | 2.60 | 18200010                       | 157636            | 57938          | 30  | 60  |
|                 | T-3           | 211.57                  | 227              | 319                  | 1.26 | 361              | 69.86  | 78.50  | 167.57 | 2.60 | 18231056                       | 157826            | 59306          | 30  | 60  |
|                 | T-4           | 227.54                  | 233              | 319                  | 1.26 | 361              | 75.77  | 85.12  | 175.66 | 2.60 | 18254257                       | 157961            | 60640          | 30  | 60  |
|                 | T-5           | 261.17                  | 244              | 319                  | 1.26 | 361              | 94.69  | 104.67 | 199.04 | 2.60 | 18316793                       | 158345            | 62860          | 30  | 60  |
|                 | T-6           | 293.64                  | 260              | 319                  | 1.26 | 361              | 112.94   | 123.83 | 221.62 | 2.60 | 18350413                       | 158494            | 65145          | 30  | 60  |
|                 | T-7           | 323.92                  | 270              | 319                  | 1.26 | 361              | 132.89   | 143.95 | 245.99 | 2.60 | 18404567                       | 158817            | 67556          | 30  | 90  |
|                 | T-8           | 353.42                  | 279              | 319                  | 1.26 | 361              | 152.73   | 163.95 | 270.25 | 2.60 | 18458827                       | 159140            | 69981          | 30  | 90  |
|                 | T-9           | 379.17                  | 293              | 319                  | 1.26 | 361              | 167.51   | 179.80 | 289.31 | 2.60 | 18481094                       | 159211            | 72442          | 60  | 90  |
|                 | T-10          | 401.63                  | 302              | 319                  | 1.26 | 361              | 185.10   | 197.66 | 311.28 | 2.60 | 18527193                       | 159476            | 75055          | 60  | 90  |
|                 | T-11          | 426.59                  | 311              | 319                  | 1.26 | 361              | 202.59   | 215.43 | 333.16 | 2.60 | 18573286                       | 159741            | 77941          | 90  | 120 |
|                 | T-12          | 446.90                  | 319              | 319                  | 1.26 | 361              | 216.82   | 230.04 | 351.73 | 2.60 | 18611612                       | 159951            | 80620          | 90  | 120 |
|                 | T-13          | 468.05                  | 327              | 319                  | 1.26 | 361              | 230.87   | 244.49 | 370.13 | 2.60 | 18649916                       | 160161            | 83296          | 90  | 120 |
|                 | T-14          | 477.65                  | 330              | 319                  | 1.26 | 361              | 216.45   | 229.80 | 357.89 | 2.60 | 18669060                       | 160266            | 85210          | 90  | 120 |
|                 | T-15          | 202.19                  | 227              | 319                  | 1.26 | 345              | 63.54  | 79.95  | 161.08 | 2.60 | 18192900                       | 157559            | 72155          | 90  | 120 |
|                 | T-16          | 245.05                  | 244              | 319                  | 1.26 | 345              | 81.13  | 101.61 | 185.25 | 2.60 | 18261950                       | 157959            | 74529          | 120 | 120 |
|                 | T-17          | 287.75                  | 260              | 319                  | 1.26 | 345              | 106.74   | 128.20 | 217.42 | 2.60 | 18327337                       | 158333            | 76831          | 120 | 120 |
|                 | T-18          | 324.85                  | 275              | 319                  | 1.26 | 345              | 129.67   | 152.22 | 246.87 | 2.60 | 18385116                       | 158653            | 79010          | 120 | 120 |
|                 | T-19          | 355.81                  | 289              | 319                  | 1.26 | 345              | 150.19   | 174.25 | 273.86 | 2.60 | 18427869                       | 158869            | 81054          | 180 | 120 |
|                 | T-20          | 388.85                  | 302              | 319                  | 1.26 | 345              | 169.58   | 195.03 | 299.73 | 2.60 | 18474452                       | 159111            | 83327          | 180 | 120 |

