

## “ COMPARATIVO ENTRE LAJE MACIÇA E LAJE ATEX ”

Norma NBR 6118/07

### MOLDE ATEX 150 / 15 + 5 = 20,0 cm

Inércia / nervura = 10.290 cm<sup>4</sup>

$$\text{Laje maciça equivalente em inércia} \Rightarrow \text{heq} = \sqrt[3]{\frac{10.290 \times 12}{60}} = 12,7 \text{ cm}$$

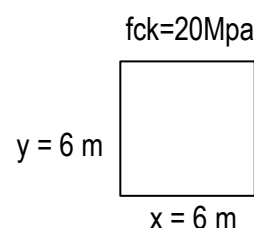
**EXEMPLO:** LAJE MACIÇA h = 12 cm

$$q = 0,12 \times 2500 \text{ (pp)} + 150 \text{ (sc)} + 75 \text{ (rev)} + 90 \text{ (div)} = 615 \text{ Kg / m}^2$$

$$f = \frac{465 + 0,75 \times 150}{887 \times 12^3} \times 6,0^4 \times 4,1 = 2,0 \text{ cm} = \frac{600}{300} \text{ (limite a longo prazo)}$$

$$M_x = M_y = 615 \times 6,0^2 : 100 \times 3,68 = 815 \text{ Kgm / m} \quad A_s = 2,7 \text{ cm}^2 \quad \emptyset 8,0 \quad \text{c.17,5}$$

$$2 \times 34 \times 0,4 \text{ kg / m} \times 6 \text{ m} = 163,2 \text{ kg} : 36 \text{ m}^2 = 4,5 \text{ kg / m}^2$$



**LAJE ATEX 150 / 15,0 + 5,0 = 20 cm**  $\Rightarrow$  **Concreto = 0,087 m<sup>3</sup> / m<sup>2</sup>**

$$q = 0,09 \times 2500 \text{ (pp)} + 150 \text{ (sc)} + 75 \text{ (rev)} + 90 \text{ (div)} = 540 \text{ Kg / m}^2$$

$$M_x = M_y = 540 \times 6,0^2 : 100 \times 3,68 = 715 \text{ Kgm / m} \times 0,6 \text{ m (espaçamento)} = 430 \text{ Kgm / nerv.}$$

$$A_s = 0,9 \text{ cm}^2 \quad 2 \emptyset 8,0 \quad 2 \times 9 \text{ nerv.} \times 6 \text{ m} \times 2 \times 0,4 \text{ kg / m} = 86,4 \text{ kg}$$

$$Q_x = Q_y = 540 \times 6,0 : 4 = 810 \text{ kg / m} \times 0,6 \text{ m} = 486 \text{ Kg / nerv.} \quad \tau_{sd} = \frac{486 \times 1,4}{6 \times 18} = 6,3 \text{ kg / cm}^2$$

$$\tau_{Rd1} = 0,0375 \times 20^{2/3} (1,6 - 0,18) (1,2 + 40 \times \frac{1,0}{6 \times 18}) = 0,62 \text{ Mpa} = 6,2 \text{ Kg / cm}^2 \approx 6,3 \text{ Kg / cm}^2 \text{ ( não armar)}$$

$$86,4 \text{ kg} : 6,0^2 = 2,4 \text{ kg / m}^2$$

$$3,2 \text{ c.15 (malha Q54 superior)} = \frac{0,9 \text{ kg / m}^2}{3,3 \text{ kg / m}^2}$$

### RESUMO

	Concreto	Aço
Maciça h = 12,0 cm	0,120 m <sup>3</sup> / m <sup>2</sup>	4,5 kg / m <sup>2</sup>
Atex h = 20,0 cm	0,087 m <sup>3</sup> / m <sup>2</sup>	3,3 kg / m <sup>2</sup>
<b>DIFERENÇA</b>	<b>- 27,5 %</b>	<b>- 27 %</b>

