

# EXPANSION TANKS FOR HEATING



# EXPANSION TANKS FOR HEATING

**EXPANSION TANKS ARE DEVICES DESIGNED TO ABSORB THE VOLUME CHANGE OF WATER OR SOME OTHER LIQUIDS, THUS ALLOWING THE CORRECT OPERATION OF A HEATING PLANT DURING ALL ITS OPERATING PHASES.**

Elbi produces closed expansion tanks composed of a tank in sheet steel and a bladder in synthetic material which separates the heating circuit from a chamber previously charged with air.

Expansion tanks with bladder are made of quality sheet steel in compliance with EN standards and welded according to strict qualitative standards; they are produced on automated lines, welded with procedures and certified weld materials, equipped with bladders in rubber suitable to resist up to 110°C; they are pre-charged with pressure of 0.5 - 1.0 - 1.5 - 2 - 2.5 - 3 bar according to the static height of the water column.

All models are subject to a hydraulic test with a pressure of 1.5 times higher than the design pressure.

Versions manufactured according to the most important European standards in force are available and are supplied with a Declaration of Conformity pursuant to the essential safety requirements outlined by 2014/68/UE Directive.

## **ELBI BLADDERS**

Designed by the Elbi technical office, bladders are tested by the quality control service once the manufacturing cycle is completed.



## EXPANSION TANKS FOR HEATING

### **46. AC-2 / ER-CE:**

FIXED BLADDER EXPANSION TANKS FOR HEATING (2 - 24 LITRES)

### **48. ERCE:**

FIXED BLADDER EXPANSION TANKS FOR HEATING (35 - 500 LITRES)

### **50. ERP:**

FIXED-BLADDER FLAT EXPANSION TANKS FOR BURNERS (6 - 24 LITRES)

**52.** SIZING AN EXPANSION TANK (RACCOLTA "R", ED. 2009)

**55.** UNIVERSAL DIAGRAM FOR SELECTING AN EXPANSION TANK





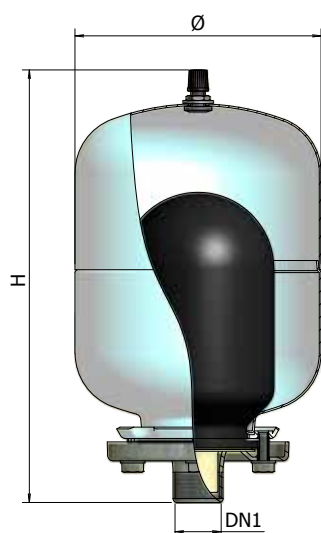
# AC-2 / ER-CE

## FIXED BLADDER EXPANSION TANKS FOR HEATING

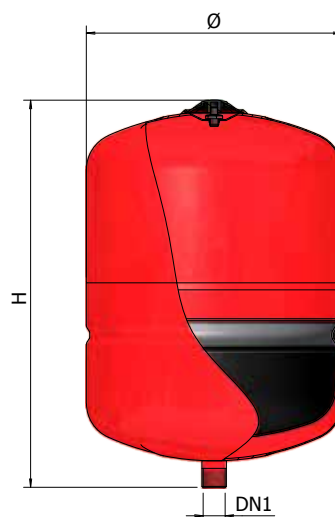
(2 - 24 LITRES)



### AC - 2



### ER 5 - 24



CE certified product



For non-drinking water



For heating systems



For air conditioning systems

#### Characteristics:

- Working temperature: -10° / +99°C
- Long lasting epoxy powder paint, red. (Model AC-2: white)
- Fixed bladder in SBR rubber (Model AC-2: replaceable butyl bladder)
- Wall fixing bracket on request (see page 229)

#### Reference standard

- Declaration of conformity to essential safety requirements outlined by 2014/68/UE Directive. Models AC-2/ER5 are exempt from CE marking.

WARRANTY: 2 YEARS

## DIMENSIONS

| MODEL    | CODE    |  | Ppre | Pmax |  |  |  | DN1  |  | NOTES |
|----------|---------|---|------|------|---|---|---|------|--|-------|
|          |         | LITRES  | bar  | bar  | max   | mm  | mm  | mm   |  |       |
| AC-2 *   | A012J07 | 2   | 2,5  | 8    | +99°C   | 130   | 225   | 3/4" | 150 x 150 x 240  |       |
| ER 5 *   | A102L11 | 5   | 1,5  | 8    | +99°C   | 205   | 215   | 3/4" | 210 x 210 x 250  |       |
| ER 8 CE  | A102L16 | 8   | 1,5  | 8    | +99°C   | 205   | 280   | 3/4" | 210 x 210 x 320  |       |
| ER 12 CE | A102L20 | 12  | 1,5  | 8    | +99°C   | 270   | 300   | 3/4" | 280 x 280 x 310  |       |
| ER 18 CE | A102L24 | 18  | 1,5  | 8    | +99°C   | 270   | 410   | 3/4" | 280 x 280 x 450  |       |
| ER 24 CE | A102L27 | 24  | 1,5  | 8    | +99°C   | 320   | 330   | 3/4" | 330 x 330 x 375  |       |

\* Exempt from CE marking

## CHOICE OF THE EXPANSION TANK

The table simplifies the choice of the ELBI expansion tank to be installed in hot water systems. The selection of the tank can be effectuated starting from the system's total capacity or from the plant's power, taking into consideration an average content of 12 litres per 1000 Kcal/h of power and a plant's maximum working pressure of 3 bars

| MODEL    | PRE-CHARGE PRESSURE<br>[BAR] | PLANT HEIGHT<br>[m] | TANK ACCEPTABLE VOLUME<br>[litri] | TANK ABSORPTION CAPACITY<br>[%] | $\Delta T = (90 - 14)^\circ\text{C}$<br>$\Delta$ expansion coefficient 0,035 |                      |       |
|----------|------------------------------|---------------------|-----------------------------------|---------------------------------|--|----------------------|-------|
|          |                              |                     |                                   |                                 | TOTAL WATER CONTENT IN THE PLANT<br>[litres]                                 | HEAT GENERATOR POWER |       |
|          |                              |                     |                                   |                                 |  | kcal/h               | kW    |
| AC-2     | 0,5                          | 5                   | 1,3                               | 62,5                            | 36   | 3.000                | 3,49  |
|          | 1                            | 10                  | 1                                 | 50                              | 29   | 2.400                | 2,79  |
| ER 5     | 0,5                          | 5                   | 3,1                               | 62                              | 89   | 7.400                | 8,6   |
|          | 1                            | 10                  | 2,5                               | 50                              | 71   | 5.900                | 6,86  |
| ER 8 CE  | 0,5                          | 5                   | 5                                 | 62                              | 143  | 11.900               | 13,84 |
|          | 1                            | 10                  | 4                                 | 50                              | 114  | 9.500                | 11,4  |
| ER 12 CE | 0,5                          | 5                   | 7,5                               | 63                              | 214  | 17.800               | 20,7  |
|          | 1                            | 10                  | 6                                 | 50                              | 171  | 14.250               | 16,57 |
| ER 18 CE | 0,5                          | 5                   | 11,3                              | 63                              | 323  | 26.900               | 31,3  |
|          | 1                            | 10                  | 9                                 | 50                              | 257  | 24.100               | 28,2  |
|          | 1,5                          | 15                  | 6,7                               | 37                              | 191  | 15.900               | 18,5  |
| ER 24 CE | 0,5                          | 5                   | 15,5                              | 65                              | 443  | 36.900               | 43    |
|          | 1                            | 10                  | 12                                | 50                              | 343  | 28.600               | 33,26 |
|          | 1,5                          | 15                  | 9,3                               | 39                              | 266  | 22.200               | 25,82 |



