

M30-3 Tolerances Assignment

(MathWorks 12 Workbook pg. 102-104)

Name: KEY

1. Complete the following table.

TOLERANCES				
Nominal value	Minimum value	Maximum value	Tolerance	\pm range
115 mm	112 mm	118 mm	6 mm	± 3 mm
15 cm	12.5 cm	17.5 cm	5 cm	± 2.5 cm
90°F	85°F	95°F	10°F	± 5 °F
$3\frac{3}{4}$ "	$3\frac{5}{8}$ "	$3\frac{7}{8}$ "	$\frac{1}{4}$ "	$\frac{1}{8}$ "

$$\frac{3}{4} - \frac{1}{8} = \frac{6}{8} - \frac{1}{8} = \frac{5}{8}$$

$$\frac{3}{4} + \frac{1}{8} = \frac{6}{8} + \frac{1}{8} = \frac{7}{8}$$

2. Munira is making custom kitchen cabinets. The front face of a drawer must have a width between $17\frac{15}{16}$ " and $18\frac{1}{16}$ " and a height between $6\frac{15}{16}$ " and $7\frac{1}{16}$ ".

a) What are the nominal dimensions of the drawer face?

nominal width = 18" nominal height = 7"

b) What is the tolerance in the measurements?

$$\frac{1}{16} + \frac{1}{16} = \frac{2}{16}$$

$$= \frac{1}{8}"$$

c) Write the width and height in the form nominal value $\pm \frac{1}{2}$ (tolerance).

width $18" \pm \frac{1}{16}"$

height $7" \pm \frac{1}{16}"$

$$\frac{1}{2} \left(\frac{1}{8} \right) = \frac{1}{16}$$

3. A chemical mixture in a manufacturing process needs to reach a nominal temperature of 10.0°C , with a tolerance of 0.5°C . $10.0^{\circ}\text{C} \pm 0.25^{\circ}\text{C}$

a) What are the minimum and maximum acceptable temperatures? Write them in the form $\begin{matrix} \text{maximum value} \\ \text{minimum value} \end{matrix}$.

$$\begin{aligned} \text{maximum} &= 10.0^{\circ}\text{C} + 0.25^{\circ}\text{C} \\ &= \boxed{10.25^{\circ}\text{C}} \end{aligned}$$

$$\begin{aligned} \text{minimum} &= 10.0^{\circ}\text{C} - 0.25^{\circ}\text{C} \\ &= \boxed{9.75^{\circ}\text{C}} \end{aligned}$$

$$\boxed{\begin{matrix} 10.25^{\circ}\text{C} \\ 9.75^{\circ}\text{C} \end{matrix}}$$

b) Write the temperature in the form nominal value $\pm \frac{1}{2}$ (tolerance).

$$\boxed{10.0^{\circ}\text{C} \pm 0.25^{\circ}\text{C}}$$

4. A medication specifies that it contains $0.0406 \text{ mg} \pm 0.0001 \text{ mg}$ of a specified drug. Calculate the tolerance and the maximum and minimum quantities of the drug present in the medication.

$$\begin{aligned} \text{max} &= 0.0406 \text{ mg} + 0.0001 \text{ mg} \\ &= \boxed{0.0407 \text{ mg}} \end{aligned}$$

$$\begin{aligned} \text{min} &= 0.0406 \text{ mg} - 0.0001 \text{ mg} \\ &= \boxed{0.0405 \text{ mg}} \end{aligned}$$

$$\begin{aligned} \text{tolerance} &= 0.0407 \text{ mg} - 0.0405 \text{ mg} \\ &= \boxed{0.0002 \text{ mg}} \end{aligned}$$

5. Junichi is tiling a roof. The building code specifies that roof tile may have an overhang of a maximum of 64 mm and a minimum of 35 mm.

a) Calculate the nominal overhang for a roof tile.

$$\text{nominal overhang} = \frac{64 \text{ mm} + 35 \text{ mm}}{2} = 49.5 \text{ mm}$$

b) Express the tolerance in the form nominal value $\pm \frac{1}{2}$ (tolerance).

$$\begin{aligned} \text{tolerance} &= 64 \text{ mm} - 35 \text{ mm} \\ &= 29 \text{ mm} \end{aligned}$$

$$49.5 \text{ mm} \pm \frac{1}{2}(29 \text{ mm})$$

$$= \boxed{49.5 \text{ mm} \pm 14.5 \text{ mm}}$$