**“ MOLDE ATEX 180 / 18 + 5 = 23,0 cm ”**

**Norma NBR 6118/07**

Inércia / nervura = 18.954 cm<sup>4</sup>

Laje maciça equivalente em inércia  $\Rightarrow$   $heq = \sqrt[3]{\frac{18954 \times 12}{60}} = 15,6 \text{ cm}$

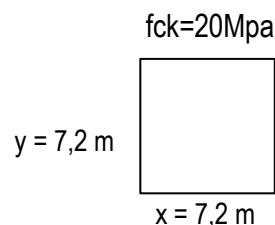
**EXEMPLO:** LAJE MACIÇA h = 15 cm

$q = 0,15 \times 2500 \text{ (pp)} + 150 \text{ (sc)} + 75 \text{ (rev)} + 90 \text{ (div)} = 690 \text{ Kg / m}^2$

$f = \frac{540 + 0,75 \times 150}{887 \times 15^3} \times 7,2^4 \times 4,1 = 2,4 \text{ cm} = \frac{720}{300}$

$M_x = M_y = 690 \times 7,2^2 : 100 \times 3,68 = 1316 \text{ Kgm / m}$        $A_s = 3,4 \text{ cm}^2 \text{ } \varnothing 8,0 \text{ c.15,0}$

$2 \times 47 \times 0,4 \text{ kg / m} \times 7,2 \text{ m} = 270,7 \text{ kg} : 7,2^2 = 5,2 \text{ kg / m}^2$



**LAJE ATEX 180 / 18,0 + 5,0 = 23 cm  $\Rightarrow$  Concreto = 0,106 m<sup>3</sup>/ m<sup>2</sup>**

$q = 0,11 \times 2500 \text{ (pp)} + 150 \text{ (sc)} + 75 \text{ (rev)} + 90 \text{ (div)} = 590 \text{ Kg / m}^2$

$M_x = M_y = 590 \times 7,2^2 : 100 \times 3,68 = 1125 \text{ Kgm / m} \times 0,6 \text{ m (espaçamento)} = 675 \text{ Kgm / nerv.}$

$A_s = 1,1 \text{ cm}^2 \quad 1 \varnothing 12,5 \quad 2 \times 11 \text{ nerv.} \times 7,2 \text{ m} \times 1 \text{ kg / m} = 158,4 \text{ kg}$

$Q_x = Q_y = 590 \times 7,2 : 4 = 1062 \text{ kg / m} \times 0,6 \text{ m} = 637,2 \text{ Kg / nerv.}$        $\tau_{sd} = \frac{637,2 \times 1,4}{8 \times 21} = 5,3 \text{ kg / cm}^2$

$\tau_{Rd1} = 0,0375 \times 20^{2/3} (1,6 - 0,21) (1,2 + 40 \times \frac{1,25}{8 \times 21}) = 0,57 \text{ Mpa} = 5,7 \text{ kg / cm}^2 > 5,3 \text{ kg / cm}^2 \text{ ( não armar)}$

$158,4 \text{ kg} : 7,2^2 = 3,0 \text{ kg / m}^2$

$3,2 \text{ c.15 (malha Q54 superior)} = \frac{0,9 \text{ kg / m}^2}{3,9 \text{ kg / m}^2}$

**RESUMO**

	<b>Concreto</b>	<b>Aço</b>
Maciça h = 15,0 cm	0,150 m <sup>3</sup> / m <sup>2</sup>	5,2 kg / m <sup>2</sup>
Atex h = 23,0 cm	0,106 m <sup>3</sup> / m <sup>2</sup>	3,9 kg / m <sup>2</sup>
<b>DIFERENÇA</b>	<b>- 29 %</b>	<b>- 25 %</b>

“ **MOLDE ATEX 800 / 20,0 + 5,0 = 25,0 cm** ”

**Norma NBR 6118/07**

Inércia / nervura = 34444 cm<sup>4</sup>

Laje maciça equivalente em inércia  $\rightarrow heq = \sqrt[3]{\frac{34444 \times 12}{80}} = 17,3 \text{ cm}$

