

## ANSYS Workbench Class3

### Error Report

#### ERROR NO:

WB2014-03

#### Keywords:

PARAMETER EXPRESSION

TEMPERATURE

UNITS

CONVERSION

#### Description of Error:

When performing calculations involving temperature quantities, quantity operators typically convert temperature quantities to an absolute temperature scale before performing the calculation. This is important because most physics laws are based on absolute temperatures. However, operations between a number and a quantity did not do this conversion to meet user expectation like ( $2 * 100[C] = 200 [C]$ ). However, this inconsistency can lead to situations such as violation of the commutative property or different results from comparable addition and multiplication operations when quantities are defined using relative temperature scales (i.e. C or F). Some examples of current behavior include:

$$k = 2$$

$$q1 = 100 [C]$$

$$q2 = 2 [m]$$

$$q1 * q2 * k = 1492.6 [m K]$$

$$k * q1 * q2 = 946.3 [m K]$$

$$q1 = 100 [C]$$

$$2 * q1 = 200 [C]$$

$$q1 + q1 = 746.3 [K]$$

#### Typical GUI Path(s):

Entering temperature-based expressions for Parameters.

**Other Comments:**

The general issue is noted in the user documentation as follows:

Caution: English US expression evaluations that involve temperatures are a special case. For the unit conversion of a specific temperature value,  $1 \text{ degC} = 274.15 \text{ K}$ . However, the unit conversion for a temperature interval ( $\Delta T$ ) is  $1 \text{ degC} = 1 \text{ K}$ .

The expression evaluator will take any temperature value and treat it as a specific temperature (not a temperature interval) by converting it to the absolute unit of the project unit system (either K or R). If the intent is to perform the evaluation in terms of temperature intervals, you need to start with temperatures in absolute units.

**First Incorrect Version:**

Release 12.0

**Corrected In:**

Release 15.0

**Suggested User Action For Running on Uncorrected Version:**

Always perform temperature calculation using absolute temperature scales, [K] or [R].

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