**Flexión negativa, esfuerzo por bandas de 1 metro.**

| TIPO DE FORJADO | TIPO DE ARMADO | ARMADO POR NERVIOS | ÁREA ARMADO (mm²) | Mu (m·kN/m) | Vu(kN/m) (2) |           |           | M límite servicio según clase de exposición (m·kN/m) |         |              |        | Mfis (m·kN/m) | RIGIDEZ (m²·kN/m) |                | REI (3) |
|-----------------|----------------|--------------------|-------------------|-------------|--------------|-----------|-----------|--|---------|--------------|--------|---------------|-------------------|----------------|---------|
|                 |                |                    |                   |             | SECCIÓN TIPO |           | MACIZADA  | I  | IIa-IIb | IIIa-IIIb-IV | IIIC   |               | HOMOG E·lh        | FISURADA E·lf₀ |         |
|                 |                |                    |                   |             | Md>Mfis,d    | Md<Mfis,d | Md>Mfis,d |  |         |              |        |               |                   |                |         |
| 30 + 10         | N-1            | 4 φ 8              | 314.16            | 42.21       | 68.31        | 111.22    | 211.82    | 42.21  | 42.21   | 42.21        | 42.21  | 42.21         | 156609            | 5729           | 90      |
|                 | N-2            | 5 φ 8              | 364.42            | 48.96       | 68.31        | 111.22    | 211.82    | 48.96  | 48.96   | 48.96        | 48.96  | 48.96         | 156783            | 6636           | 90      |
|                 | N-3            | 4 φ 10             | 427.26            | 57.22       | 68.27        | 111.22    | 211.43    | 57.22  | 57.22   | 57.22        | 57.22  | 57.22         | 156987            | 7681           | 90      |
|                 | N-4            | 5 φ 10             | 505.80            | 66.22       | 68.27        | 111.22    | 211.43    | 66.22  | 66.22   | 66.22        | 66.22  | 66.22         | 157255            | 9920           | 90      |
|                 | N-5            | 4 φ 12             | 565.49            | 73.63       | 68.27        | 111.22    | 211.04    | 73.63  | 73.63   | 73.63        | 73.63  | 73.63         | 157439            | 10952          | 90      |
|                 | N-6            | 5 φ 12             | 678.58            | 88.23       | 68.27        | 111.22    | 211.04    | 86.49  | 86.49   | 86.49        | 86.49  | 86.49         | 157818            | 12930          | 90      |
|                 | N-7            | 6 φ 12             | 791.68            | 102.42      | 68.27        | 111.22    | 211.04    | 100.94   | 86.86   | 86.86        | 86.86  | 86.86         | 158196            | 14915          | 90      |
|                 | N-8            | 4 φ 16             | 917.35            | 117.89      | 68.27        | 111.22    | 210.26    | 112.68   | 87.21   | 87.21        | 87.21  | 87.21         | 158547            | 16833          | 90      |
|                 | N-9            | 5 φ 16             | 1118.41           | 143.18      | 68.27        | 111.22    | 210.26    | 143.18   | 111.35  | 87.84        | 87.84  | 87.84         | 159198            | 20110          | 90      |
|                 | N-10           | 6 φ 16             | 1319.47           | 168.35      | 68.36        | 111.22    | 211.98    | 168.35   | 140.03  | 92.57        | 88.48  | 88.48         | 159846            | 23270          | 90      |
|                 | N-11           | 5 φ 20             | 1683.89           | 211.96      | 74.47        | 111.22    | 230.91    | 211.96   | 179.19  | 115.07       | 89.53  | 89.53         | 160882            | 28469          | 120     |
|                 | N-12           | 6 φ 20             | 1998.05           | 250.10      | 79.13        | 111.22    | 245.37    | 250.10   | 224.96  | 141.58       | 90.51  | 90.51         | 161853            | 32934          | 120     |
|                 | N-13           | 8 φ 20             | 2626.37           | 326.21      | 87.10        | 111.22    | 270.07    | 326.21   | 321.87  | 196.20       | 98.89  | 92.47         | 163774            | 41287          | 120     |
|                 | N-14           | 10 φ 20            | 3254.69           | 400.37      | 90.56        | 111.22    | 280.81    | 400.37   | 400.37  | 282.58       | 127.65 | 94.43         | 165665            | 49027          | 120     |
|                 | N-15           | 8 φ 25             | 4040.09           | 484.92      | 90.07        | 111.22    | 279.29    | 484.92   | 484.92  | 297.21       | 152.16 | 96.57         | 167598            | 57088          | 120     |
|                 | N-16           | 10 φ 25            | 5021.84           | 583.61      | 90.07        | 111.22    | 279.29    | 583.61   | 583.61  | 453.24       | 196.24 | 99.57         | 170349            | 67090          | 120     |