**RESUMO**

	<b>Concreto</b>	<b>Aço</b>
Maciça h = 17,3 cm	0,173 m <sup>3</sup> / m <sup>2</sup>	1 – <u>17,3</u>
Atex h = 25,0 cm	0,114 m <sup>3</sup> / m <sup>2</sup>	25,0
<b>DIFERENÇA</b>	<b>- 34 %</b>	<b>- 31 %</b>

“ **MOLDE ATEX 800 / 20,0 + 7,5 = 27,5 cm** ”

**Norma NBR 6118/07**

Inércia / nervura = 46395 cm<sup>4</sup>

Laje maciça equivalente em inércia  $\rightarrow heq = \sqrt[3]{\frac{46395 \times 12}{80}} = 19,1 \text{ cm}$

**RESUMO**

	<b>Concreto</b>	<b>Aço</b>
Maciça h = 19,1 cm	0,191 m <sup>3</sup> / m <sup>2</sup>	1 – <u>19,1</u>
Atex h = 27,5 cm	0,139 m <sup>3</sup> / m <sup>2</sup>	27,5
<b>DIFERENÇA</b>	<b>- 27 %</b>	<b>- 30,5 %</b>

“ **MOLDE ATEX 800 / 25,0 + 5,0 = 30,0 cm** ”

**Norma NBR 6118/07**

Inércia / nervura = 59543 cm<sup>4</sup>

Laje maciça equivalente em inércia  $\rightarrow heq = \sqrt[3]{\frac{59543 \times 12}{80}} = 20,7 \text{ cm}$

**RESUMO**

	<b>Concreto</b>	<b>Aço</b>
Maciça h = 20,7 cm	0,207 m <sup>3</sup> / m <sup>2</sup>	1 - <u>20,7</u>
Atex h = 30,0 cm	0,134 m <sup>3</sup> / m <sup>2</sup>	30,0
<b>DIFERENÇA</b>	<b>- 35 %</b>	<b>- 31 %</b>

“ **MOLDE ATEX 800 / 25,0 + 7,5 = 32,5 cm** ”

**Norma NBR 6118/07**

Inércia / nervura = 77643 cm<sup>4</sup>

Laje maciça equivalente em inércia  $\rightarrow heq = \sqrt[3]{\frac{77643 \times 12}{80}} = 22,7 \text{ cm}$

**RESUMO**

	<b>Concreto</b>	<b>Aço</b>
Maciça h = 22,7 cm	0,227 m <sup>3</sup> / m <sup>2</sup>	1 - <u>22,7</u>
Atex h = 32,5 cm	0,159 m <sup>3</sup> / m <sup>2</sup>	32,5
<b>DIFERENÇA</b>	<b>- 30 %</b>	<b>- 30 %</b>

“ **MOLDE ATEX 800 / 30,0 + 5,0 = 35,0 cm** ”

**Norma NBR 6118/07**

Inércia / nervura = 95454 cm<sup>4</sup>

Laje maciça equivalente em inércia  $\rightarrow heq = \sqrt[3]{\frac{95454 \times 12}{80}} = 24,3 \text{ cm}$

**RESUMO**

	<b>Concreto</b>	<b>Aço</b>
Maciça h = 24,3 cm	0,243 m <sup>3</sup> / m <sup>2</sup>	1 – <u>24,3</u>
Atex h = 35,0 cm	0,159 m <sup>3</sup> / m <sup>2</sup>	35,0
<b>DIFERENÇA</b>	<b>- 35 %</b>	<b>- 31 %</b>

“ **MOLDE ATEX 800 / 30,0 + 7,5 = 37,5 cm** ”

**Norma NBR 6118/07**

Inércia / nervura = 122004 cm<sup>4</sup>

Laje maciça equivalente em inércia  $\rightarrow heq = \sqrt[3]{\frac{122004 \times 12}{80}} = 26,4 \text{ cm}$

