Tower of Fantasy Data Repeater Guide

Kata

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Equipment(Gear) Stats

Since each star of advancement has a range of values it can give to the gear, we need to understand the range of each stat when increased by a star.

For the sake of simplicity our focus will be on damage-increasing stats. This includes

⚔ Attack	⚡ Volt Attack	✦ Crit	⚡ Volt Attack +8.46%	⚡ Volt Damage +1.37%	✦ Crit Rate +1.05%
attack	elemental attack	crit	elemental attack %	elemental damage %	crit rate

These are all the damage-increasing stats provided by our equipment(as of June 2024). We will also be assuming a level 100 account and a level 100 enemy.

Gear Upgrade Stat Range

Stat	Initial Value	Minimum Upgrade	Maximum Upgrade
Attack	52	93	234
Elemental Attack	69	125	312
Crit	258	468	1169
Elemental Attack%	1.26%	1.44%	1.44%
Elemental Damage%	0.65%	0.72%	0.72%
Crit Rate	1.05%	1.19%	1.19%

Notes: Crit

- The value of crit stat is converted into percentage linearly, meaning a 100 crit increase from 0 to 100 increases crit rate the same amount as a 100 crit increase from 100 to 200.

- The crit stat needed to get 100% crit excluding other sources is **28213**.

- Calculating the value of 1.05% crit rate gives us **296** crit and each roll into crit rate gives us 1.19% crit which is equal to **336** crit.

Crit Rate
1.050% +???
MAX: +1.452%

Notes: Crit Conversion

> Increase Crit Rate by 65.889% when attacking a same-level opponent; also boost Crit Rate when using skills for healing.

> Special ✳ Crit 18589

To convert crit from value to percentage, it is as simple as dividing the crit value by **28213***

18589 ÷ 28213 =
0.6588806578527629

*To be exact, the formula for 100% crit rate for any given level is
crit/(-3.71*Level^2+1151*Level-49787)*

Credits: Lilia

Notes: Estimating the Value of Crit

Here is a formula to estimate the value of **1** base attack in terms of crit, this will allow us to determine which boots/gloves are better.

$$\left(\frac{baseattack*critrate + critrate + \frac{1}{critdamage}}{baseattack} - critrate\right)*28213$$

Note that crit damage more specifically refers to crit damage bonus, which has a default value of **0.5**.

Notes: Estimating the Value of Crit pt.2

Using the stats below as an example, by using the formula we can estimate that **1** point of attack is worth around **2.3** crit in this case.

Notes: Calculating Total Atk% Bonus

Calculating total attack% bonus is a tricky and laborious process. Make sure to take into account all potential sources including:

- Elemental Resonance

- All Weapons and Matrices

- Supercomputing Evolution

- Vera Gear

- Food

*Vera gear includes combat engine, microreactor, eyepiece, and exoskeleton.

Volt Resonance: Increase volt ATK by **15%** and volt resistance

Data progress: 1/148

All Elemental Damage Boost	+2.5%
all attack	+5%
Shatter	+5%

Notes: Atk vs Atk%

2 formulas to compare base attack and attack% on our gear.

base attack $= A$, attack increase $= a$
initial attack% bonus $= B$, attack % increase $= b$
Then we can write a or b in terms of the others, as

$$b = \frac{a(1 + B)}{A}$$

or

$$a = \frac{Ab}{1 + B}$$

Augmentation(Titan)

Random Stats
♥ HP
4125 +1887
MAX: +19937

Random Stats
⚔ Attack
52 +23
MAX: +249

Base Stats
⚔ Attack
1032
♥ HP
55092

Augmentation Stats
⚔ Physical Attack
+1293
❄ Frost Attack
+1285

Rare stat locked

Owned:5

Random Stats
🔥 Flame Attack
1371 +44
MAX: +463

Random Stats
⚡ Volt Attack
69 +1273
MAX: +1674

The base attack for this piece is 1371+52=1423

Notes: Augmentation

Random stat bonuses from augmentation are set to be a significant value plus a small percentage of the current value we have on the stat.

This means just having an extra offensive stat on the piece, without even having rolled into it would still increase the overall value of the piece by a lot.

The next page will show the math on how the additional stats are calculated, however it is not necessary to know. The conclusions will be on the page after that.