Peso del forjado (kN/m²): 6.54  
 Acero armadura superior: B 500S o B 500SD UNE 36-069-94  
 Armadura de reparto mínima: ME 20 x 30 A r 6 - 6 B 500 T 5x2.30 UNE 36092:1995  
 Área armado mínima: 588 mm²



MU1600855



**ALJEMA**  
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0099/CPR/A87/0133  
 EN 1168:2005+A3:2011



ER-1255/2008

**Flexión positiva, esfuerzo por bandas de 1 metro.**

| TIPO DE FORJADO | TIPO DE PLACA | MOMENTO ULTIMO (m·kN/m) | Vu(kN/m)         |                      |      |                  | M límite servicio según clase de exposición (m·kN/m) |        |        | β*** | MÓDULO RESISTENTE Wh,inf (mm <sup>3</sup> ) | RIGIDEZ (m <sup>2</sup> ·kN/m) |                            | REI |     |
|-----------------|---------------|-------------------------|------------------|----------------------|------|------------------|--|--------|--------|------|---|--------------------------------|----------------------------|-----|-----|
|                 |               |                         | SECCIÓN TIPO (1) | SECCIÓN MACIZADA (2) | ** ζ | RASANTE Vu(KN/m) | Mo   | Mo'    | Mo2    |      |   | HOMOG E·lh                     | FISURADA E·lf <sub>0</sub> | (3) | (4) |
|                 |               |                         |                  |                      |      |                  |  |        |        |      |   |                                |                            |     |     |
| 30 + 12         | T-1           | 188.35                  | 226              | 335                  | 1.32 | 381              | 55.49  | 63.25  | 154.69 | 2.99 | 19710078                                    | 181519                         | 75586                      | 30  | 60  |
|                 | T-2           | 207.03                  | 233              | 335                  | 1.32 | 381              | 62.69  | 71.22  | 164.22 | 2.99 | 19742636                                    | 181733                         | 77034                      | 30  | 60  |
|                 | T-3           | 226.95                  | 239              | 335                  | 1.32 | 381              | 69.86  | 79.17  | 173.73 | 2.99 | 19775387                                    | 181949                         | 78489                      | 30  | 60  |
|                 | T-4           | 242.34                  | 245              | 335                  | 1.32 | 381              | 75.77  | 85.85  | 181.94 | 2.99 | 19800252                                    | 182105                         | 79898                      | 30  | 60  |
|                 | T-5           | 279.29                  | 257              | 335                  | 1.32 | 381              | 91.63  | 103.00 | 202.47 | 2.99 | 19866173                                    | 182540                         | 82286                      | 30  | 60  |
|                 | T-6           | 316.38                  | 274              | 335                  | 1.32 | 381              | 111.40   | 123.65 | 226.80 | 2.99 | 19904630                                    | 182734                         | 84760                      | 30  | 60  |
|                 | T-7           | 345.69                  | 285              | 335                  | 1.32 | 381              | 133.05   | 145.32 | 253.08 | 2.99 | 19962158                                    | 183104                         | 87318                      | 30  | 90  |