**RESUMO**

	<b>Concreto</b>	<b>Aço</b>
Maciça h = 26,4 cm	0,264 m <sup>3</sup> / m <sup>2</sup>	1 – 26,4
Atex h = 37,5 cm	0,184 m <sup>3</sup> / m <sup>2</sup>	37,5
<b>DIFERENÇA</b>	<b>- 30 %</b>	<b>- 30 %</b>

**“ MOLDE ATEX 800 / 35,0 + 5,0 = 40,0 cm ”**

**Norma NBR 6118/07**

Inércia / nervura = 142988 cm<sup>4</sup>

Laje maciça equivalente em inércia  $\rightarrow heq = \sqrt[3]{\frac{142988 \times 12}{80}} = 27,8 \text{ cm}$

**RESUMO**

	<b>Concreto</b>	<b>Aço</b>
Maciça h = 27,8 cm	0,278 m <sup>3</sup> / m <sup>2</sup>	1 - <u>27,8</u>
Atex h = 40,0 cm	0,186 m <sup>3</sup> / m <sup>2</sup>	40,0
<b>DIFERENÇA</b>	<b>- 33 %</b>	<b>- 30,5 %</b>

**“ MOLDE ATEX 800 / 35,0 + 7,5 = 42,5 cm ”**

**Norma NBR 6118/07**

Inércia / nervura = 179875 cm<sup>4</sup>

Laje maciça equivalente em inércia  $\rightarrow heq = \sqrt[3]{\frac{179875 \times 12}{80}} = 30,0 \text{ cm}$

**RESUMO**

	<b>Concreto</b>	<b>Aço</b>
Maciça h = 30,0 cm	0,300 m <sup>3</sup> / m <sup>2</sup>	1 - <u>30,0</u>
Atex h = 42,5 cm	0,211 m <sup>3</sup> / m <sup>2</sup>	42,5
<b>DIFERENÇA</b>	<b>- 30 %</b>	<b>- 29 %</b>

“ **MOLDE ATEX 800 / 40,0 + 5,0 = 45,0 cm** ”

**Norma NBR 6118/07**

Inércia / nervura = 205963 cm<sup>4</sup>

Laje maciça equivalente em inércia  $\rightarrow heq = \sqrt[3]{\frac{205963 \times 12}{80}} = 31,4 \text{ cm}$

**RESUMO**

	<b>Concreto</b>	<b>Aço</b>
Maciça h = 31,4 cm	0,314 m <sup>3</sup> / m <sup>2</sup>	1 - <u>31,4</u>
Atex h = 45,0 cm	0,219 m <sup>3</sup> / m <sup>2</sup>	45,0
<b>DIFERENÇA</b>	<b>- 30 %</b>	<b>- 30 %</b>

“ **MOLDE ATEX 800 / 40,0 + 7,5 = 47,5 cm** ”

**Norma NBR 6118/07**

Inércia / nervura = 255473 cm<sup>4</sup>

Laje maciça equivalente em inércia  $\rightarrow heq = \sqrt[3]{\frac{255473 \times 12}{80}} = 33,7 \text{ cm}$

**RESUMO**

	<b>Concreto</b>	<b>Aço</b>
Maciça h = 33,7 cm	0,337 m <sup>3</sup> / m <sup>2</sup>	1 - <u>33,7</u>
Atex h = 47,5 cm	0,244 m <sup>3</sup> / m <sup>2</sup>	47,5
<b>DIFERENÇA</b>	<b>- 28 %</b>	<b>- 29 %</b>

**“ MOLDE ATEX 900 / 22,5 + 5,0 = 27,5 cm ”**

**Norma NBR 6118/07**

Inércia / nervura = 49.561 cm<sup>4</sup>

Laje maciça equivalente em inércia  $\rightarrow heq = \sqrt[3]{\frac{49561 \times 12}{90}} = 18,7 \text{ cm}$