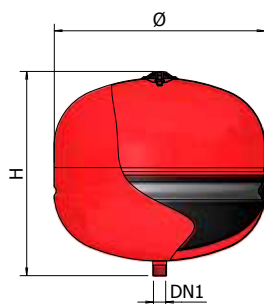
# ERCE

## FIXED BLADDER EXPANSION TANKS FOR HEATING

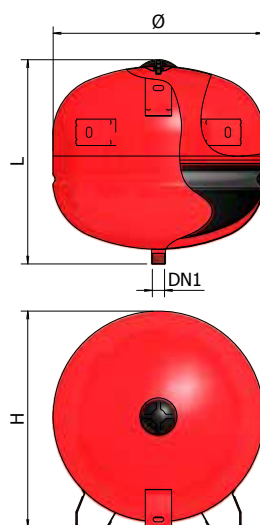
(35 - 500 LITRES)



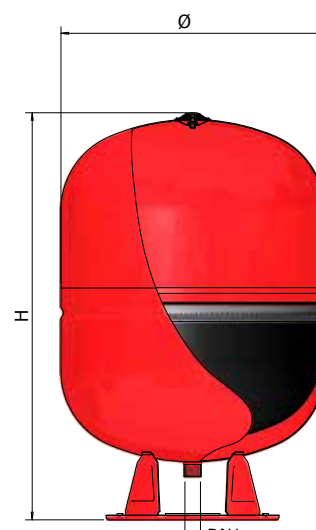
ERCE 35 - 50



ERCE 35/P - 50/P



ERCE 80 - 500



CE certified product



For non-drinking water



For heating systems



For air conditioning systems

### Characteristics:

- Working temperature:  $-10^{\circ}$  /  $+99^{\circ}$ C
- Long lasting epoxy powder paint, red.
- Fixed bladder in SBR rubber  
**(Model AC-2: replaceable butyl bladder)**
- Wall fixing bracket on request (see page 229)

### Reference standard

- Declaration of conformity to essential requirements outlined by 2014/68/UE Directive.

**WARRANTY: 2 YEARS**

## DIMENSIONS

| MODEL      | CODE    |  | Ppre | Pmax |  |  |  |  | DN1  |  | NOTES |
|------------|---------|---|------|------|---|---|---|---|------|---|-------|
|            |         | LITRES  |      |      | bar   | bar   | max   | mm  |      | mm  |       |
| ERCE 35    | A102L31 | 35  | 1,5  | 10   | +99°C   | 400   | 395   | -   | 3/4" | 410 x 410 x 410   |       |
| ERCE 35/P* | A122L31 | 35  | 1,5  | 10   | +99°C   | 400   | 415   | 395 (LENGTH)  | 3/4" | 410 x 410 x 410   |       |
| ERCE 50    | A102L34 | 50  | 1,5  | 10   | +99°C   | 400   | 500   | -   | 3/4" | 410 x 410 x 535   |       |
| ERCE 50/P* | A122L34 | 50  | 1,5  | 10   | +99°C   | 400   | 415   | 500 (LENGTH)  | 3/4" | 410 x 410 x 535   |       |
| ERCE 80    | A112L37 | 80  | 1,5  | 10   | +99°C   | 400   | 820   | -   | 3/4" | 410 x 410 x 860   |       |
| ERCE 100   | A112L38 | 100   | 1,5  | 10   | +99°C   | 500   | 735   | -   | 3/4" | 510 x 510 x 830   |       |
| ERCE 150   | A112L43 | 150   | 1,5  | 10   | +99°C   | 500   | 935   | -   | 3/4" | 510 x 510 x 1040  |       |
| ERCE 200   | A112L47 | 200   | 1,5  | 10   | +99°C   | 600   | 1020  | -   | 1"   | 610 x 610 x 1110  |       |
| ERCE 250   | A112L49 | 250   | 1,5  | 10   | +99°C   | 650   | 1160  | -   | 1"   | 660 x 660 x 1210  |       |
| ERCE 300   | A112L51 | 300   | 1,5  | 10   | +99°C   | 650   | 1210  | -   | 1"   | 660 x 660 x 1290  |       |
| ERCE 500   | A112L55 | 500   | 1,5  | 10   | +99°C   | 775   | 1350  | -   | 1"   | 785 x 785 x 1440  |       |

1MPa = 10 bar 1MPa = 10 bar

\*Version with feet for wall fixing

## CHOICE OF THE EXPANSION TANK

The table simplifies the choice of the ELBI expansion tank to be installed in hot water systems. The selection of the tank can be effectuated starting from the system's total capacity or from the plant's power, taking into consideration an average content of 12 litres per 1000 Kcal/h of power.

| MODEL     | PRE-CHARGE PRESSURE | MAXIMUM WORKING PRESSURE OF SYSTEM | PLANT HEIGHT | TANK ACCEPTABLE VOLUME | TANK ABSORPTION CAPACITY | $\Delta T = (90 - 14)^\circ\text{C}$<br>$\Delta$ expansion coefficient 0.035 |                      |          |
|-----------|---------------------|------------------------------------|--------------|------------------------|--------------------------|--|----------------------|----------|
|           |                     |                                    |              |                        |                          | TOTAL WATER CONTENT IN THE PLANT   | HEAT GENERATOR POWER |          |
|           |                     |                                    |              |                        |                          | [litres]   | kcal/h               | kW       |
| ER CE 35  | [BAR]               | [BAR]                              | [m]          | [litres]               | [%]                      | [litres]   |                      |          |
|           | 1                   |                                    | 10           | 17,6                   | 50                       | 503  | 41.900               | 48,72093 |
|           | 1,5                 | 3                                  | 15           | 13,1                   | 37                       | 374  | 31.200               | 36,27907 |
| ER CE 50  | 2                   |                                    | 20           | 8,8                    | 25                       | 251  | 20.900               | 24,30233 |
|           | 1                   |                                    | 10           | 25                     | 50                       | 714  | 59.500               | 69,18605 |
|           | 1,5                 | 3                                  | 15           | 18,8                   | 38                       | 537  | 71.400               | 52,03488 |
| ER CE 80  | 2                   |                                    | 20           | 12,5                   | 25                       | 357  | 29.750               | 34,59302 |
|           | 1                   |                                    | 5            | 40                     | 50                       | 1.143  | 95.250               | 110,7558 |
|           | 1,5                 | 3                                  | 10           | 30                     | 38                       | 857  | 71.400               | 83,02326 |
| ER CE 100 | 2                   |                                    | 20           | 20                     | 25                       | 571  | 47.600               | 55,34884 |
|           | 1                   |                                    | 10           | 50                     | 50                       | 1.428  | 119.000              | 138,3721 |
|           | 1,5                 | 5                                  | 15           | 38                     | 38                       | 1.086  | 90.500               | 105,2326 |
| ER CE 150 | 2                   |                                    | 20           | 25                     | 25                       | 714  | 59.500               | 69,18605 |
|           | 0,5                 |                                    | 5            | 100                    | 67                       | 2.857  | 238.000              | 276,7442 |
|           | 1                   | 5                                  | 10           | 87                     | 58                       | 2.486  | 207.000              | 240,6977 |
| ER CE 200 | 1,5                 |                                    | 15           | 75                     | 50                       | 2.143  | 178.600              | 207,6744 |
|           | 1                   |                                    | 5            | 133                    | 67                       | 3.800  | 317.000              | 368,6047 |
|           | 1,5                 |                                    | 15           | 116                    | 58                       | 3.314  | 276.000              | 320,9302 |
|           | 2                   | 5                                  | 20           | 100                    | 50                       | 2.857  | 238.000              | 276,7442 |
|           | 2,5                 |                                    | 25           | 83                     | 42                       | 2.371  | 197.600              | 229,7674 |
| ER CE 250 | 3                   |                                    | 30           | 66                     | 33                       | 1.886  | 157.200              | 182,7907 |
|           | 1                   |                                    | 5            | 178                    | 71                       | 5.086  | 423.800              | 492,7907 |
|           | 1,5                 |                                    | 15           | 160                    | 64                       | 4.571  | 380.900              | 442,907  |
|           | 2                   | 5                                  | 20           | 143                    | 57                       | 4.086  | 340.500              | 395,9302 |
|           | 2,5                 |                                    | 25           | 125                    | 50                       | 3.571  | 297.600              | 346,0465 |
| ER CE 300 | 3                   |                                    | 30           | 107                    | 43                       | 3.057  | 254.800              | 296,2791 |
|           | 1                   |                                    | 5            | 214                    | 71                       | 6.114  | 509.500              | 592,4419 |
|           | 1,5                 |                                    | 15           | 193                    | 64                       | 5.514  | 459.500              | 534,3023 |
|           | 2                   | 6                                  | 20           | 171                    | 57                       | 4.886  | 407.000              | 473,2558 |
|           | 2,5                 |                                    | 25           | 150                    | 50                       | 4.286  | 357.200              | 415,3488 |
| ER CE 500 | 3                   |                                    | 30           | 128                    | 43                       | 3.657  | 304.800              | 354,4186 |
|           | 1,5                 |                                    | 5            | 321                    | 64                       | 9.171  | 764.300              | 888,7209 |
|           | 2                   |                                    | 15           | 285                    | 57                       | 8.143  | 678.600              | 789,0698 |
|           | 2,5                 | 6                                  | 20           | 250                    | 50                       | 7.143  | 595.300              | 692,2093 |
|           | 3                   |                                    | 25           | 215                    | 43                       | 6.143  | 512.000              | 595,3488 |
|           | 3,5                 |                                    | 30           | 178                    | 36                       | 5.086  | 427.000              | 496,5116 |