Notes: Random Stat Bonuses

Stat	Base Increase	Additional Increase
Attack	244	10% of initial value
Elemental Attack	326	10% of initial value
Crit	1221	10% of initial value
Elemental Atk %	0.909%	0.072% per roll
Elemental Dmg %	0.458%	0.036% per roll
Crit Rate	1.452%	0.0596% per roll

Credits: Lilia

Random Stat Bonus: Example

3 rolls into volt attack%, following the formula we have **0.909%+0.072%*3 =1.125%**, which is what we have.

Following the elemental attack formula, we have **326+0.1*326 =358.6**, rounded down to 358.

Following the attack formula, we have **244+0.1*280 =272**.

Notes: Random Stat Bonus tldr

- Crit rate ✴ is a good stat to have on an eyepiece, but we don't want to have it upgraded.

- High values on elemental attack ⚡ and attack 🗡 are still good on vera pieces for newer players, veterans should still go for high percentage pieces.

- Vera pieces should ideally have 3 or more stats that benefit our team's element. Aesperia pieces* excluding boots and gloves should almost always have both elemental attack and attack.

*These pieces include helmet, spaulders, bracers, armor, belt, and legguards.

Notes: Augmentation Stats

Augmentation stat bonuses are dependent on the stat which the piece rolled most on. The only possible offensive stats we can get for augmentation stats are elemental attack, elemental attack%, and elemental damage%.

If a piece already has 2 stats of the same type, for example, 2 different elemental attacks, the lower elemental attack will be brought up to match the higher elemental attack.

% stat cheat sheet			
rolls	atk%	dmg%	crit%
0	1.26%	0.65%	1.05%
1	2.7%	1.37%	2.24%
2	4.14%	2.09%	3.43%
3	5.58%	2.81%	4.62%
4	7.02%	3.53%	5.81%
5	8.46%	4.25%	7%

Notes: Augmentation Stats Example

Here we can clearly see that the piece rolled most on flame attack.

Since the majority of the rolls went into elemental attack, the resulting augmentation stats would be 2 random elemental attacks*. But since we already have 2 elemental attacks as random stats, here we see all 4 elemental attacks as a result.

Volt attack is brought up to match* flame attack. Note that this would happen even when flame attack was not the majority roll.

*5% lower ceiling + higher variance

Notes: Augmentation Stats Tiebreaker Case 1

Percentage stats, including elemental attack%, elemental damage%, and crit rate always counted as max rolls, so if a piece rolled **twice** on attack and **twice** on volt attack%, the augmentation stat on that piece would always be attack %'s of different elements.

2 rolls into volt attack%

Random Stats
Volt Attack
4.140% +???
MAX: +1.053%

Random Stats
Volt Attack
579 +???
MAX: +383

2 rolls into volt attack

Possible Augmentation Stats
Flame Attack
+3.519%~3.941%
Physical Attack
+3.519%~3.941%
Frost Attack
+3.519%~3.941%
Rare stat locked

We get attack% as the augmentation stats, as expected.

Random Stats
Frost Resistance
215 +???
MAX: +1038

Random Stats
HP
16925 +???
MAX: +21217

Notes: Augmentation Stats Tiebreaker Case 2

Percentage stats, including elemental attack%, elemental damage%, and crit rate always counted as max rolls, so if a piece low-rolled **thrice** on attack and rolled **twice** on frost attack%, the augmentation stat on that piece might still be attack %'s of different elements.

Notes: Augmentation Stats Tiebreaker case 3

If a piece rolled **twice** into elemental attack%, and **twice** into elemental damage%, the stat positioned higher gets priority.