|                 | T-8           | 376.73                  | 295              | 335                  | 1.32 | 381              | 154.57   | 166.88 | 279.24 | 2.99 | 20019786                                    | 183474                         | 89891                      | 30  | 90  |
|                 | T-9           | 406.03                  | 310              | 335                  | 1.32 | 381              | 170.59   | 183.96 | 299.77 | 2.99 | 20046797                                    | 183581                         | 92523                      | 60  | 90  |
|                 | T-10          | 434.23                  | 320              | 335                  | 1.32 | 381              | 189.67   | 203.21 | 323.45 | 2.99 | 20096239                                    | 183888                         | 95308                      | 60  | 90  |
|                 | T-11          | 457.43                  | 329              | 335                  | 1.32 | 381              | 208.63   | 222.35 | 347.02 | 2.99 | 20145675                                    | 184195                         | 98080                      | 90  | 120 |
|                 | T-12          | 478.66                  | 338              | 335                  | 1.32 | 381              | 224.06   | 238.10 | 367.02 | 2.99 | 20187295                                    | 184443                         | 100745                     | 90  | 120 |
|                 | T-13          | 500.24                  | 347              | 335                  | 1.32 | 381              | 239.30   | 253.66 | 386.83 | 2.99 | 20228895                                    | 184691                         | 103591                     | 90  | 120 |
|                 | T-14          | 511.07                  | 342              | 335                  | 1.32 | 381              | 223.66   | 237.83 | 373.48 | 2.99 | 20249687                                    | 184815                         | 105727                     | 90  | 120 |
|                 | T-15          | 214.77                  | 239              | 335                  | 1.32 | 364              | 63.54  | 81.13  | 167.25 | 2.99 | 19736956                                    | 181660                         | 91294                      | 90  | 120 |
|                 | T-16          | 263.02                  | 257              | 335                  | 1.32 | 364              | 81.13  | 103.09 | 191.74 | 2.99 | 19811027                                    | 182124                         | 93897                      | 120 | 120 |
|                 | T-17          | 308.51                  | 274              | 335                  | 1.32 | 364              | 104.67   | 128.70 | 222.18 | 2.99 | 19881398                                    | 182559                         | 96415                      | 120 | 120 |
|                 | T-18          | 348.13                  | 290              | 335                  | 1.32 | 364              | 129.54   | 154.44 | 253.90 | 2.99 | 19944104                                    | 182937                         | 98796                      | 120 | 120 |
|                 | T-19          | 383.20                  | 305              | 335                  | 1.32 | 364              | 151.80   | 178.05 | 282.95 | 2.99 | 19991655                                    | 183200                         | 101032                     | 180 | 120 |
|                 | T-20          | 417.53                  | 320              | 335                  | 1.32 | 364              | 172.83   | 200.32 | 310.80 | 2.99 | 20043064                                    | 183492                         | 103386                     | 180 | 120 |