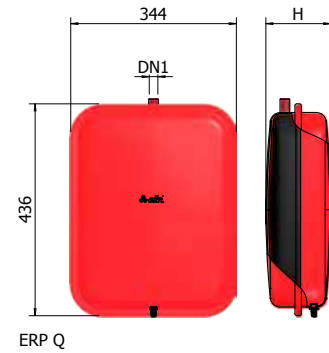


# ERP

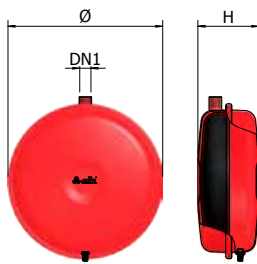
## FIXED-BLADDER FLAT EXPANSION TANKS, FOR BURNERS

(6 - 24 LITRES)

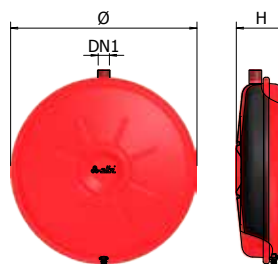
### ERP Q



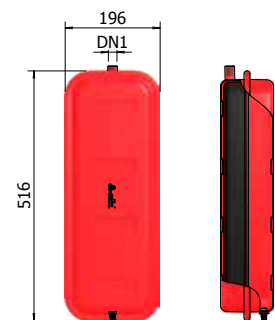
### ERP 320



### ERP 385



### ERP RET



For non-drinking water



For heating systems

#### Characteristics:

- Working temperature: -10° / +90°C.
- Long lasting epoxy powder paint, red.
- SBR rubber bladder with characteristics to guarantee the best performance and long duration.

**ERP 320 and ERP 385:**  
Articles supplied in packs of 4 pieces.

**ERP RET**  
Articles supplied in packs of 2 pieces.

**WARRANTY: 2 YEARS**



## DIMENSIONS

| MODEL      | CODE    |        | Ppre | Pmax |       |     |     |                 | DN1  | NOTES |
|------------|---------|--------|------|------|-------|-----|-----|-----------------|------|-------|
|            |         | LITRES | bar  | bar  | max   | mm  | mm  | mm              |      |       |
| ERP 320/6  | 1120106 | 6      | 1    | 3    | +90°C | 320 | 94  | -               | 3/4" |       |
| ERP 320/8  | 1120203 | 8      | 1    | 3    | +90°C | 320 | 121 | -               | 3/4" |       |
| ERP 320/10 | 1120301 | 10     | 1    | 3    | +90°C | 320 | 131 | -               | 3/4" |       |
| ERP 320/12 | 1120408 | 12     | 1    | 3    | +90°C | 320 | 165 | -               | 3/4" |       |
| ERP 385/7  | 1121101 | 7      | 1    | 3    | +90°C | 385 | 83  | -               | 3/4" |       |
| ERP 385/8  | 1121209 | 8      | 1    | 3    | +90°C | 385 | 98  | -               | 3/4" |       |
| ERP 385/10 | 1121306 | 10     | 1    | 3    | +90°C | 385 | 108 | -               | 3/4" |       |
| ERP 385/12 | 1121403 | 12     | 1    | 3    | +90°C | 385 | 139 | -               | 3/4" |       |
| ERP 385/14 | 1121501 | 14     | 1    | 3    | +90°C | 385 | 146 | -               | 3/4" |       |
| ERP 416/8  | 1135007 | 8      | 1    | 3    | +90°C | 416 | 75  | -               | 3/8" |       |
| ERP RET/6  | 1140601 | 6      | 1    | 3    | +90°C | -   | -   | 516 x 196 x 95  | 3/4" |       |
| ERP RET/8  | 1140701 | 8      | 1    | 3    | +90°C | -   | -   | 516 x 196 x 110 | 3/4" |       |
| ERP RET/10 | 1140901 | 10     | 1    | 3    | +90°C | -   | -   | 516 x 196 x 124 | 3/4" |       |
| ERP RET/12 | 1141001 | 12     | 1    | 3    | +90°C | -   | -   | 516 x 196 x 152 | 3/4" |       |
| ERP-Q/7    | 1150007 | 7      | 1    | 3    | +90°C | -   | -   | 436 x 344 x 77  | 3/8" |       |
| ERP-Q/10   | 1150009 | 10     | 1    | 3    | +90°C | -   | -   | 436 x 344 x 97  | 1/2" |       |
| ERP-Q/12   | 1150010 | 12     | 1    | 3    | +90°C | -   | -   | 436 x 344 x 117 | 1/2" |       |
| ERP-Q/14   | 1150011 | 14     | 1    | 3    | +90°C | -   | -   | 436 x 344 x 132 | 1/2" |       |
| ERP-Q/16   | 1150013 | 16     | 1    | 3    | +90°C | -   | -   | 436 x 344 x 147 | 1/2" |       |
| ERP-Q/18   | 1150014 | 18     | 1    | 3    | +90°C | -   | -   | 436 x 344 x 155 | 1/2" |       |
| ERP-Q/20   | 1150015 | 20     | 1    | 3    | +90°C | -   | -   | 436 x 344 x 162 | 1/2" |       |
| ERP-Q/24   | 1150016 | 24     | 1    | 3    | +90°C | -   | -   | 436 x 344 x 177 | 1/2" |       |

## CHOICE OF THE EXPANSION TANK

The table simplifies the choice of the ELBI expansion tank to be installed in hot water systems. The selection of the tank can be effectuated starting from the system's total capacity or from the plant's power, taking into consideration an average content of 8 litres per 1000 Kcal/h of power, a precharge pressure of 1 bar and a plant's maximum working pressure of 3 bars.