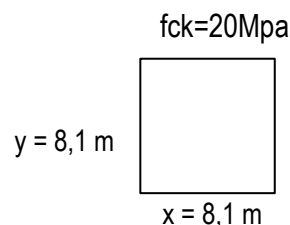
**EXEMPLO:** LAJE MACIÇA h = 18 cm

$q = 0,18 \times 2500 \text{ (pp)} + 200 \text{ (sc)} + 100 \text{ (rev)} + 90 \text{ (div)} = 840 \text{ Kg / m}^2$

$f = \frac{640 + 0,75 \times 200}{887 \times 18^3} \times 8,1^4 \times 4,1 = 2,7 \text{ cm} = \frac{810}{300}$

$M_x = M_y = 840 \times 8,1^2 : 100 \times 3,68 = 2028 \text{ Kgm / m}$        $As = 4,2 \text{ cm}^2 \text{ } \emptyset 8,0 \text{ c.12,0}$

$2 \times 67 \times 0,4 \text{ kg / m} \times 8,1 \text{ m} = 434,1 \text{ kg} : 8,1^2 = 6,6 \text{ kg / m}^2$



**LAJE ATEX 900 / 22,5 + 5,0 = 27,5 cm  $\Rightarrow$  Concreto = 0,132 m<sup>3</sup>/ m<sup>2</sup>**

$q = 0,132 \times 2500 \text{ (pp)} + 200 \text{ (sc)} + 100 \text{ (rev)} + 90 \text{ (div)} = 720 \text{ Kg / m}^2$

$M_x = M_y = 720 \times 8,1^2 : 100 \times 3,68 = 1738 \text{ Kgm / m} \times 0,9 \text{ m (espaçamento)} = 1564 \text{ Kgm / nerv.}$

$As = 2,0 \text{ cm}^2 \quad 2 \emptyset 12,5 \quad 2 \times 8 \text{ nerv.} \times 8,1 \text{ m} \times 2 \times 1 \text{ kg / m} = 259 \text{ kg}$

$Q_x = Q_y = 720 \times 8,1 : 4 = 1458 \text{ kg / m} \times 0,9 \text{ m} = 1312 \text{ Kg / nerv.}$        $\tau_{sd} = \frac{1312 \times 1,4}{12,5 \times 25,5} = 5,8 \text{ kg / cm}^2$

$\tau_{Rd1} = 0,0375 \times 20^{2/3} (1,6 - 0,255) (1,2 + 40 \times \frac{2,5}{12,5 \times 25,5}) = 0,56 \text{ Mpa} = 5,6 \text{ Kg / cm}^2 \approx 5,8 \text{ Kg / cm}^2 \text{ ( não armar)}$

$259 \text{ kg} : 8,1^2 = 3,95 \text{ kg / m}^2$

$3,2 \text{ c.15 (malha Q54 superior)} = 0,85 \text{ kg / m}^2$

**4,8 kg / m<sup>2</sup>**

**RESUMO**

	Concreto	Aço
Maciça h = 18,0 cm	0,180 m <sup>3</sup> / m <sup>2</sup>	6,6 kg / m <sup>2</sup>
Atex h = 27,5 cm	0,132 m <sup>3</sup> / m <sup>2</sup>	4,8 kg / m <sup>2</sup>
<b>DIFERENÇA</b>	<b>- 27 %</b>	<b>- 27 %</b>

**“ MOLDE ATEX 900 / 32,5 + 5,0 = 37,5 cm ”**

**Norma NBR 6118/07**

Inércia / nervura = 125.718 cm<sup>4</sup>

$$\text{Laje maciça equivalente em inércia} \longrightarrow heq = \sqrt[3]{\frac{125718 \times 12}{90}} = 25,5 \text{ cm}$$