**Flexión negativa, esfuerzo por bandas de 1 metro.**

| TIPO DE FORJADO | TIPO DE ARMADO | ARMADO POR NERVIO | ÁREA ARMADO (mm <sup>2</sup> ) | Mu (m·kN/m) | Vu(kN/m) (2)                       |                                    |                                    | M límite servicio según clase de exposición (m·kN/m) |         |              |        | Mfis (m·kN/m) | RIGIDEZ (m <sup>2</sup> ·kN/m) |                            | REI (3) |
|-----------------|----------------|-------------------|--------------------------------|-------------|------------------------------------|------------------------------------|------------------------------------|--|---------|--------------|--------|---------------|--------------------------------|----------------------------|---------|
|                 |                |                   |                                |             | SECCIÓN TIPO                       |                                    | MACIZADA                           | I  | IIa-IIb | IIIa-IIIb-IV | IIIC   |               | HOMOG E·lh                     | FISURADA E·lf <sub>0</sub> |         |
|                 |                |                   |                                |             | M <sub>d</sub> >M <sub>fis,d</sub> | M <sub>d</sub> <M <sub>fis,d</sub> | M <sub>d</sub> >M <sub>fis,d</sub> |  |         |              |        |               |                                |                            |         |
| 30 + 12         | N-1            | 4 φ 8             | 314.16                         | 44.49       | 70.81                              | 116.25                             | 219.58                             | 44.49  | 44.49   | 44.49        | 44.49  | 44.49         | 180517                         | 6369                       | 90      |
|                 | N-2            | 5 φ 8             | 364.42                         | 51.61       | 70.81                              | 116.25                             | 219.58                             | 51.61  | 51.61   | 51.61        | 51.61  | 51.61         | 180710                         | 7378                       | 90      |
|                 | N-3            | 4 φ 10            | 427.26                         | 60.32       | 70.69                              | 116.25                             | 219.19                             | 60.32  | 60.32   | 60.32        | 60.32  | 60.32         | 180936                         | 8543                       | 90      |
|                 | N-4            | 5 φ 10            | 505.80                         | 69.89       | 70.69                              | 116.25                             | 219.19                             | 69.89  | 69.89   | 69.89        | 69.89  | 69.89         | 181233                         | 11056                      | 90      |
|                 | N-5            | 4 φ 12            | 565.49                         | 77.72       | 70.56                              | 116.25                             | 218.81                             | 77.72  | 77.72   | 77.72        | 77.72  | 77.72         | 181438                         | 12214                      | 90      |
|                 | N-6            | 5 φ 12            | 678.58                         | 93.15       | 70.56                              | 116.25                             | 218.81                             | 93.15  | 93.15   | 93.15        | 93.15  | 93.15         | 181860                         | 14422                      | 90      |
|                 | N-7            | 6 φ 12            | 791.68                         | 108.16      | 70.56                              | 116.25                             | 218.81                             | 108.16   | 96.92   | 96.92        | 96.92  | 96.92         | 182280                         | 16644                      | 90      |
|                 | N-8            | 4 φ 16            | 917.35                         | 124.53      | 70.32                              | 116.25                             | 218.03                             | 121.06   | 97.30   | 97.30        | 97.30  | 97.30         | 182673                         | 18799                      | 90      |
|                 | N-9            | 5 φ 16            | 1118.41                        | 151.29      | 70.32                              | 116.25                             | 218.03                             | 151.29   | 119.38  | 97.98        | 97.98  | 97.98         | 183398                         | 22469                      | 90      |
|                 | N-10           | 6 φ 16            | 1319.47                        | 177.35      | 70.32                              | 116.25                             | 218.03                             | 177.35   | 149.81  | 98.65        | 98.65  | 98.65         | 184119                         | 26061                      | 90      |
|                 | N-11           | 5 φ 20            | 1683.89                        | 224.16      | 76.30                              | 116.25                             | 236.59                             | 224.16   | 191.33  | 122.39       | 99.79  | 99.79         | 185280                         | 31862                      | 120     |
|                 | N-12           | 6 φ 20            | 1998.05                        | 264.58      | 81.08                              | 116.25                             | 251.41                             | 264.58   | 239.85  | 150.31       | 100.83 | 100.83        | 186364                         | 36877                      | 120     |
|                 | N-13           | 8 φ 20            | 2626.37                        | 345.14      | 89.24                              | 116.25                             | 276.71                             | 345.14   | 342.52  | 208.73       | 105.50 | 102.93        | 188510                         | 46266                      | 120     |
|                 | N-14           | 10 φ 20           | 3254.69                        | 423.42      | 94.45                              | 116.25                             | 292.88                             | 423.42   | 423.42  | 300.41       | 135.96 | 105.03        | 190627                         | 54983                      | 120     |
|                 | N-15           | 8 φ 25            | 4040.09                        | 514.19      | 93.97                              | 116.25                             | 291.37                             | 514.19   | 514.19  | 316.43       | 161.82 | 107.34        | 192816                         | 64118                      | 120     |
|                 | N-16           | 10 φ 25           | 5021.84                        | 619.57      | 93.97                              | 116.25                             | 291.37                             | 619.57   | 619.57  | 480.79       | 209.07 | 110.56        | 195912                         | 75401                      | 120     |

