



*****THIS IS A NEW IM. - PLEASE READ CAREFULLY.*****

PROCEDURE FOR ROUNDING DATA

SCOPE

When comparing test data to the specification limit, a uniform method is used to round the data. When a rounding method is not specified elsewhere for the test data, the method to be used is the Rounding Method in ASTM E29 except that the rounding procedure in section 6.4.3 is replaced as below and 6.4.4 is eliminated.

6.4.3 When the digit next beyond the last place to be retained is 5, and there are no digits beyond this 5, or only zeros, increase by 1 the digit in the last place retained.

When the Iowa DOT provides a computer program or spreadsheet for reporting test results, the rounding procedure will be as reported by the computer software.

PROCEDURE

The modified ASTM E29 rounding procedures and rounding method are:

A. Determine the last digit to be used.

1. The last digit to be used may be specified in the test procedure.

An example of this would be in [IM 316](#), “Report the modulus of rupture to the nearest 5 psi”.

2. For comparing a test result to the specification, the last digit in the specification limit is used to round the test result (unless noted in the specification).

An example of this would be the slump p for structural concrete in [Article 2403](#), “...allowing a maximum of 4 inches as a tolerance.” If the test result for a slump test was 4 $\frac{1}{4}$ ”, the result would be within the tolerance because it rounds to 4. If the maximum was stated as, “... allowing a maximum of 4.0 inches as a tolerance”; then the result 4 $\frac{1}{4}$ ” would be outside the tolerance.

B. Rounding Procedure

1. If the digit following the last digit to be used is less than 5, do not change the last digit used.

Example: 1.861 would round to 1.86 for the nearest 0.01

2. If the digit following the last digit to be used is more than 5, raise the last digit used one number.

Example: 1.861 would round to 1.9 for the nearest 0.1

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3. If the digit following the last digit to be used is exactly 5, raise the last digit used one number.

Example: 1.851 would round to 1.9 for the nearest 0.1

- C. Rounding Procedure for 50, 5, 0.5, 0.05, etc.

To round to the nearest 50, 5, 0.5, or 0.05:

1. Double the number you are rounding.
2. Round that number to the nearest 100, 10, 1, or 0.1 using the procedure in B above.
3. Divide this rounded number by 2.

Example: Round 1.811 to 0.05

$$1.811 \times 2 = 3.622$$

3.622 rounds to 3.6

$$3.6 / 2 = 1.80 \text{ is the result of rounding 1.811 to the nearest 0.05.}$$

- D. Rounding Procedure for other increments; 0.02, 0.25, etc.

To round to the nearest 0.02, or 0.25:

1. Divide the number you are rounding by the increment.
2. Round that number to the nearest whole number using the procedure in B above.
3. Multiply this rounded number by the increment.

Example: Round 1.811 to 0.25

$$1.811 / 0.25 = 7.244$$

7.244 rounds to 7

$$7 \times .25 = 1.75 \text{ the result of rounding 1.811 to the nearest 0.25.}$$

- E. Rounding Procedure for fractions.

To round fractions, they must first be converted to a decimal. Then the procedures B through D can be used.