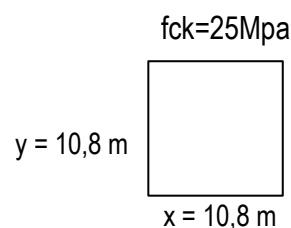
**EXEMPLO:** LAJE MACIÇA h = 25 cm

$$q = 0,25 \times 2500 \text{ (pp)} + 200 \text{ (sc)} + 100 \text{ (rev)} + 125 \text{ (div)} = 1050 \text{ Kg / m}^2$$

$$f = \frac{850 + 0,75 \times 200}{992 \times 25^3} \times 10,8^4 \times 4,1 = 3,6 \text{ cm} = \frac{1080}{300}$$

$$M_x = M_y = 1050 \times 10,8^2 : 100 \times 3,68 = 4506 \text{ Kgm / m} \quad A_s = 6,5 \text{ cm}^2 \quad \emptyset 8,0 \quad c.7,5$$

$$2 \times 143 \times 0,4 \text{ kg / m} \times 10,8 \text{ m} = 1235 \text{ kg} : 10,8^2 = 10,6 \text{ kg / m}^2$$



**LAJE ATEX 900 / 32,5 + 5,0 = 37,5 cm    ➡    Concreto = 0,173 m<sup>3</sup>/ m<sup>2</sup>**

$$q = 0,173 \times 2500 \text{ (pp)} + 200 \text{ (sc)} + 100 \text{ (rev)} + 125 \text{ (div)} = 860 \text{ Kg / m}^2$$

$$M_x = M_y = 860 \times 10,8^2 : 100 \times 3,68 = 3691 \text{ Kgm / m} \times 0,9 \text{ m (espaçamento)} = 3322 \text{ Kgm / nerv.}$$

$$A_s = 3,12 \text{ cm}^2 \quad 2 \emptyset 12,5 + 1 \emptyset 10,0 \quad 2 \times 11 \text{ nerv.} \times 10,8 \text{ m} \times (2 \times 1,0 \text{ kg / m} + 1 \times 0,64 \text{ Kg / m}) = 627 \text{ kg}$$

$$Q_x = Q_y = 860 \times 10,8 : 4 = 2322 \text{ kg / m} \times 0,9 \text{ m} = 2090 \text{ Kg / nerv.} \quad \tau_{sd} = \frac{2090 \times 1,4}{12,5 \times 35,5} = 6,6 \text{ kg / cm}^2$$

$$\tau_{Rd1} = 0,0375 \times 25^{2/3} (1,6 - 0,355) (1,2 + 40 \times \frac{3,3}{12,5 \times 35}) = 0,60 \text{ Mpa} = 6,0 \text{ Kg / cm}^2 \approx 6,6 \text{ Kg / cm}^2 \text{ ( não amar)}$$

$$627 \text{ kg} : 10,8^2 = 5,4 \text{ kg / m}^2$$

$$3,2 \text{ c.15 (malha Q54 superior)} = 0,9 \text{ kg / m}^2$$

$$6,3 \text{ kg / m}^2$$

**RESUMO**

	<b>Concreto</b>	<b>Aço</b>
Maciça h = 25,0 cm	0,250 m <sup>3</sup> / m <sup>2</sup>	10,6 kg / m <sup>2</sup>
Atex h = 37,5 cm	0,173 m <sup>3</sup> / m <sup>2</sup>	6,3 kg / m <sup>2</sup>
<b>DIFERENÇA</b>	<b>- 31 %</b>	<b>- 41 %</b>

**“ MOLDE ATEX 900 / 42,5 + 5,0 = 47,5 cm ”**

**Norma NBR 6118/07**

Inércia / nervura = 255.029 cm<sup>4</sup>

Laje maciça equivalente em inércia  $\rightarrow heq = \sqrt[3]{\frac{255029 \times 12}{90}} = 32,4 \text{ cm}$

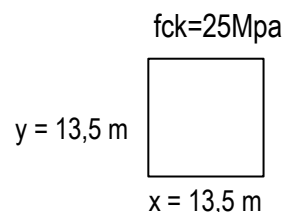
**EXEMPLO:** LAJE MACIÇA h = 32 cm

$q = 0,32 \times 2500 \text{ (pp)} + 200 \text{ (sc)} + 100 \text{ (rev)} + 25 \text{ (div)} = 1125 \text{ Kg / m}^2$

