Eve Math

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This page teaches basic understanding of some important calculations in EVE and how they affect you.

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Ship Fitting

In EVE, there are two types of modifiers.

1. **Flat** modifiers are added directly to whatever stat they affect. For example, 1600mm Steel Plates I increases armor by 3500.
2. **Percent** modifiers multiply the stat they affect. For example, Hull Upgrades IV gives a 20% bonus to armor (or, more precisely, multiplies armor by 1.2).

Basic Bonuses

Two 25% bonus give a 56% bonus. Two 50% bonuses give a 125% bonus. More bonuses are generally better than one big bonus. Best is lots of big bonuses.

When percent modifiers combine, they multiply by each other. For example, Hull Upgrades IV gives +20% armor and a Layered Plating II module gives +8% armor. This doesn't give +28% armor, but instead:

20% + 8% + (20% of 8%) = 29.6%

As noted above, percentages are really just multipliers. For example, +20% is a 1.2 multiplier, and +8% is a 1.08 multiplier. This changes the above formula into:

$1.2 \times 1.08 = 1.296$

As an example, lets take a look at the Harbinger with a 1600mm Steel Plates I, Hull Upgrades IV and a Layered Plating II. The base armor for the Harbinger is 5250. The plate gives 3500 more armor and, as we saw above, Hull Upgrades IV gives a 1.2 multiplier and layered plating a 1.08 multiplier.

$\textit{Total Armor} = (5250 + 3500) \times 1.2 \times 1.08 = 8750 \times 1.296 = 11340$

So the Harbinger will end up with 11,340 HP of armor.

Basic Reductions

Some reductions are actually bonuses. Two 25% reductions make a 44% reduction. Two 50% reductions make a 75% reduction. One big reduction is better than lots of small ones.

Again, like bonuses, reductions are best thought of as multipliers. For example, a 25% reduction is a 0.75 multiplier.

Resistances

Resistances are best thought of as reductions to incoming damage. Each mod affects one or all of the four resistances for each layer of defence. It's easy to see that the −25% EM Damage Resistance Bonus of the Multispectrum Shield Hardener I on a ship with 0% EM resistance would reduce incoming damage by 25%. If the ship has 20% thermal resistance already, then you need to multiply the penalties to incoming damage together:

> 20% base resistance (1 − 0.2) = 0.8
> 25% Multispectrum Shield Hardener (1 − 0.25) = 0.75
>
> 0.8 × 0.75 = 0.6
> (1 − 0.6) = 0.4 or 40% resistance.

Besides the base resistances of the ship and the Damage Control module, all resistance rigs/modules suffer a stacking penalty. The stacking penalty is ordered highest to lowest per resistance, not per rig/module, which means the highest resistance module for that resistance is calculated first, even though that may not be the highest resist module for another resist.

For example, a ship with base shield resistances, an Multispectrum Shield Hardener I, an Anti-EM Shield Hardener I, a Anti-Thermal Shield Hardener I, and a Damage Control I would have the following.

> **EM:** *(base)* 1.0 × *(DCU)* 0.925 × *(Anti-EM Shield Hardener)* 0.5 × *(Multispectrum Shield Hardener (diminished))* (1 − 0.25 × 0.8691) = **0.361**, or **64%**
> **Thermal:** *(base)* 0.8 × *(DCU)* 0.925 × *(Anti-Thermal Shield Hardener I)* 0.5 × *(Multispectrum Shield Hardener (diminished))* (1 − 0.25 × 0.8691) = **0.289**, or **71%**
> **Kinetic:** 0.6 × 0.925 × 0.75 = **0.416**, or **58%**
> **Explosive:** 65%

Three Multispectrum Shield Hardeners, due to diminishing returns would provide much lower EM and Thermal (38% and 50%) with only a 63% kinetic resistance.