Peso del forjado (kN/m<sup>2</sup>): 7.02  
 Acero armadura superior: B 500S o B 500SD UNE 36-069-94  
 Armadura de reparto mínima: ME 20 x 30 A r 6 - 6 B 500 T 5x2.30 UNE 36092:1995  
 Área armado mínima: 631 mm<sup>2</sup>



Documento visado electrónicamente con número: MU1600855





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ER-1255/2008

**Flexión positiva, esfuerzo por bandas de 1 metro.**

| TIPO DE FORJADO | TIPO DE PLACA | MOMENTO ULTIMO (m·kN/m) | Vu(kN/m)         |                      |      |                  | M límite servicio según clase de exposición (m·kN/m) |        |        | β*** | MÓDULO RESISTENTE Wh,inf (mm³) | RIGIDEZ (m²·kN/m) |                | REI |     |
|-----------------|---------------|-------------------------|------------------|----------------------|------|------------------|--|--------|--------|------|--------------------------------|-------------------|----------------|-----|-----|
|                 |               |                         | SECCIÓN TIPO (1) | SECCIÓN MACIZADA (2) | ** ζ | RASANTE Vu(kN/m) | Mo   | Mo'    | Mo2    |      |                                | HOMOG E·lh        | FISURADA E·lf₀ | (3) | (4) |
|                 |               |                         |                  |                      |      |                  |  |        |        |      |                                |                   |                |     |     |
| 30 + 15         | T-1           | 206.55                  | 244              | 359                  | 1.41 | 409              | 55.49  | 64.16  | 163.90 | 3.63 | 22194472                       | 222090            | 95088          | 30  | 60  |
|                 | T-2           | 226.79                  | 251              | 359                  | 1.41 | 409              | 62.69  | 72.22  | 173.59 | 3.63 | 22229589                       | 222345            | 96674          | 30  | 60  |
|                 | T-3           | 247.88                  | 258              | 359                  | 1.41 | 409              | 69.86  | 80.26  | 183.26 | 3.63 | 22264884                       | 222602            | 98265          | 30  | 60  |
|                 | T-4           | 267.18                  | 265              | 359                  | 1.41 | 409              | 75.77  | 87.03  | 191.64 | 3.63 | 22292228                       | 222793            | 99798          | 30  | 60  |
|                 | T-5           | 307.28                  | 278              | 359                  | 1.41 | 409              | 90.02  | 103.02 | 210.89 | 3.63 | 22363202                       | 223309            | 102452         | 30  | 60  |
|                 | T-6           | 346.95                  | 296              | 359                  | 1.41 | 409              | 106.20   | 120.98 | 231.96 | 3.63 | 22408866                       | 223576            | 105215         | 30  | 60  |
|                 | T-7           | 382.68                  | 308              | 359                  | 1.41 | 409              | 130.57   | 145.19 | 261.30 | 3.63 | 22471424                       | 224020            | 108017         | 30  | 90  |
|                 | T-8           | 414.64                  | 320              | 359                  | 1.41 | 409              | 154.79   | 169.26 | 290.49 | 3.63 | 22534074                       | 224465            | 110816         | 30  | 90  |
|                 | T-9           | 449.40                  | 335              | 359                  | 1.41 | 409              | 172.80   | 188.32 | 313.35 | 3.63 | 22568161                       | 224635            | 113701         | 60  | 90  |
|                 | T-10          | 479.95                  | 345              | 359                  | 1.41 | 409              | 194.28   | 209.81 | 339.76 | 3.63 | 22622584                       | 225011            | 116692         | 60  | 90  |
|                 | T-11          | 510.11                  | 354              | 359                  | 1.41 | 409              | 215.62   | 231.18 | 366.03 | 3.63 | 22677002                       | 225386            | 119706         | 90  | 120 |
|                 | T-12          | 533.14                  | 362              | 359                  | 1.41 | 409              | 232.98   | 248.76 | 388.29 | 3.63 | 22723533                       | 225695            | 122565         | 90  | 120 |
|                 | T-13          | 555.95                  | 370              | 359                  | 1.41 | 409              | 250.12   | 266.13 | 410.33 | 3.63 | 22770045                       | 226004            | 125445         | 90  | 120 |
|                 | T-14          | 569.81                  | 362              | 359                  | 1.41 | 409              | 232.52   | 248.45 | 395.18 | 3.63 | 22793294                       | 226158            | 127586         | 90  | 120 |
|                 | T-15          | 238.35                  | 258              | 359                  | 1.41 | 393              | 63.54  | 83.06  | 176.79 | 3.63 | 22226057                       | 222280            | 111008         | 90  | 120 |
|                 | T-16          | 290.69                  | 278              | 359                  | 1.41 | 393              | 81.13  | 105.49 | 201.77 | 3.63 | 22307608                       | 222847            | 113974         | 120 | 120 |
|                 | T-17          | 342.42                  | 296              | 359                  | 1.41 | 393              | 98.61  | 127.46 | 226.64 | 3.63 | 22385408                       | 223381            | 116836         | 120 | 120 |
|                 | T-18          | 387.42                  | 314              | 359                  | 1.41 | 393              | 126.60   | 156.00 | 261.98 | 3.63 | 22455461                       | 223851            | 119536         | 120 | 120 |
|                 | T-19          | 426.39                  | 330              | 359                  | 1.41 | 393              | 151.64   | 182.18 | 294.31 | 3.63 | 22510181                       | 224194            | 122052         | 180 | 120 |
|                 | T-20          | 464.39                  | 344              | 359                  | 1.41 | 393              | 175.32   | 206.88 | 325.29 | 3.63 | 22568794                       | 224569            | 124680         | 180 | 120 |

