Answer on Question 53376, Physics, Electric Circuits

Question:

How many 176 ohm resistors (in parallel) are required to carry $5A$ on $220V$ line?

Solution:

Let x be the total number of resistors of resistance 176Ω connected in parallel.

Then, the total equivalent resistance of equal valued resistors connected in parallel is equal to the value of one of the resistors divided by the number of resistors connected in parallel:

$$\frac{1}{R_t} = x\left(\frac{1}{176\Omega}\right),$$

$$R_t = R = \frac{176\Omega}{x}.$$

By the Ohm's laws we get:

$$\frac{V}{I} = R = \frac{176\Omega}{x}.$$

Therefore,

$$x = \frac{176\Omega \cdot \mathrm{I}}{V} = \frac{176\Omega \cdot 5\mathrm{A}}{220V} = 4.$$

Answer:

Four resistors of 176Ω connected in parallel are required to carry $5A$ on $220V$ line.