Tolerance

Nominal value - the target value for the size of an item you want to make or an item you want to buy

Tolerance - the amount that a measurement is allowed to vary for an item you want to make/buy

also, the difference between max and min

Example 1

Clothing companies allow for certain tolerance when making products. Jeans are sold in the whole-inch sizes by waist measurement. A company allows for a tolerance of $\pm\frac{1}{4}$ inch when labelling products.

a) What is the tolerance for the waist measurement of a pair of pants?

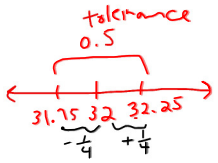
$2\left(\frac{1}{4}\right)$ $0.5''$ or $\frac{1}{2}''$

b) What are the maximum and minimum allowable waist measurements that can be labelled as 32 inch waist pant?

nominal value

max = $32'' + \frac{1}{4}''$ $= 32\frac{1}{4}''$ $(32.25'')$

min = $32'' - \frac{1}{4}''$ $= 31\frac{3}{4}''$ $(31.75'')$



Four Ways to Write the Acceptable Range

1) Maximum value $32.25''$
Minimum value $31.75''$

2) Nominal value $\pm \frac{1}{2}$ tolerance $\Rightarrow$ $32 \pm \frac{1}{2}(0.5)''$ $32 \pm \frac{1}{4}''$

3) Minimum value $^{+\text{tolerance}}_{-0}$ $31.75^{+0.5}_{-0}$

4) Maximum value $^{+0}_{-\text{tolerance}}$ $32.25^{+0}_{-0.5}$

on prev exam

12 ± 2.5cm $12 \pm \frac{1}{2}(5)$ ↑ tol

nominal value $^{+\text{tol}}_{-0}$

nom value 9.5 cm $12 - 2.5$

tolerance 5 cm

Example 2

The dimensions on a drawing are specified as $0.250"$ (max) / $0.230"$ (min).

nominal value $0.240"$

Express the dimensions in the other 3 acceptable forms:

half way between

or

Nominal value $= \frac{max+min}{2}$

Tolerance = max − min
= 0.250 − 0.230
= 0.020"

② Nominal value $\pm \frac{1}{2}$(tolerance)
$0.240 \pm \frac{1}{2}(0.020)$
0.240 ± 0.010

③ $0.230^{+0.020}_{-0}$

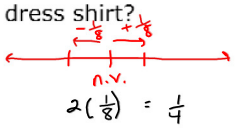
④ $0.250^{+0}_{-0.020}$

Example 3 - Your turn!!!

The same company from Example 1 allows a tolerance of $\pm \frac{1}{8}$ inch when labelling the neck size of a dress shirt.

a) What is the tolerance for the neck measurement of a dress shirt?

$\frac{1}{4}"$



$2(\frac{1}{8}) = \frac{1}{4}$

b) What are the maximum and minimum allowable neck measurements that can be labelled as 15 inch neck?

max = $(15 + \frac{1}{8})"$
= $15\frac{1}{8}"$

min = $(15 - \frac{1}{8})"$
= $14\frac{7}{8}"$

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Exam/marking guide
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