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UR.3.1. Recommended Minimum Load

Table 8 Recommended Minimum Load

Why d, Not e!?!?

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UR.3.1. Recommended Minimum Load

Table 8 Recommended Minimum Load

G-S.5.2.2.(c) - A digital value “rounds off” to the nearest minimum unit that can be indicated or recorded.

For example, a digital scale with 1 lb scale divisions (d) will round up to 0.5 lb.

When weighed on this scale;

An item that weighs 6.4 lb, would round down to 6 lb (-0.4 lb).

An item that weighs 6.5 lb,would round up to 7 lb (+0.5 lb).

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UR.3.1. Recommended Minimum Load

UR.3.1. Recommended Minimum Load. – A recommended minimum load is specified in Table 8. Recommended Minimum Load since the use of a device to weigh light loads is likely to result in relatively large errors.

4.4 Relative Error at Low Load Values

At low load values, the uncertainty of the indicated reading may produce a large relative error*

*Excerpt from a report titled "PROPOSED REGULATIONS FOR WEIGHING DEVICE TOLERANCES" by the SMA Expanded Tolerance Subcommittee, March 5, 1981 (1981 NCWM Annual Report)

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Table 8. Recommended Minimum Load

Uncertainty

e vs d

RML = 20	e	d	Max Rounded Value d (MRV)	uncertainty MRV ÷ RML (RML 20 d)	uncertainty MRV ÷ RML (RML 20 e)
e > d	1	0.1	0.05	2.50%	Inequitable 0.25%
e = d	1	1	0.5	2.50%	2.50%

$$\frac{0.05\ d}{20\ x\ 1\ e} = \frac{0.05\ d}{20\ e} = 0.0025 \times 100 = 0.25\ \%$$

$$\frac{0.05\ d}{20\ x\ 0.1\ d} = \frac{0.05\ d}{2\ d} = 0.025 \times 100 = 2.5\ \%$$

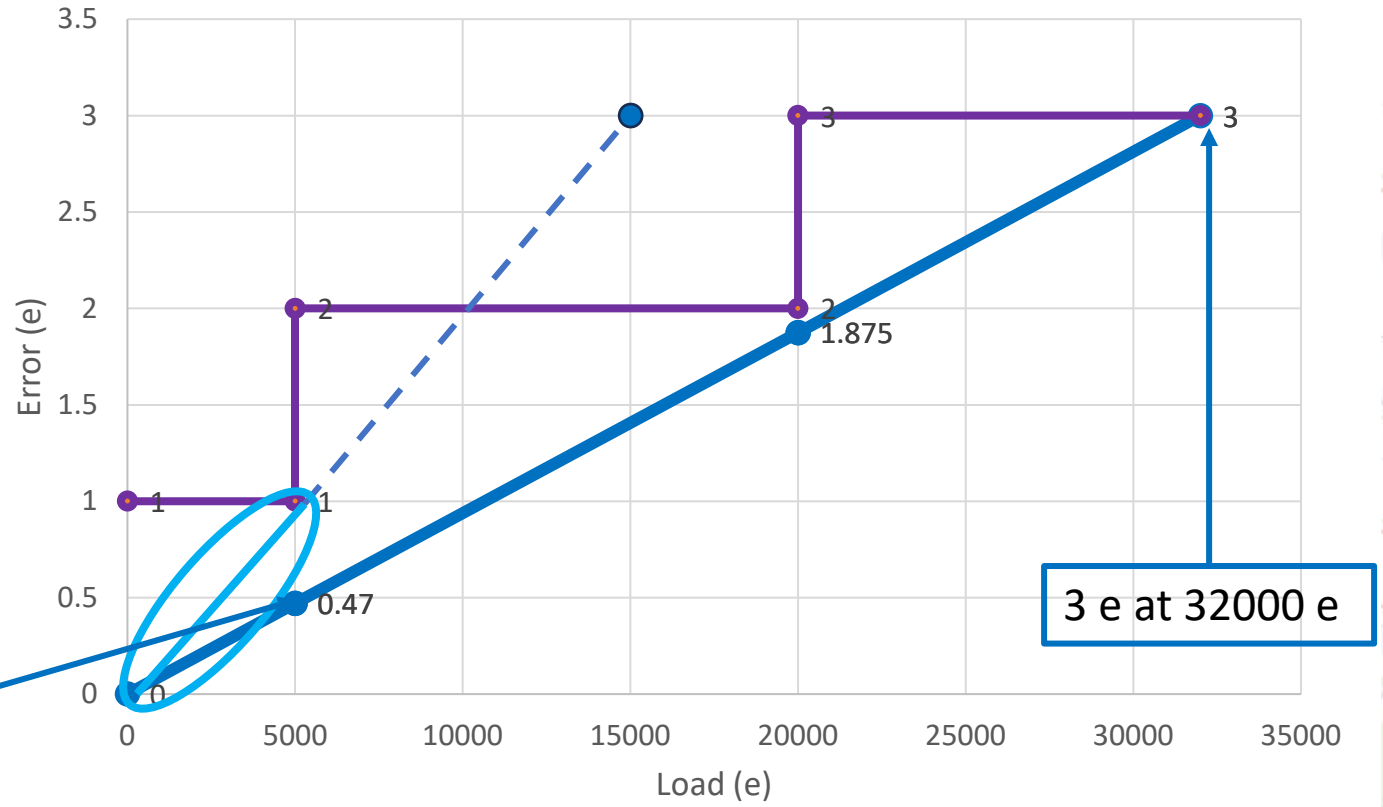
$$\frac{0.5\ e}{20\ x\ 1\ e} = \frac{0.5\ e}{20\ e} = 0.025 \times 100 = 2.50\ \%$$