**Flexión negativa, esfuerzo por bandas de 1 metro.**

| TIPO DE FORJADO | TIPO DE ARMADO | ARMADO POR NERVIO | ÁREA ARMADO (mm²) | Mu (m·kN/m) | Vu(kN/m) (2) |           |          | M límite servicio según clase de exposición (m·kN/m) |         |              |        | Mfis (m·kN/m) | RIGIDEZ (m²·kN/m) |                | REI (3) |
|-----------------|----------------|-------------------|-------------------|-------------|--------------|-----------|----------|--|---------|--------------|--------|---------------|-------------------|----------------|---------|
|                 |                |                   |                   |             | SECCIÓN TIPO |           | MACIZADA | I  | IIa-IIb | IIIa-IIIb-IV | IIIC   |               | HOMOG E·lh        | FISURADA E·lf₀ |         |
|                 |                |                   |                   |             | Md>Mfis,d    | Md<Mfis,d |          |  |         |              |        |               |                   |                |         |
| 30 + 15         | N-1            | 4 φ 8             | 402.12            | 61.32       | 74.52        | 124.02    | 231.08   | 61.32  | 61.32   | 61.32        | 61.32  | 61.32         | 220437            | 9267           | 90      |
|                 | N-2            | 5 φ 8             | 452.39            | 68.98       | 74.52        | 124.02    | 231.08   | 68.98  | 68.98   | 68.98        | 68.98  | 68.98         | 220661            | 10437          | 90      |
|                 | N-3            | 4 φ 10            | 515.22            | 76.48       | 74.40        | 124.02    | 230.70   | 76.48  | 76.48   | 76.48        | 76.48  | 76.48         | 220925            | 13154          | 90      |
|                 | N-4            | 5 φ 10            | 593.76            | 88.18       | 74.40        | 124.02    | 230.70   | 88.18  | 88.18   | 88.18        | 88.18  | 88.18         | 221271            | 14970          | 90      |
|                 | N-5            | 4 φ 12            | 653.45            | 96.56       | 74.28        | 124.02    | 230.32   | 96.56  | 96.56   | 96.56        | 96.56  | 96.56         | 221511            | 16296          | 90      |
|                 | N-6            | 5 φ 12            | 766.55            | 113.18      | 74.28        | 124.02    | 230.32   | 112.06   | 112.06  | 112.06       | 112.06 | 112.06        | 222001            | 18845          | 90      |
|                 | N-7            | 6 φ 12            | 879.65            | 129.35      | 74.28        | 124.02    | 230.32   | 129.35   | 112.49  | 112.49       | 112.49 | 112.49        | 222490            | 21407          | 90      |
|                 | N-8            | 4 φ 16            | 1005.31           | 146.98      | 74.03        | 124.02    | 229.55   | 146.98   | 112.91  | 112.91       | 112.91 | 112.91        | 222955            | 23895          | 90      |
|                 | N-9            | 5 φ 16            | 1206.37           | 175.82      | 74.03        | 124.02    | 229.55   | 175.82   | 142.75  | 113.65       | 113.65 | 113.65        | 223800            | 28121          | 90      |
|                 | N-10           | 6 φ 16            | 1407.43           | 203.96      | 74.03        | 124.02    | 229.55   | 203.96   | 176.20  | 114.39       | 114.39 | 114.39        | 224643            | 32285          | 90      |
|                 | N-11           | 5 φ 20            | 1771.86           | 254.55      | 78.98        | 124.02    | 244.89   | 254.55   | 220.78  | 139.60       | 115.64 | 115.64        | 226013            | 39006          | 120     |
|                 | N-12           | 6 φ 20            | 2086.02           | 298.35      | 83.92        | 124.02    | 260.23   | 298.35   | 273.77  | 170.72       | 116.79 | 116.79        | 227285            | 44829          | 120     |
|                 | N-13           | 8 φ 20            | 2714.34           | 384.71      | 92.37        | 124.02    | 286.42   | 384.71   | 384.71  | 233.67       | 119.09 | 119.09        | 229805            | 55796          | 120     |
|                 | N-14           | 10 φ 20           | 3342.65           | 470.09      | 99.50        | 124.02    | 308.54   | 470.09   | 470.09  | 335.46       | 151.71 | 121.40        | 232297            | 65953          | 120     |
|                 | N-15           | 8 φ 25            | 4128.05           | 568.95      | 99.76        | 124.02    | 309.34   | 568.95   | 568.95  | 351.45       | 179.40 | 123.96        | 234917            | 76709          | 120     |
|                 | N-16           | 10 φ 25           | 5109.80           | 684.85      | 99.76        | 124.02    | 309.34   | 684.85   | 684.85  | 530.13       | 230.47 | 127.51        | 238586            | 89964          | 120     |

Peso del forjado (kN/m²): 7.74  
 Acero armadura superior: B 500S o B 500SD UNE 36-069-94  
 Armadura de reparto mínima: ME 20 x 30 A r 8 - 8 B 500 T 5x2.30 UNE 36092:1995  
 Área armado mínima: 696 mm²



Documento visado electrónicamente con número: MU1600855