$$\Delta T = (90 - 14)^\circ\text{C}$$

$$\Delta \text{ expansion coefficient } 0.035$$

| MODEL      | PRE-CHARGE PRESSURE | PLANT HEIGHT | TANK ACCEPTABLE VOLUME | TANK ABSORPTION CAPACITY | TOTAL WATER CONTENT IN THE PLANT | HEAT GENERATOR POWER |       |
|------------|---------------------|--------------|------------------------|--------------------------|----------------------------------|----------------------|-------|
|            | [BAR]               | [m]          | [litres]               | [%]                      | [litres]                         | kcal/h               | kW    |
| ERP 320/6  | 1,0                 | 10           | 3,0                    | 50                       | 86                               | 10.700               | 12,44 |
| ERP 320/8  | 1,0                 | 10           | 4,0                    | 50                       | 114                              | 14.300               | 16,63 |
| ERP 320/10 | 1,0                 | 10           | 5,0                    | 50                       | 143                              | 17.900               | 20,80 |
| ERP 320/12 | 1,0                 | 10           | 6,0                    | 50                       | 172                              | 21.500               | 25,00 |
| ERP 385/7  | 1,0                 | 10           | 3,5                    | 50                       | 100                              | 12.500               | 14,53 |
| ERP 385/8  | 1,0                 | 10           | 4,0                    | 50                       | 114                              | 14.300               | 16,63 |
| ERP 385/10 | 1,0                 | 10           | 5,0                    | 50                       | 143                              | 17.900               | 20,81 |
| ERP 385/12 | 1,0                 | 10           | 6,0                    | 50                       | 172                              | 21.500               | 25,00 |
| ERP 385/14 | 1,0                 | 10           | 7,0                    | 50                       | 200                              | 25.000               | 29,10 |
| ERP 416/8  | 1,0                 | 10           | 4,0                    | 50                       | 114                              | 14.300               | 16,63 |
| ERP RET 6  | 1,0                 | 10           | 3,0                    | 50                       | 86                               | 10.700               | 12,44 |
| ERP RET 8  | 1,0                 | 10           | 4,0                    | 50                       | 114                              | 14.300               | 16,63 |
| ERP RET 10 | 1,0                 | 10           | 5,0                    | 50                       | 143                              | 17.900               | 20,81 |
| ERP RET 12 | 1,0                 | 10           | 6,0                    | 50                       | 172                              | 21.500               | 25,00 |
| ERP Q 7    | 1,0                 | 10           | 3,5                    | 50                       | 100                              | 12.500               | 14,53 |
| ERP Q 10   | 1,0                 | 10           | 5,0                    | 50                       | 143                              | 17.900               | 20,81 |
| ERP Q 12   | 1,0                 | 10           | 6,0                    | 50                       | 172                              | 21.500               | 25,00 |
| ERP Q 14   | 1,0                 | 10           | 7,0                    | 50                       | 200                              | 25.000               | 29,10 |
| ERP Q 16   | 1,0                 | 10           | 8,0                    | 50                       | 228                              | 28.500               | 33,14 |
| ERP Q 18   | 1,0                 | 10           | 9,0                    | 50                       | 258                              | 32.200               | 37,44 |
| ERP Q 20   | 1,0                 | 10           | 10,0                   | 50                       | 286                              | 35.800               | 41,63 |
| ERP Q 24   | 1,0                 | 10           | 12,0                   | 50                       | 343                              | 42.900               | 49,88 |

MPa = 10 bar  
 Max press. 3 bar  
 t max 90°C  
 t min 10°C

## SIZING OF A PRE-PRESSURISED EXPANSION TANK WITH BLADDER FOR HEATING SYSTEMS ("RACCOLTA\_R", EDITION 2009)

The closed expansion tank volume must be sized in relation to the expansion volume of the water in the system.  
The expansion volume ( $V_e$ ) is the maximum variation of the water volume which can be in the system:

$$V_e = V_a \cdot \frac{n}{100}$$

Where:

$V_a$  = total volume of the system [litres]

$n = 0.31 + 3.9 \cdot 10^{-4} \cdot t_m^2$

$t_m$  = maximum permitted temperature in °C referring to safety device activation

The nominal volume  $V_n$  of the closed expansion tank with a bladder is calculated using the following formula:

$$V_n \geq \frac{V_e}{1 - \frac{P_1}{P_2}}$$

Where:

$P_1$  = absolute pressure in bar to which the gas cushion pre-charge; pressure which should not be lower than the hydro-static pressure of the point in which the chamber is installed (or the recovery pressure of the filling unit). This absolute initial pressure value cannot be lower than 1.5 bar.

$P_2$  = absolute calibration pressure of the safety valve, in bar, decreased by a quantity corresponding to the drop in the existing height difference between the expansion tank and the safety valve, if the latter is placed lower or increased if placed higher.

### TABLES FOR THE TANK SELECTION

**TAB.  
1**

#### SPECIFIC VOLUME OF THE WATER AT VARIOUS TEMPERATURES

| T<br>°C | U<br>litres/Kg | T<br>°C | U<br>litres/Kg | T<br>°C | U<br>litres/Kg | T<br>°C | U<br>litres/Kg |
|---------|----------------|---------|----------------|---------|----------------|---------|----------------|
| -10     | 1,00186        | 16      | 1,00103        | 36      | 1,00632        | 80      | 1,0290         |
| -5      | 1,00070        | 18      | 1,00138        | 38      | 1,00706        | 85      | 1,0324         |
| 0       | 1,00013        | 20      | 1,00177        | 40      | 1,0078         | 90      | 1,0359         |
| 2       | 1,00003        | 22      | 1,00221        | 45      | 1,0099         | 95      | 1,0396         |
| 4       | 1,00000        | 24      | 1,00268        | 50      | 1,0121         | 100     | 1,0434         |
| 6       | 1,00003        | 26      | 1,00320        | 55      | 1,0145         | 110     | 1,0515         |
| 8       | 1,00012        | 28      | 1,00375        | 60      | 1,0171         | 120     | 1,0600         |
| 10      | 1,00027        | 30      | 1,00435        | 65      | 1,0198         | 130     | 1,0795         |
| 12      | 1,00048        | 32      | 1,00497        | 70      | 1,0227         | 140     | 1,0795         |
| 14      | 1,00073        | 34      | 1,00563        | 75      | 1,0258         | 150     | 1,0903         |

**TAB.  
2A**

#### WORKING PRESSURE

#### WORKING PRESSURE (BAR)

|     | 1     | 1,5   | 2     | 2,5   | 3     | 3,5   | 4     | 4,5   | 5    |
|-----|-------|-------|-------|-------|-------|-------|-------|-------|------|
| 1,5 | 0,2   |       |       |       |       |       |       |       |      |
| 2   | 0,333 | 0,167 |       |       |       |       |       |       |      |
| 2,5 | 0,429 | 0,286 | 0,143 |       |       |       |       |       |      |
| 3   | 0,5   | 0,375 | 0,25  | 0,125 |       |       |       |       |      |
| 3,5 | 0,556 | 0,444 | 0,333 | 0,222 | 0,111 |       |       |       |      |
| 4   | 0,6   | 0,5   | 0,400 | 0,3   | 0,2   | 0,1   |       |       |      |
| 4,5 | 0,636 | 0,545 | 0,455 | 0,364 | 0,273 | 0,182 | 0,091 |       |      |
| 5   | 0,667 | 0,583 | 0,5   | 0,417 | 0,333 | 0,25  | 0,167 | 0,083 |      |
| 5,5 | 0,692 | 0,615 | 0,538 | 0,462 | 0,385 | 0,308 | 0,231 | 0,154 | 0,07 |
| 6   | 0,714 | 0,643 | 0,571 | 0,5   | 0,429 | 0,357 | 0,286 | 0,21  | 0,14 |
| 6,5 | 0,733 | 0,667 | 0,60  | 0,533 | 0,467 | 0,4   | 0,333 | 0,26  | 0,2  |
| 7   | 0,75  | 0,688 | 0,625 | 0,563 | 0,5   | 0,438 | 0,375 | 0,31  | 0,25 |
| 7,5 | 0,765 | 0,706 | 0,647 | 0,588 | 0,529 | 0,471 | 0,412 | 0,35  | 0,29 |
| 8   | 0,778 | 0,722 | 0,667 | 0,611 | 0,556 | 0,5   | 0,444 | 0,38  | 0,33 |
| 8,5 | 0,789 | 0,737 | 0,684 | 0,632 | 0,579 | 0,526 | 0,474 | 0,42  | 0,36 |
| 9   | 0,8   | 0,75  | 0,7   | 0,65  | 0,6   | 0,55  | 0,5   | 0,45  | 0,4  |
| 9,5 | 0,81  | 0,762 | 0,714 | 0,667 | 0,619 | 0,571 | 0,524 | 0,47  | 0,43 |
| 10  | 0,818 | 0,773 | 0,727 | 0,682 | 0,636 | 0,591 | 0,545 | 0,5   | 0,45 |