SCL-25.1 Table 8. Recommended Minimum Load

Class II Tolerance (e)		
1	2	3
Test Load (e)		
0 – 5 000	5 001 – 20 000	20 001+

Effect of Tolerance

320 g e = 0.01 g d = 0.001 g (n=32000)



50.00[5] g

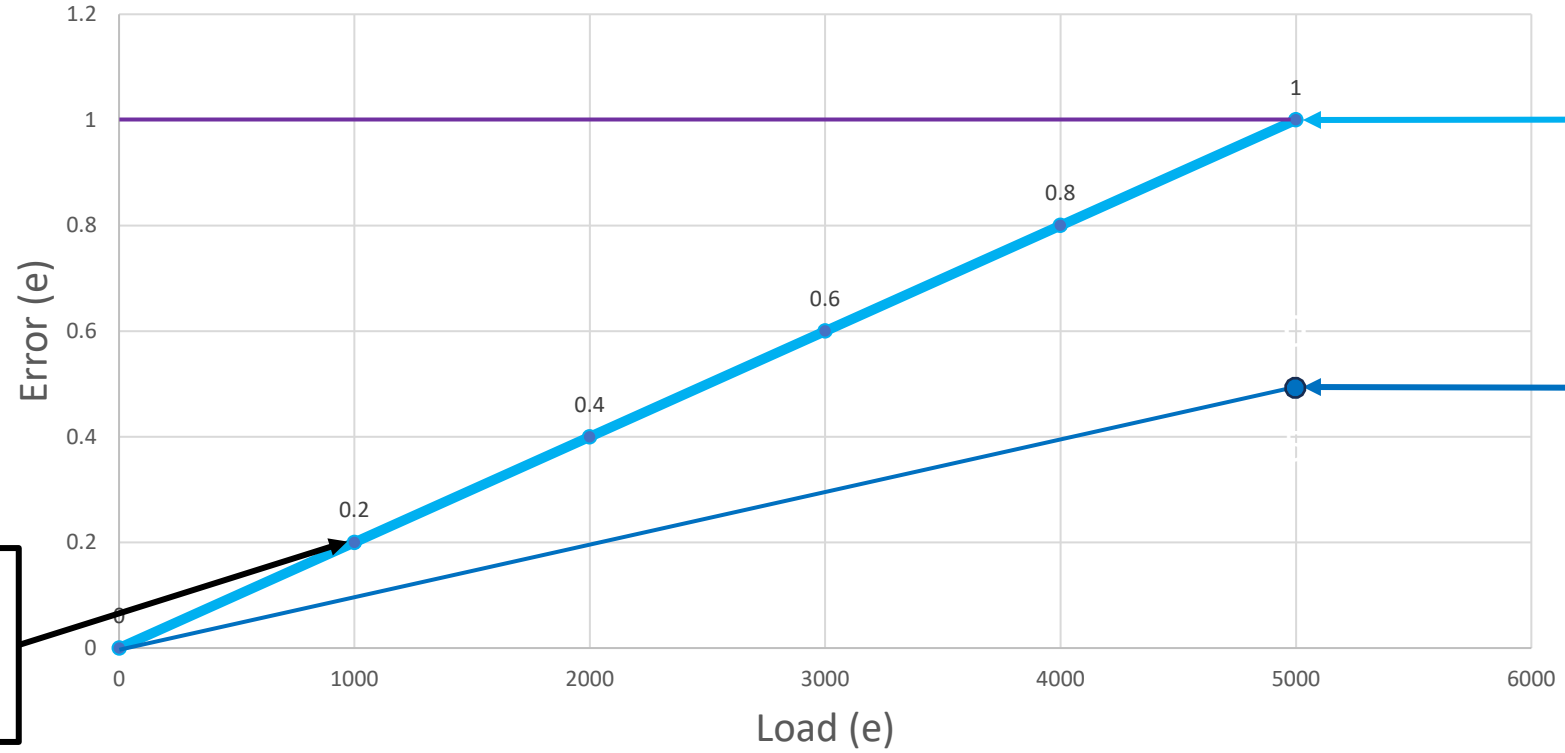
Error^P at 5000 e ≈ 0.5 e
5000 e = 50 g
0.5 e = 0.005 g