Fortress Combat Engine

★★★★★

CS: 4181

♥ HP +6,420

Random Stats ⊙

🗡 Attack +282

♥ HP +4,125

⚡ Volt Attack +4.14%
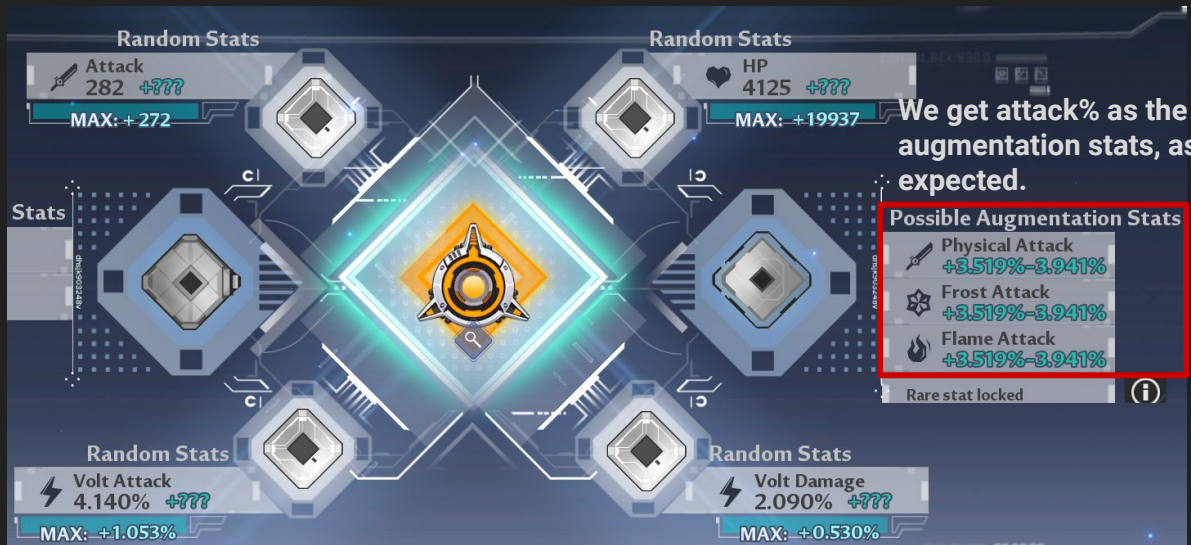
⚡ Volt Damage +2.09%

2 rolls on either stat. But volt Attack% is positioned higher, therefore gets priority.

Random Stats
🗡 Attack
282 +???
MAX: + 272

Random Stats
♥ HP
4125 +???
MAX: +19937

Stats

We get attack% as the augmentation stats, as expected.

Possible Augmentation Stats
🗡 Physical Attack
+3.519%-3.941%
✴ Frost Attack
+3.519%-3.941%
🔥 Flame Attack
+3.519%-3.941%

Rare stat locked ⓘ

Random Stats
⚡ Volt Attack
4.140% +???
MAX: +1.053%

Random Stats
⚡ Volt Damage
2.090% +???
MAX: +0.530%

Blocker Guide: Aesperia Gear

- Data repeaters will often be referred as blockers.

- Know the base attack of the current piece.

- Never use more than 1 blocker at a time.

- Know when the gear is on pace to be an improvement.

- Be very careful about using blockers on crit pieces, i.e. boots and gloves. Personally I would only consider using blockers early on pieces that have 3 stats(crit, volt atk, atk), since I am a volt main. I would start using blockers on the third roll after rolling into crit twice.

- When a piece is already an improvement and there's upgrades left, always use blockers.

Blocker Cost & Gear Probability Table

The table assumes if one was to roll a piece of Aesperia gear with elemental attack and attack(not boots or gloves), how many pieces of gear would they have to go through? And how many blockers would they have spent on average for a piece with a certain base attack?

The table assumes that blockers would only be used when a piece is on pace for the attack target that it's trying to reach.

Being on pace means getting the average upgrade on attack up to that point for the rest of the upgrades would reach the attack goal for the piece.

For example, if the goal was 1121 attack on a piece, then being on pace is getting on average 200 attack per roll. (as elemental attack and attack give 121 attack without rolls)

Of course, this is not the only way to use blockers. To allow blockers to be used when slightly behind on pace would increase the number of blockers used, but also decrease the expected number of pieces needed. The same principle applies the other way around.

Blocker Cost & Gear Probability Table: Assumptions

1. Uniformity of stat increase. Any stat in the range is equally likely to be added into the piece.

2. Independence of stat type. All the stat types have equal chances to be upgraded.

3. Independence of location. The probability to roll into the first line vs second line vs third line vs fourth line is the same.

4. Blocker consistency. Data repeaters does what we think it does; prevent one stat from being upgraded, and distributes the chance to upgrade the other stats equally.

5. Gambler's fallacy-proof. Earlier advancements don't affect later advancements. Rolls on previous pieces don't affect upcoming pieces.

