

1 Notation:

Number of Parts, n_P

Number of Operators, n_O

Number of Repeated Measurements, n_M

Average of the Part/Operator Ranges, \bar{R}

Range of the Part/Operator Means for each Part, R_M

Average of the R_M , \bar{R}_M

2 Formulas:

$$\hat{\sigma}_{Repeat}^2 = \left[\frac{\bar{R}}{d_2(n_M)} \right]^2$$

$$\hat{\sigma}_{Reprod}^2 = \left(\left[\frac{\bar{R}_M}{d_2(n_O)} \right]^2 - \frac{1}{n_M} \left[\frac{\bar{R}}{d_2(n_M)} \right]^2 \right)$$

$$\hat{\sigma}_{Total}^2 = \hat{\sigma}_{Repeat}^2 + \hat{\sigma}_{Reprod}^2$$

3 Table of Constants:

n	$d_2(n)$
2	1.128
3	1.693
4	2.059
5	2.326
6	2.534
7	2.704
8	2.847
9	2.970
10	3.078