TAB.  
2B

| WORKING PRESSURE | WORKING PRESSURE (BAR) |      |      |      |      |      |      |      |      |
|------------------|------------------------|------|------|------|------|------|------|------|------|
|                  | 5,5                    | 6    | 6,5  | 7    | 7,5  | 8    | 8,5  | 9    | 9,5  |
| 6                | 0,07                   |      |      |      |      |      |      |      |      |
| 6,5              | 0,13                   | 0,06 |      |      |      |      |      |      |      |
| 7                | 0,18                   | 0,12 | 0,06 |      |      |      |      |      |      |
| 7,5              | 0,23                   | 0,17 | 0,11 | 0,06 |      |      |      |      |      |
| 8                | 0,28                   | 0,22 | 0,16 | 0,11 | 0,06 |      |      |      |      |
| 8,5              | 0,31                   | 0,26 | 0,21 | 0,16 | 0,1  | 0,05 |      |      |      |
| 9                | 0,35                   | 0,3  | 0,25 | 0,21 | 0,15 | 0,1  | 0,05 |      |      |
| 9,5              | 0,38                   | 0,33 | 0,28 | 0,24 | 0,19 | 0,14 | 0,01 | 0,05 |      |
| 10               | 0,41                   | 0,36 | 0,32 | 0,27 | 0,23 | 0,18 | 0,14 | 0,09 | 0,09 |

TAB.  
2

COEFFICIENTS OF THE WATER EXPANSION IN % (WITH OR WITHOUT THE ADDITION OF ANTI-FREEZE GLYCOL)

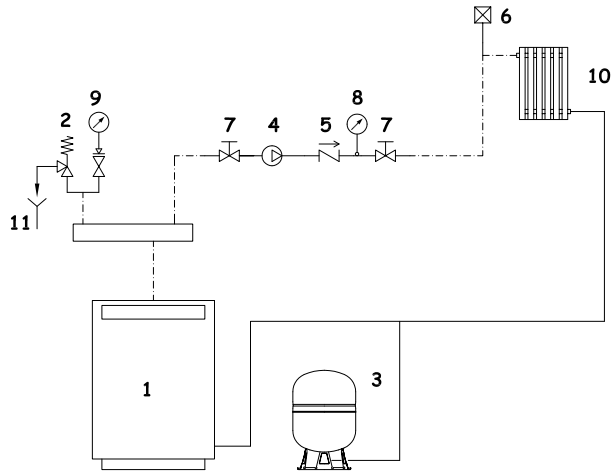
| T<br>°C | WATER ONLY | ANTI-FREEZE |      |      |      |      |
|---------|------------|-------------|------|------|------|------|
|         |            | 10%         | 20%  | 30%  | 40%  | 50%  |
| 10      | 0,04       | 0,32        | 0,64 | 0,96 | 1,28 | 1,60 |
| 15      | 0,11       | 0,43        | 0,75 | 1,07 | 1,39 | 1,71 |
| 20      | 0,18       | 0,50        | 0,82 | 1,14 | 1,46 | 1,78 |
| 25      | 0,31       | 0,63        | 0,95 | 1,27 | 1,59 | 1,91 |
| 30      | 0,44       | 0,76        | 1,08 | 1,40 | 1,72 | 2,04 |
| 35      | 0,62       | 0,94        | 1,26 | 1,58 | 1,90 | 2,22 |
| 40      | 0,79       | 1,11        | 1,43 | 1,75 | 2,07 | 2,39 |
| 45      | 1,00       | 1,32        | 1,64 | 1,96 | 2,28 | 2,60 |
| 50      | 1,21       | 1,53        | 1,85 | 2,17 | 2,49 | 2,81 |
| 55      | 1,46       | 1,78        | 2,10 | 2,42 | 2,74 | 3,06 |
| 60      | 1,71       | 2,03        | 2,35 | 2,67 | 2,99 | 3,31 |
| 65      | 2,01       | 2,33        | 2,65 | 2,97 | 3,29 | 3,61 |
| 70      | 2,28       | 2,60        | 2,92 | 3,24 | 3,56 | 3,88 |
| 75      | 2,59       | 2,91        | 3,23 | 3,55 | 3,87 | 4,19 |
| 80      | 2,90       | 3,22        | 3,54 | 3,86 | 4,18 | 4,50 |
| 85      | 3,21       | 3,53        | 3,85 | 4,17 | 4,49 | 4,81 |
| 90      | 3,59       | 3,91        | 4,23 | 4,55 | 4,87 | 5,19 |
| 95      | 3,96       | 4,29        | 4,61 | 4,93 | 5,25 | 5,57 |
| 100     | 4,35       | 4,67        | 4,99 | 5,31 | 5,63 | 5,95 |

**TAB. 3**

**WATER VOLUME**

| T<br>°C | DENSITY<br>KG/L. |
|---------|------------------|
| 10      | 0,99975          |
| 15      | 0,99915          |
| 20      | 0,99820          |
| 25      | 0,99711          |
| 30      | 0,99576          |
| 35      | 0,99421          |
| 40      | 0,99224          |
| 45      | 0,99025          |
| 50      | 0,98807          |
| 55      | 0,98573          |
| 60      | 0,98324          |
| 65      | 0,98059          |
| 70      | 0,98781          |
| 75      | 0,97849          |
| 80      | 0,97183          |
| 85      | 0,96865          |
| 90      | 0,96534          |
| 95      | 0,96192          |
| 100     | 0,95838          |