Attack	Blockers we're willing to spend on a piece with attack and elemental attack									
	1	2	3	4	5	1	2	3	4	5
	Average # of blockers used					Average # of pieces needed				
900	1.11	2.36	3.78	5.96	10.90	8.48	7.56	6.79	5.85	4.68
950	1.16	2.55	4.29	7.03	13.59	12.18	10.72	9.38	8.03	6.32
1000	1.22	2.79	4.99	8.46	17.70	18.20	15.78	13.53	11.48	8.97
1050	1.31	3.17	5.96	10.52	24.08	28.74	24.34	20.31	17.13	13.30
1100	1.44	3.65	7.33	13.45	34.31	47.02	39.14	32.66	26.92	20.61
1150	1.59	4.27	9.14	18.02	52.36	81.34	66.80	54.81	45.42	34.25
1200	1.79	5.16	11.81	25.06	87.04	149.29	121.34	99.40	81.69	61.78
1250	2.05	6.45	16.06	37.20	161.68	298.65	243.19	198.50	163.00	123.98
1300	2.40	8.30	23.33	60.89	333.95	668.75	541.30	442.67	366.96	273.51
1350	2.86	11.24	36.89	118.38	817.78	1691.39	1380.00	1128.44	922.18	698.33
1400	3.54	16.21	63.85	270.58	2341.48	5061.02	4104.81	3378.29	2749.80	2070.09
1450	4.53	25.64	125.87	737.30	8210.36	18219.78	14932.94	12323.71	9902.24	7469.69

Blocker Cost & Gear Probability Table:
How to use the table

Atk	1	2	3	4	5	1	2	3	4
	Average # of blockers used					Average # of pieces needed			
900	1.11	2.36	3.78	5.96	10.90	8.48	7.56	6.79	5.85
950	1.16	2.55	4.29	7.03	13.59	12.18	10.72	9.38	8.03
1000	1.22	2.79	4.99	8.46	17.70	18.20	15.78	13.53	11.48

Assuming we are aiming for a piece with 1000 base attack, and for any given piece we are willing to use at most 2 blockers. It would take on average 15.78 pieces with elemental attack and attack and 2.79 blockers, assuming proper blocker usage.

Blocker Cost & Gear Probability Table: Results

Not counting the free blocker from Tianhe Bazaar, we get 5 blockers a week, 1 from weekly, 2 from spacetime store, and 2 from mentorship store. This results in 20 blockers per month and a maximum of 120 elemental atk+atk pieces per month.

Doing the math gives us the following table.

Target Atk	Maximum Blocker Per Piece
Under 1k	1
1000-1150	2
1150-1300	3
1300+	4

Blocker Cost & Gear Probability Table: Conclusion

The average number of pieces required increases exponentially as the target attack value goes up. As a result, it is not wise to have a target attack that is too far above the <u>base attack</u> of our current piece.

Here is a recommendation on the attack we should aim for and how many blockers we should use depending on the <u>base attack</u> of our piece.

Current Base Attack	Recommended Target Attack	Maximum Blocker Per Piece
Under 1k	1000-1150	2
1000-1150	1150-1300	3
1150-1300	1300+	4

When to Start Doing Balanced JO

The percentage of pieces that have both elemental attack and attack is around 39%.

Doing regular JO* gives at most 300 pieces of gear per month, and of those pieces, around 120 pieces will have elemental attack and attack. 30 of those pieces will be of the main element. This means that every month, it is expected to get a piece of gear with 1150-1200 base attack of a non main element, or a 1100-1150 base attack of the main element, given proper blocker usage.

On the other hand, doing balanced JOs everyday gives on average 80 attack per month.

So, if an Aesperia gear currently being used has less than 1070-1120 base attack of a non-main element, or less than 1020-1070 base attack of the main element, then doing normal JO is better. Otherwise, balanced JOs are better.

*piece specific JOs

Blocker Guide: Vera Gear

- [Know the value of the current piece](#).

- Never use more than 1 blocker at a time, unless the piece has 3 stats or more that benefit the team.

- When a piece is already an improvement and there's upgrades left, always use blockers.

Vera pieces include: Eyepiece, Microreactor, Combat Engine, and Exoskeleton.

Calculating the Value of a Vera Piece

To calculate the true value of a vera piece, it is important to look at what the piece would look like when <u>fully augmented</u>. The goal generally is to have 3 stats that benefit the team, while also having all 5 rolls into stats that increase the team's damage.