Error^P is the Potential Error

SCL-25.1 Table 8. Recommended Minimum Load

Effect of Tolerance

320 g e = 0.01 g d = 0.001 g (n=32000)



10.00[2] g

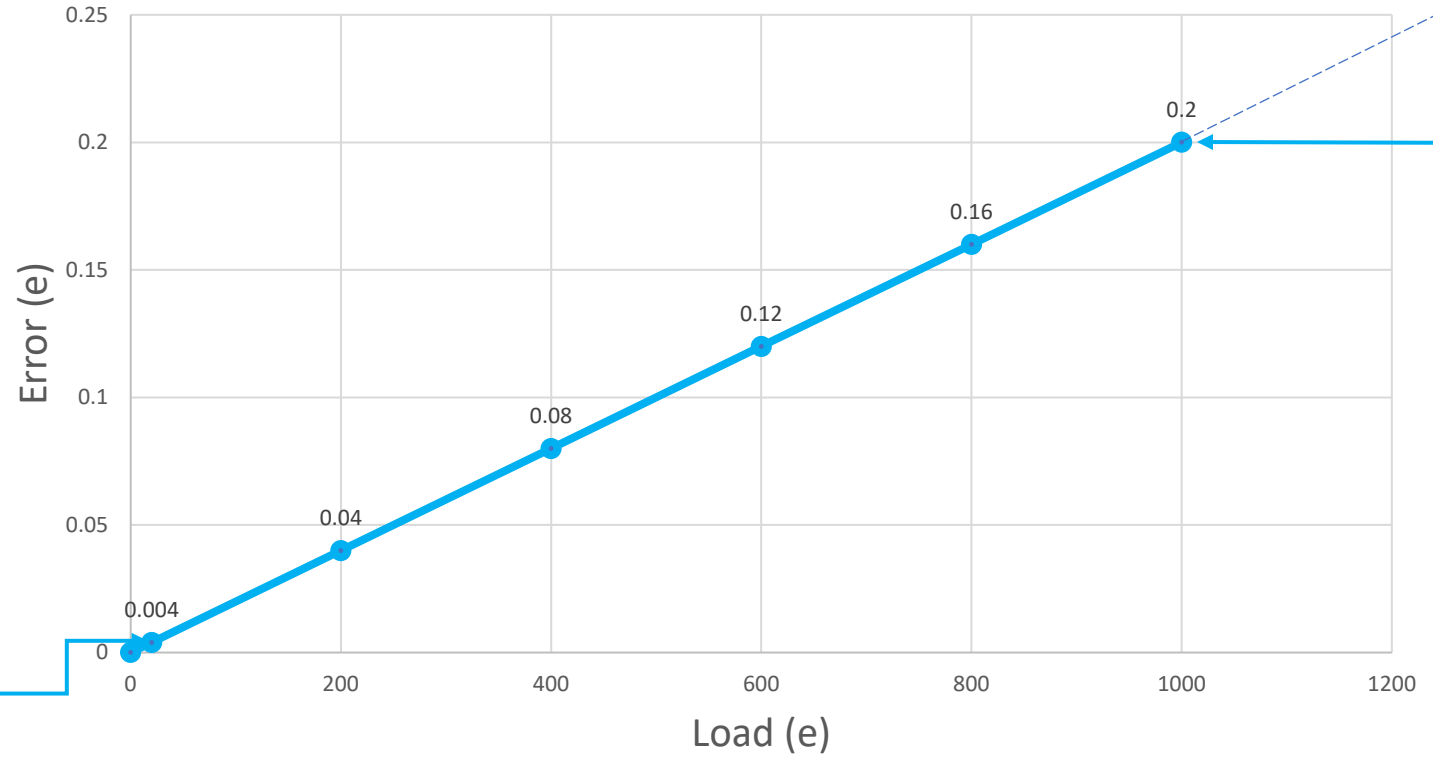
Error^P at 1000 e ≈ 0.2 e
1000 e = 10 g
0.2 e = 0.002 g

Error^P is the Potential Error

SCL-25.1 Table 8. Recommended Minimum Load

Effect of Tolerance

320 g e = 0.01 g d = 0.001 g



5000 e (1 e)