**EXAMPLE OF INSTALLATION**



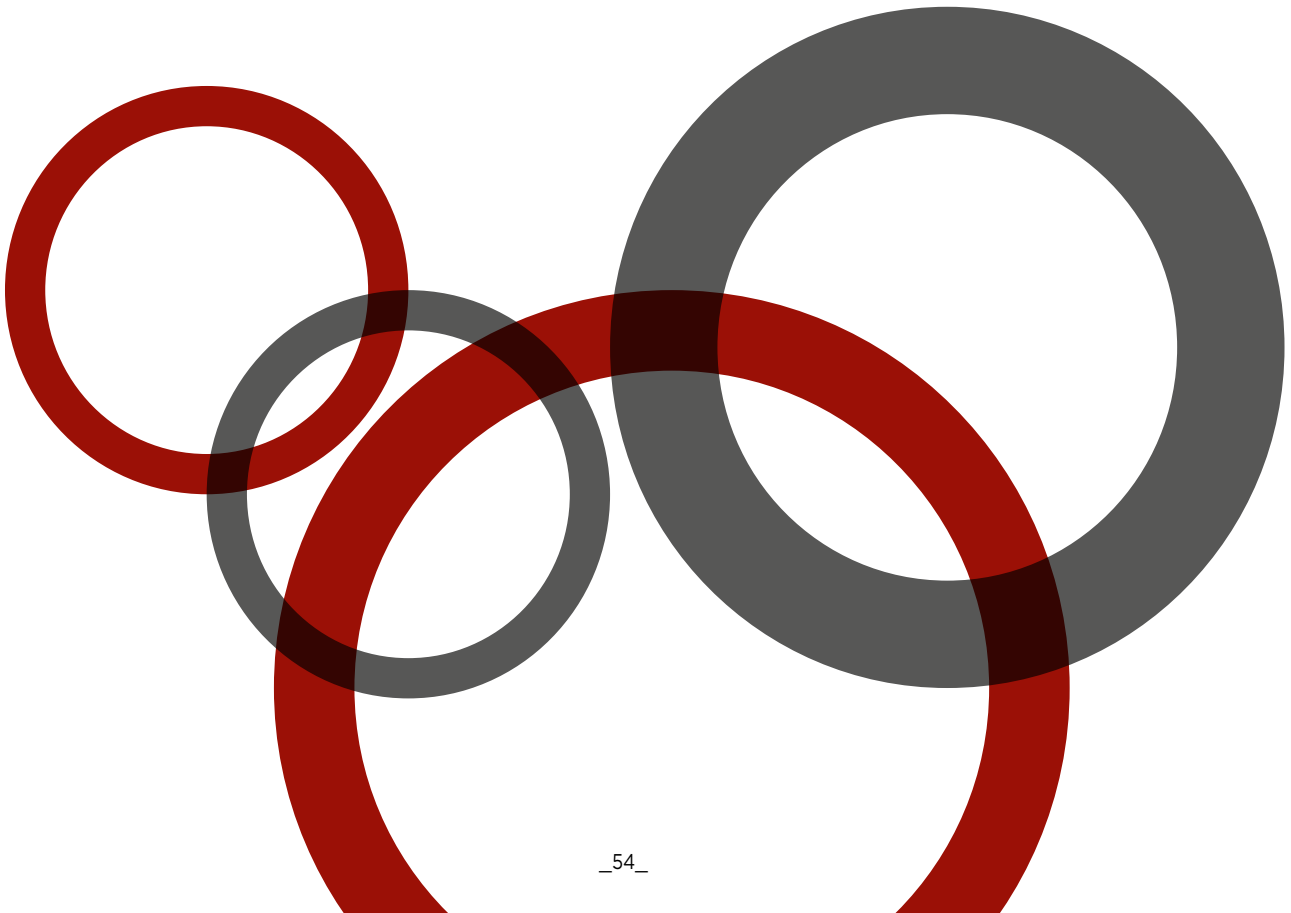
**KEYWORD**

- 1 - Heat generator
- 2 - Safety valve
- 3 - ERCE series expansion tank
- 4 - Boiler circuit pump
- 5 - Check valve
- 6 - Venting valve
- 7 - Shut-off valve
- 8 - Thermometer
- 9 - Gauge
- 10 - Radiator
- 11 - Drain

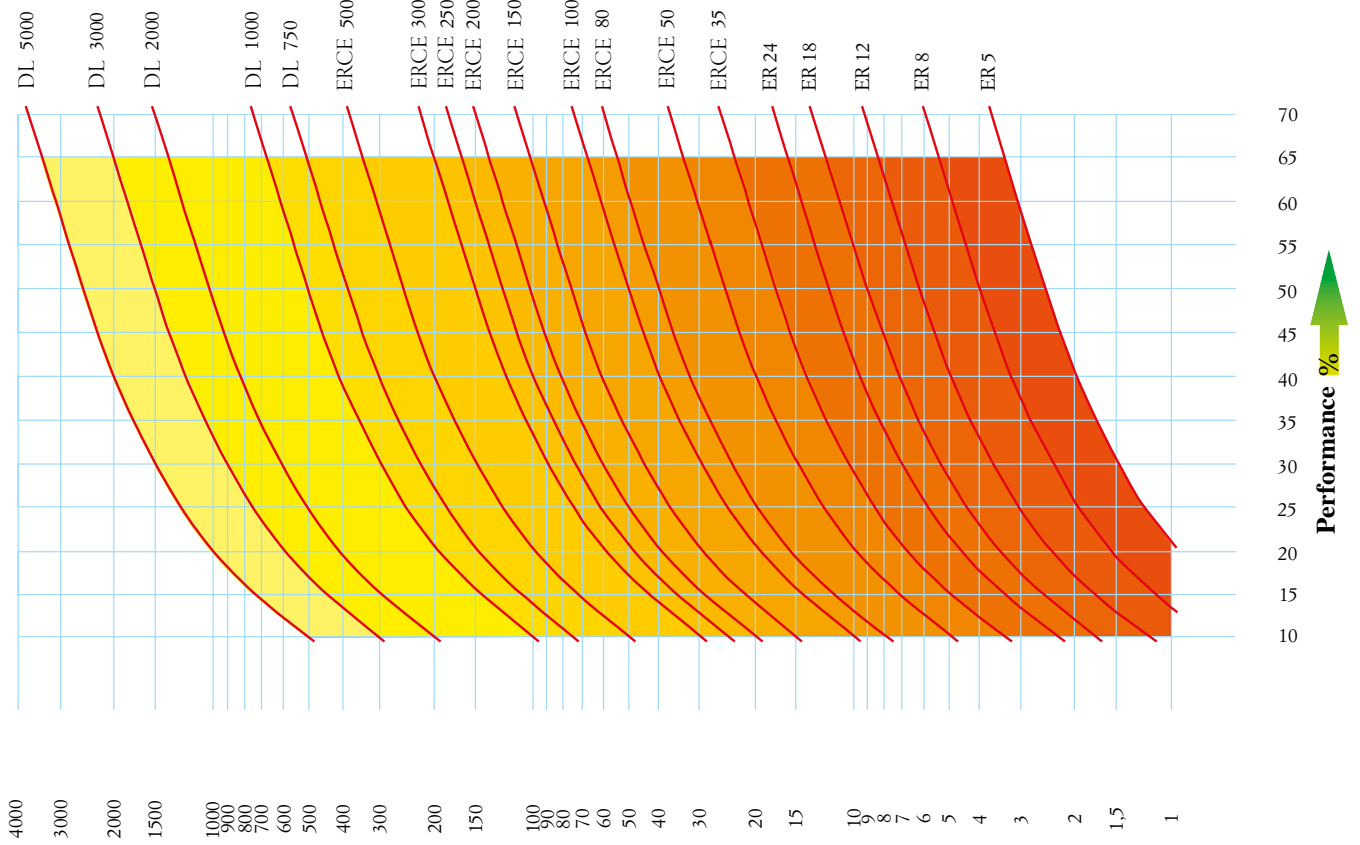
**TAB. 4**

**TYPE OF TANK ACCORDING TO THE PLANT'S WATER VOLUME (M3) AND THE MAX. WORKING TEMPERATURE (°C)**

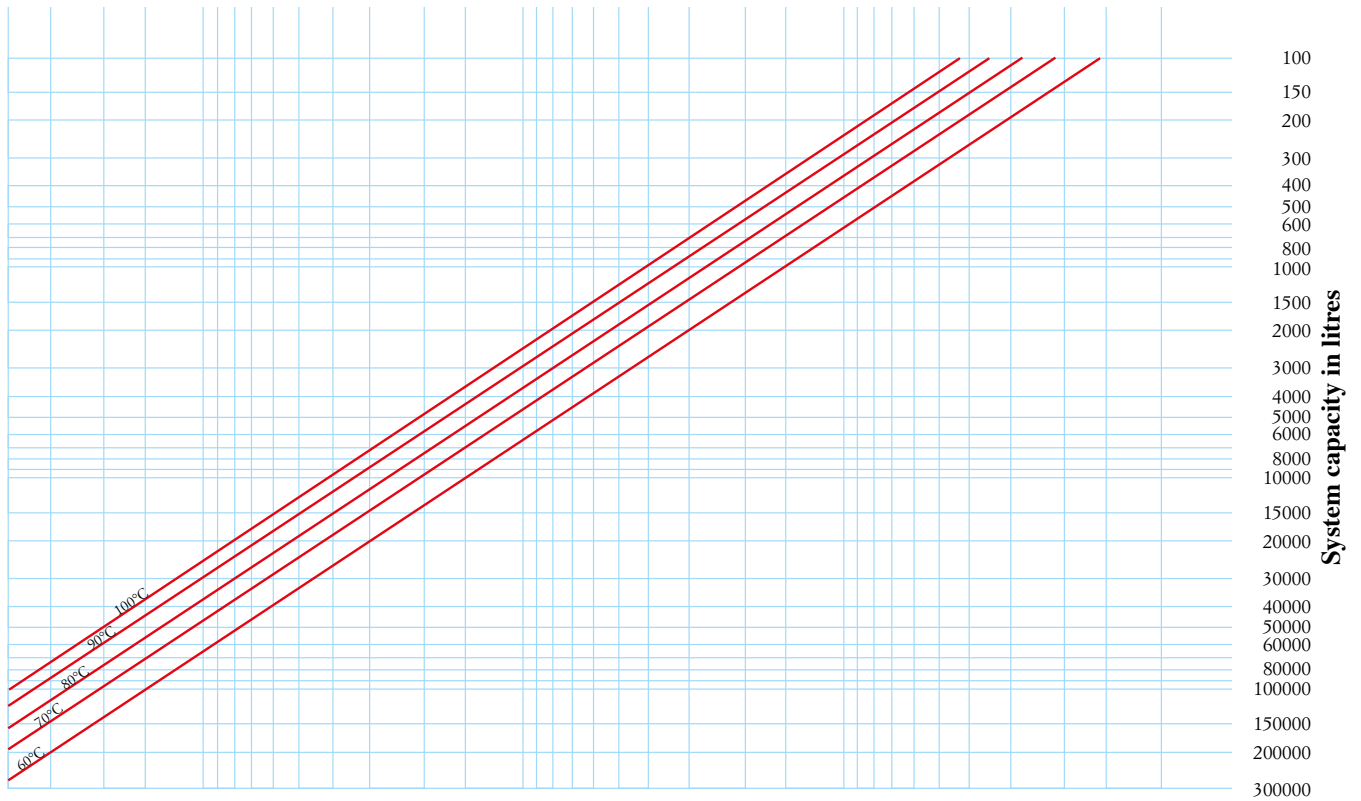
| DL   | Volume m <sup>3</sup> |      |      |       | EXPANSION (litres) |
|------|-----------------------|------|------|-------|--------------------|
|      | 70°C                  | 80°C | 90°C | 100°C |                    |
| 300  | 11                    | 9    | 7    | 6     | 250                |
| 500  | 19                    | 15   | 12   | 10    | 430                |
| 750  | 28                    | 22   | 18   | 15    | 640                |
| 1000 | 38                    | 30   | 24   | 20    | 850                |
| 2000 | 76                    | 59   | 48   | 39    | 1.700              |
| 3000 | 114                   | 89   | 72   | 59    | 2.550              |
| 5000 | 190                   | 149  | 118  | 99    | 4.250              |