This exoskeleton would be a perfect piece for frost, but it would also be a decent piece for other elements as a result of <u>augmentation.</u>

Fortress Exoskeleton

★★★★★

CS: 4614

Base Stats
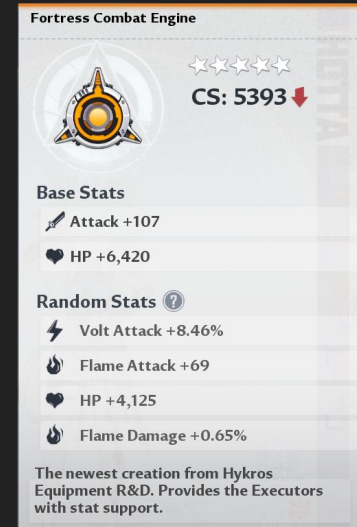
⚔ Attack +107

❤ HP +6,420

Random Stats ❓

❤ HP +4,125

⚔ Attack +233

❄ Frost Attack +7.02%

❄ Frost Damage +0.65%

A new exoskeleton developed by District 7 R&D that provides excellent stat support.

This engine is decent for volt, but would be a perfect piece for flame when augmented.

Fortress Combat Engine

★★★★★

CS: 5393 🔻

Base Stats

⚔ Attack +107

❤ HP +6,420

Random Stats ❓

⚡ Volt Attack +8.46%

🔥 Flame Attack +69

❤ HP +4,125

🔥 Flame Damage +0.65%

The newest creation from Hykros Equipment R&D. Provides the Executors with stat support.

Blocker Guide: Vera Gear Example 1

This is the first piece that we will look at, and things that we should consider while rolling on them, to preserve blocker and to optimize the piece.

Fortress Combat Engine

CS: 1722

Base Stats

- Attack +107
- HP +6,420

Random Stats ❓

- Physical Attack +1.26%
- HP +4,125
- Attack +52
- Flame Damage +0.65%

The newest creation from Hykros Equipment R&D. Provides the Executors with stat support.

Since the owner of the piece was a physical main, this piece has the potential to have 3 stats that benefit the element, so blockers will be used right away.

Since we want the piece to be a physical piece, we are hoping to get a majority roll on flame damage%, so the augmentation stat would give us physical damage%, resulting in 3 stats that benefit physical.

Special thanks to Orange for all the pieces

Blocker Guide: Vera Gear Example 1

★

The first roll was a low roll into attack, but it still has the potential to be a good piece for flame or physical.

	Physical Attack	1.26%
	HP	4125
	Attack	180
	Flame Damage	0.65%

Blocking hp on the next roll.

Blocker Guide: Vera Gear Example 1

★ ★

Another low roll into attack. At this point even 1 more roll into attack would render the piece's augmentation stats useless.

Physical Attack	1.26%
HP	4125
Attack	313
Flame Damage	0.65%

Using a blocker from this spot wouldn't be good anymore.

No more blockers on the next rolls.

Blocker Guide: Vera Gear Example 2

The owner of this piece was a physical main. So it has the potential to give 3 stats that benefit the main element.

Fortress Combat Engine

CS: 1671

Base Stats

- Attack +107
- HP +6,420

Random Stats ?

- Physical Damage +0.65%
- Volt Attack +1.26%
- HP +4,125
- Attack +52

The newest creation from Hykros Equipment R&D. Provides the Executors with stat support.

We are hoping to see a majority roll into volt attack%, so the augmentation stats would give us physical attack%.

We will be blocking hp on the first roll.

Blocker Guide: Vera Gear Example 2

★

First roll was a high roll into attack. The best outcome would've been an upgrade onto volt attack%, but at this point the piece still has potential.

Physical Damage	0.65%	
Volt Attack	1.26%	
HP	4125	
Attack	282	

Blocking hp on the next roll.

Blocker Guide: Vera Gear Example 2

★ ★

Second roll was a roll into volt attack%. This is the best case scenario for a physical main.

	Physical Damage	0.65%
	Volt Attack	2.70%
	HP	4125
	Attack	282

Blocking hp on the next roll.

Blocker Guide: Vera Gear Example 2

★ ★ ★

Third roll was into physical damage%. Another roll into phys damage% would guarantee that the piece wouldn't be a perfect physical piece.

	Physical Damage	1.37%
	Volt Attack	2.70%
♥	HP	4125
	Attack	282

Blocking hp on the next roll.

But the owner of this piece didn't mind a volt piece either, so blockers would still be used on hp.

Blocker Guide: Vera Gear Example 2

Fourth roll was a low roll into attack. At this point the only good stat to block is hp. But the owner had better pieces at this point, so no blocker was used for the next roll.