$f = \frac{925 + 0,75 \times 200}{992 \times 32^3} \times 13,5^4 \times 4,1 = 4,5 \text{ cm} = \frac{1350}{300}$

$M_x = M_y = 1125 \times 13,5^2 : 100 \times 3,68 = 7545 \text{ Kgm / m}$      $A_s = 8,4 \text{ cm}^2 \text{ } \emptyset 10,0 \text{ c.9,5}$

$2 \times 141 \times 0,64 \text{ kg / m} \times 13,5 \text{ m} = 2436 \text{ kg} : 13,5^2 = 13,4 \text{ kg / m}^2$



**LAJE ATEX 900 / 42,5 + 5,0 = 47,5 cm  $\Rightarrow$  Concreto = 0,225 m<sup>3</sup>/ m<sup>2</sup>**

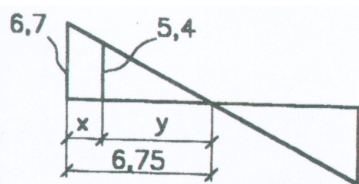
$q = 0,225 \times 2500 \text{ (pp)} + 200 \text{ (sc)} + 100 \text{ (rev)} + 25 \text{ (div)} = 900 \text{ Kg / m}^2$

$M_x = M_y = 900 \times 13,5^2 : 100 \times 3,68 = 6036 \text{ Kgm / m} \times 0,9 \text{ m (espaçamento)} = 5433 \text{ Kgm / nerv.}$

$A_s = 4,0 \text{ cm}^2 \quad 2 \emptyset 16 \quad 2 \times 14 \text{ nerv.} \times 13,5 \text{ m} \times 2 \times 1,64 \text{ Kg / m} = 1240 \text{ kg}$

$Q_x = Q_y = 900 \times 13,5 : 4 = 3038 \text{ kg / m} \times 0,9 \text{ m} = 2734 \text{ Kg / nerv.}$      $\tau_{sd} = \frac{2734 \times 1,4}{12,5 \times 45,5} = 6,7 \text{ kg / cm}^2$

$\tau_{Rd1} = 0,0375 \times 25^{2/3} (1,6 - 0,455) (1,2 + 40 \times \frac{4,0}{12,5 \times 45,5}) = 0,54 \text{ Mpa} < 0,67 \text{ Mpa (armar X)}$



$y = \frac{6,75 \times 5,4}{6,7} = 5,45 \quad X = 6,75 - 5,45 = 1,3 \text{ m}$

$f_{ywd} = 250 + \left( \frac{435 - 250}{20} \right) (h - 15) \leq 435 \text{ Mpa}$

$h = 47,5 \text{ cm} \quad f_{ywd} = 435 \text{ Mpa}$

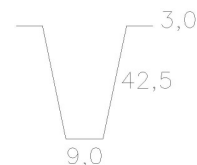
$\emptyset 5,0 \text{ c. } 20 \quad 130:20 = 6 \text{ estribos}$

6 estribos  $\times 0,16 \text{ Kg / m} \times 1,0 \text{ m} \times 2 \text{ extremidades} \times 14 \text{ nerv.} \times 2 = 53,8 \text{ Kg}$

$1240 \text{ kg} + 53,8 \text{ Kg} = 1294 \text{ Kg} : 13,5^2 = 7,1 \text{ kg / m}^2$

$3,2 \text{ c. } 15 \text{ (malha Q54 superior)} = 0,9 \text{ kg / m}^2$

**8,0 kg / m<sup>2</sup>**



**Resumo**

	Concreto	Aço
Maciça h = 32,0 cm	0,320 m <sup>3</sup> / m <sup>2</sup>	13,4 kg / m <sup>2</sup>
Atex h = 47,5 cm	0,225 m <sup>3</sup> / m <sup>2</sup>	8,0 kg / m <sup>2</sup>
<b>DIFERENÇA</b>	<b>- 30 %</b>	<b>- 40 %</b>