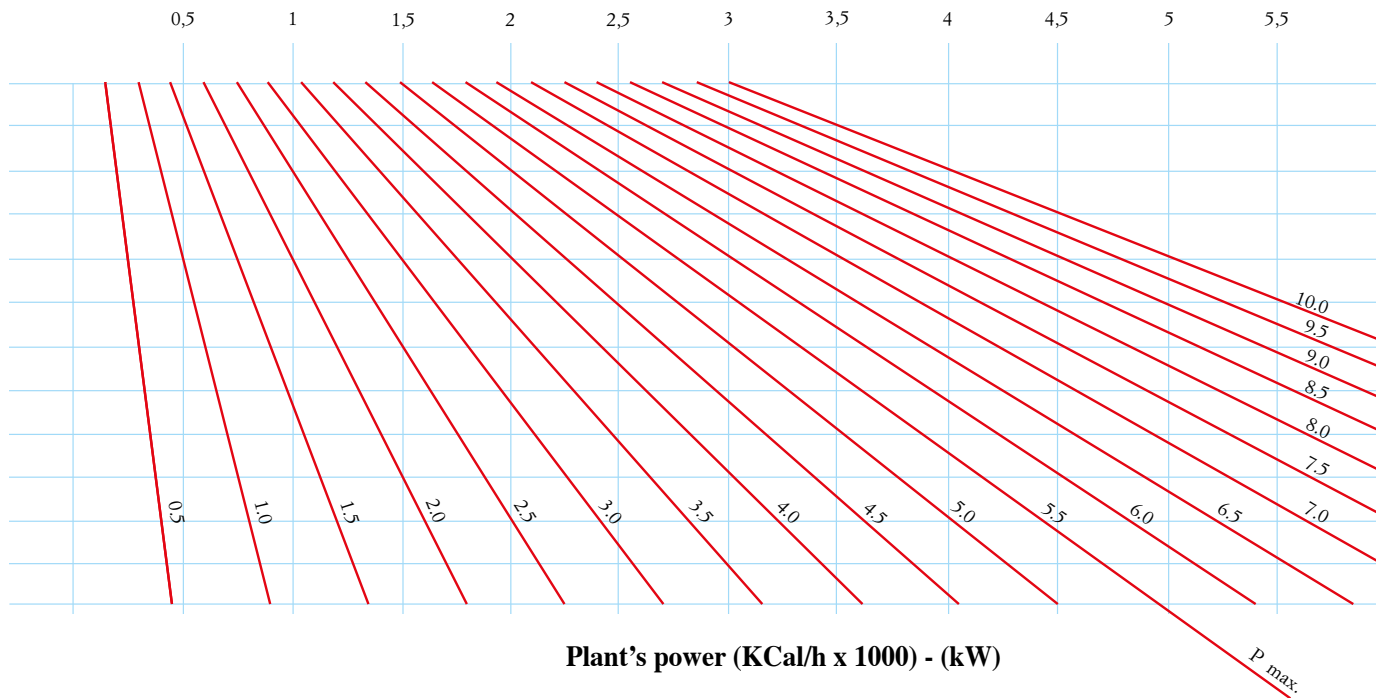
**ELBI expansion tanks**



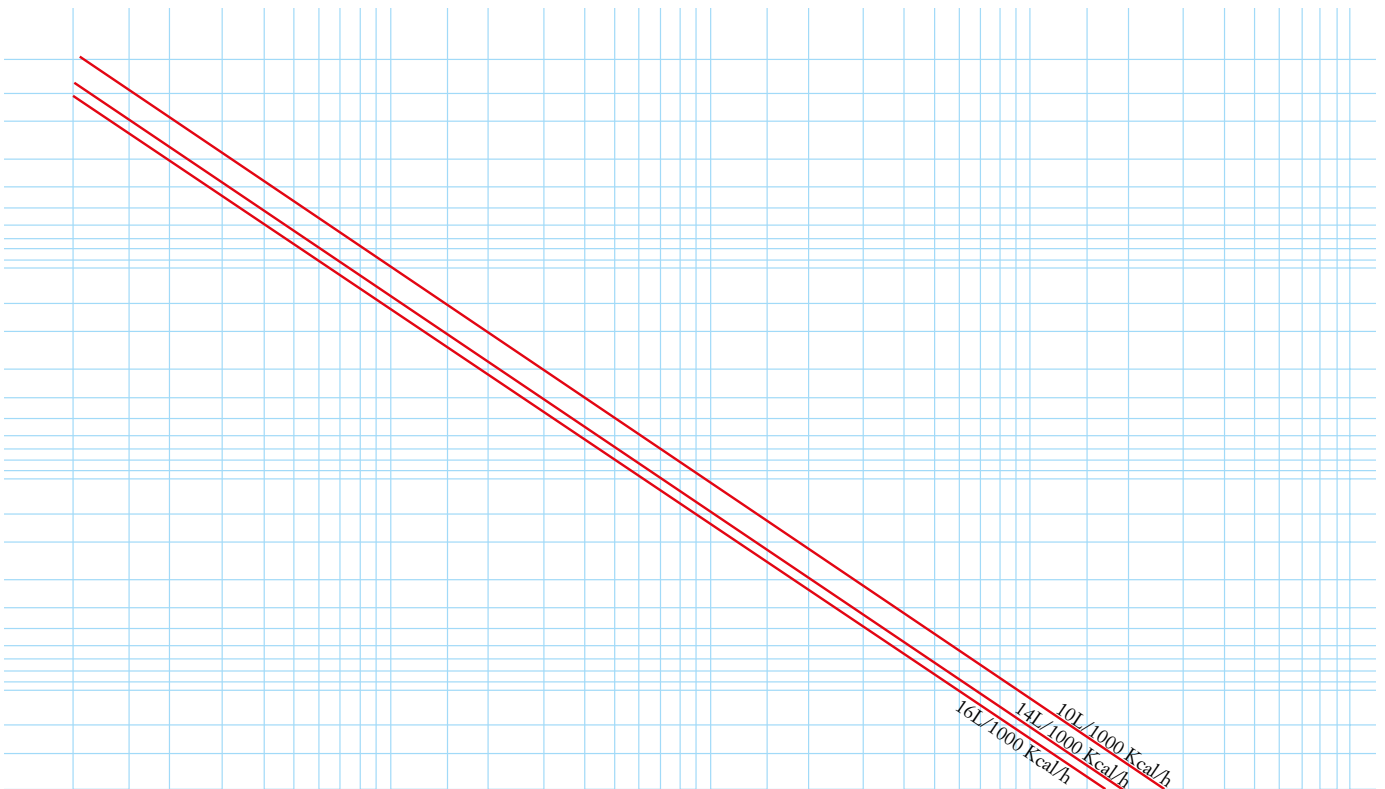
**Expansion volume in litres**



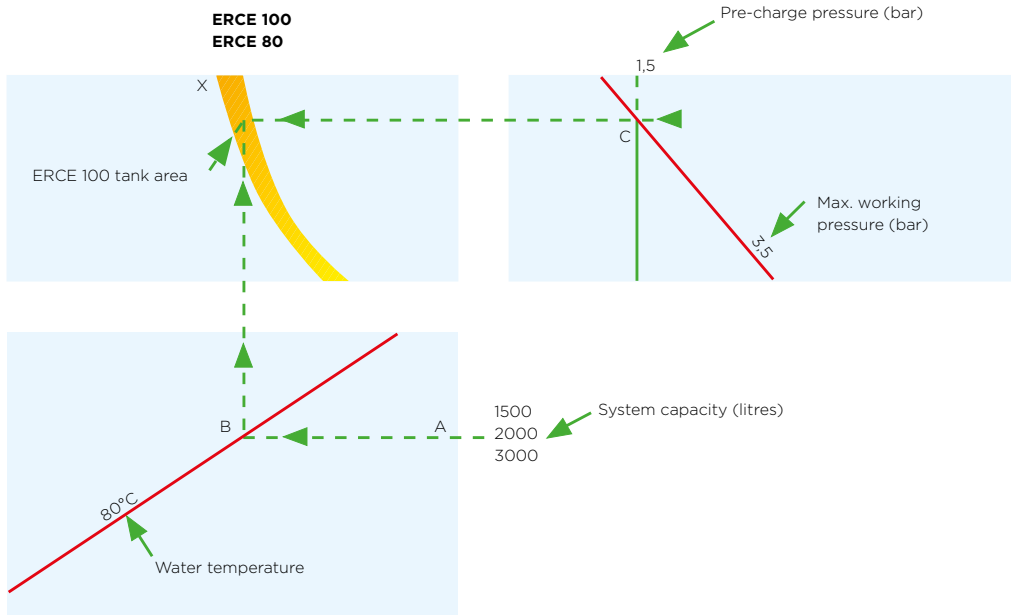
Pre-charge pressure (bar)



| Kcal/h x 1000 | kW         |
|---------------|------------|
| 10            | 11,628     |
| 15            | 17,442     |
| 20            | 23,256     |
| 30            | 34,884     |
| 40            | 46,512     |
| 50            | 58,140     |
| 60            | 69,767     |
| 70            | 81,395     |
| 80            | 93,023     |
| 90            | 104,651    |
| 100           | 116,279    |
| 150           | 174,419    |
| 200           | 232,558    |
| 300           | 348,837    |
| 400           | 465,116    |
| 500           | 581,395    |
| 600           | 697,674    |
| 700           | 813,953    |
| 800           | 930,233    |
| 900           | 1046,512   |
| 1000          | 1162,791   |
| 1500          | 1744,186   |
| 2000          | 2325,581   |
| 3000          | 3488,372   |
| 4000          | 4651,163   |
| 5000          | 5813,953   |
| 6000          | 6976,744   |
| 7000          | 8139,535   |
| 8000          | 9302,326   |
| 9000          | 10465,116  |
| 10000         | 11627,907  |
| 15000         | 17441,860  |
| 20000         | 23255,814  |
| 30000         | 34883,721  |
| 40000         | 46511,628  |
| 50000         | 58139,535  |
| 60000         | 69767,442  |
| 70000         | 81395,349  |
| 80000         | 93023,256  |
| 90000         | 104651,163 |
| 100000        | 116279,070 |



16L/1000kcal/h : plant with radiators  
 14L/1000kcal/h : plant with convectors (or radiating panels with steel tubes)  
 10L/1000kcal/h : plant with radiating panels with copper tubes

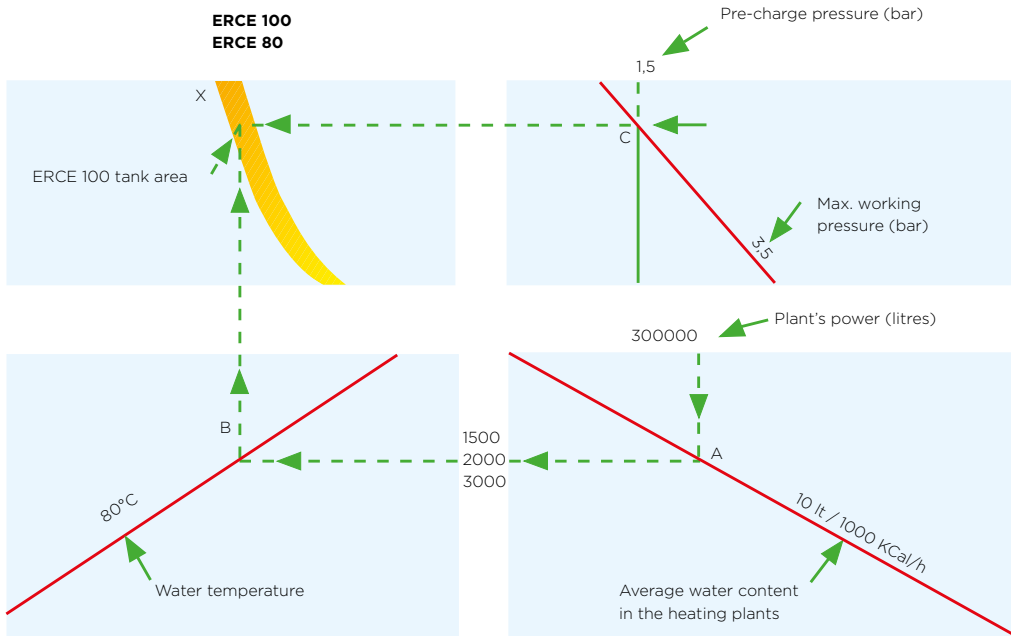


**Determination of the expansion tank according to the plant's water content**

The initial data used to determine the expansion tank's capacity are the following ones, namely:

- plant's static pressure or precharge pressure (absolute pressure);
- maximum working pressure of the plant (absolute pressure);
- water mean temperature;
- plant's capacity.

As you know already the plant's capacity, draw a horizontal line until intersecting the water mean temperature line "A-B". From the point "B", draw a vertical line up to the above graph. Since you know already the precharge pressure and the plant's maximum pressure, it is necessary to find the intersection point of the two right lines "C" and, starting from this one, draw a horizontal line until reaching the graph on the side. In the intersection point of these two right lines "X" you find the expansion tank necessary for the plant.



**Determination of the expansion tank according to the plant's power**

The initial data used to determine the expansion tank's capacity are the following ones, namely:

- plant's static pressure or precharge pressure (absolute pressure);
- plant's static pressure or precharge pressure (absolute pressure);
- maximum working pressure of the plant (absolute pressure);
- water mean temperature;
- plant's power.

Since you know already the power, draw a vertical line until intersecting the right line relevant to the mean water content of the plant "A". Starting from the point "A", draw a horizontal line until intersecting the water mean temperature line "AB". From the point "B", draw a vertical line up to the above graph. Since you know already the precharge pressure and the plant's maximum pressure, it is necessary to find the intersection point of the two right lines "C" and, starting from this one, draw a horizontal line until reaching the graph on the side. In the intersection point of these two right lines "X" you find the expansion tank necessary for the plant.