# NIOSH Lifting Equation (revised)

# NIOSH Lifting Equation - Calculating Recommended Weight Limit (RWL)

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## What is the Revised NIOSH lifting equation?

The equation is:

LC x HM x VM x DM x AM x FM x CM = RWL

where LC is the load constant (23 kg) and other factors in the equation are:

- HM, the Horizontal Multiplier factor
- VM, the Vertical Multiplier factor
- DM, the Distance Multiplier factor
- FM, the Frequency Multiplier factor
- AM, the Asymmetric Multiplier factor
- CM, the Coupling Multiplier factor
- RWL, the Recommended Weight Limit

For each value, look up the corresponding factor and use this number in the equation.

**NOTE:** Please see this alternate page for a functioning calculator.

See Assessing Relevant Handling Factors for an explanation of terms.

**Horizontal Multiplier (HM):** Horizontal distance (H, in cm) from the midpoint between the ankles to the hands while holding the object.

| H = Horizontal Distance (cm) | HM Factor |
|---|---|
| 25 or less | 1.00 |
| 30 | 0.83 |
| 40 | 0.63 |
| 50 | 0.50 |
| 60 | 0.42 |

**Vertical Multiplier (VM):** The vertical distance (V, in cm) of the hands from the ground at the start of the lift.

| V = Starting Height (cm) | VM Factor |
|---|---|
| 0 | 0.78 |
| 30 | 0.87 |
| 50 | 0.93 |
| 70 | 0.99 |
| 100 | 0.93 |
| 150 | 0.78 |
| 175 | 0.70 |
| >175 | 0.00 |

**Distance Multiplier (DM):** The vertical distance (D, in cm) that the load travels.

| D = Lifting Distance (cm) | DM Factor |
|---|---|
| 25 or less | 1.00 |
| 40 | 0.93 |
| 55 | 0.90 |
| 100 | 0.87 |
| 145 | 0.85 |
| 175 | 0.85 |
| >175 | 0.00 |

**Asymmetric Multiplier (AM):** The twisting angle (A) of the body while lifting, measured in degrees.

| A = Angle (degrees) | AM Factor |
|---|---|
| 90° | 0.71 |
| 60° | 0.81 |
| 45° | 0.86 |
| 30° | 0.90 |
| 0° | 1.00 |

**Frequency Multiplier (FM):** The frequency (F) of lifts and the duration of lifting (in minutes or seconds) over a workshift.

| F = Time Between Lifts | FM Factor | | | |
|---|---|---|---|---|
| | Lifting While Standing: | | OR Lifting While Stooping: | |
| | One Hour or Less | Over One Hour | One Hour or Less | Over One Hour |
| 5 min | 1.00 | 0.85 | 1.00 | 0.85 |
| 1 min | 0.94 | 0.75 | 0.94 | 0.75 |
| 30 sec | 0.91 | 0.65 | 0.91 | 0.65 |
| 15 sec | 0.84 | 0.45 | 0.84 | 0.45 |
| 10 sec | 0.75 | 0.27 | 0.75 | 0.27 |
| 6 sec | 0.45 | 0.13 | 0.45 | - |
| 5 sec | 0.37 | - | 0.37 | - |

**Coupling Multiplier (CM):** The quality of grasp (or coupling, C) classified as good, fair or poor and depends on the body position (either standing or stooping).

| C = Grasp | CM Factor: | |
|---|---|---|
| | Standing | Stooping |
| Good (handles) | 1.00 | 1.00 |
| Fair | 1.00 | 0.95 |
| Poor | 0.90 | 0.90 |

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