Error^P at 1000 e ≈ 0.2 e
1000 e = 10 g
0.2 e = 0.002 g

0.20[0]04 g

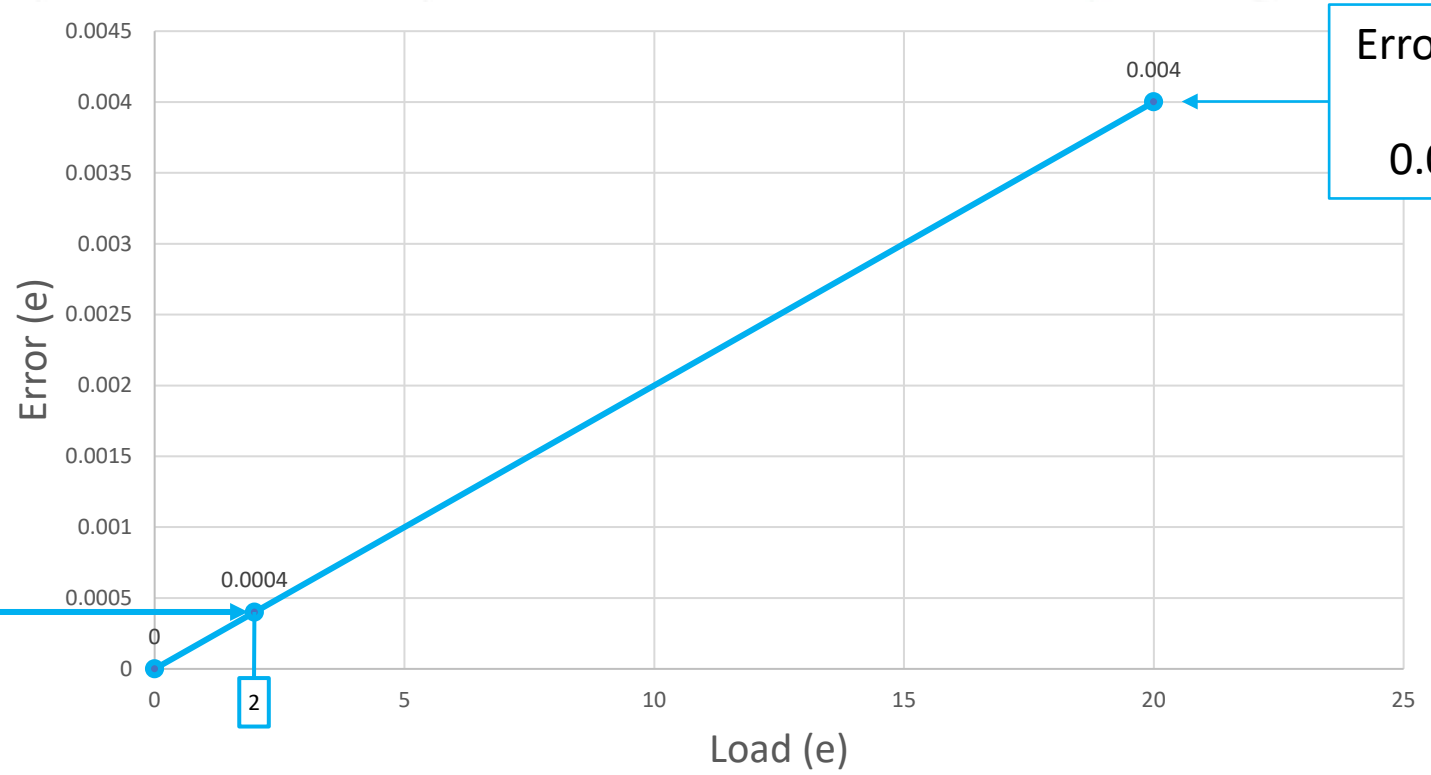
Error^P at 20 e ≈ 0.004 e
20 e = 0.2 g
0.004 e = 0.00004 g

Error^P is the Potential Error

SCL-25.1 Table 8. Recommended Minimum Load

Effect of Tolerance

320 g e = 0.01 g d = 0.001 g



Error^P at 20 e ≈ 0.004 e
20 e = 0.2 g
0.004 e = 0.00004 g

0.02[0]004 g

Error^P at 2 e (20 d) ≈ 0.0004 e
2 e = 0.02 g
0.0004 e = 0.000004 g ≈ 0 e (g)

Error^P is the Potential Error

SCL-25.1 Table 8. Recommended Minimum Load

Uncertainty and the Effect of Tolerance

- Table 8 was adopted to minimize the uncertainty associated with rounding of the scale division (d)
- If the Recommended Minimum Load (RML) is based on e, the standard applied to scales with e > d would be inequitable (0.25 % uncertainty vs 2.50 % uncertainty)
- The linearity of errors results in insignificant errors at the lower weighing range (≈ 0)
- Referencing d in Table 8 is technically correct.