★ ★ ★ ★

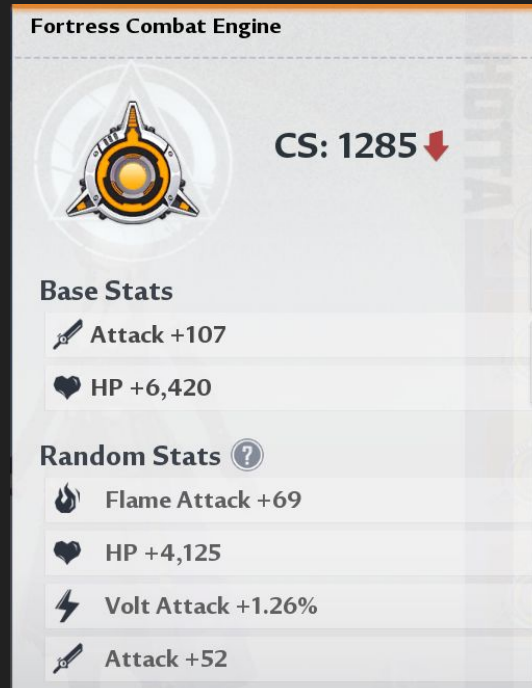|		
Physical Damage	1.37%
Volt Attack	2.70%
HP	4125
Attack	444

No blocker on the next roll.

If the fourth roll had gone into volt attack% instead, it would have been a good idea to block physical damage%, as getting the physical attack% as augmentation stats would have been guaranteed unless the fifth roll went into physical damage%.

Blocker Guide: Vera Gear Example 3

This piece has the potential to either be a volt or flame piece. But since the only % stat is volt, the piece is better as a flame piece. With majority rolls into volt attack%.

Fortress Combat Engine

CS: 1285

Base Stats

- Attack +107
- HP +6,420

Random Stats ❓

- Flame Attack +69
- HP +4,125
- Volt Attack +1.26%
- Attack +52

Blocking hp on the next roll.

Blocker Guide: Vera Gear Example 3

★

Best case scenario. A roll into Volt attack%.

🔥 Flame Attack	69	
❤️ HP	4125	
⚡ Volt Attack	2.70%	Inef
🗡️ Attack	52	

Blocking hp on the next roll.

Blocker Guide: Vera Gear Example 3

★ ★

Low roll into flame attack. Not the best but at this point the piece still has potential. Blockers will still be used.

🔥 Flame Attack	251	
❤️ HP	4125	
⚡ Volt Attack	2.70%	
🗡️ Attack	52	

Blocking hp on the next roll.

Blocker Guide: Vera Gear Example 3

★ ★ ★

Blocking hp on the next roll.

Another low roll into flame attack. Another roll into flame attack and the piece is guaranteed to be a volt piece. As the owner didn't mind a volt piece, blocker would still be used.

At this point it is a good idea to check what the current volt piece is. If it's better than 840* volt attack base with 4.14% volt attack%, along with triple stats to augment, then the next blocker could be used on flame attack instead.

*518+312(maxroll)=830. This is the maximum roll we can get for flame attack in 1 roll. Then we multiply by 0.95. 830*0.95=788.5+52(attack)=840.5

Blocker Guide: Vera Gear Example 3

★★★★

A very low roll into flame attack. The piece is now a mediocre volt piece, regardless of what it rolls on next.

🔥 Flame Attack	655	
❤️ HP	4125	
⚡ Volt Attack	2.70%	
🗡️ Attack	52	

If the owner doesn't already have a decent volt piece, then a blocker would be used on hp. If they do, then no blocker would be used on the next roll.

Blocker Guide: Vera Gear Example 4

A piece with 2 different elemental percentages, could either be a physical piece or a frost piece through augmentation.

Fortress Combat Engine

CS: 1722

Base Stats

🗡 Attack +107

❤ HP +6,420

Random Stats ❓

🗡 Attack +52

🔥 Flame Resistance +215

🗡 Physical Attack +1.26%

❄ Frost Damage +0.65%

Blocking flame resistance on the next roll.

Blocker Guide: Vera Gear Example 4

★

Upgrade into frost damage%. The owner was a physical main so this is the best case scenario.

Attack	52	
Flame Resistance	215	
Physical Attack	1.26%	
Frost Damage	1.37%	

Blocking flame resistance on the next roll.

Blocker Guide: Vera Gear Example 4

★ ★

Upgrade into physical attack%. Still on pace to be a very good piece, for both physical and frost.

Attack	52
Flame Resistance	215
Physical Attack	2.70%
Frost Damage	1.37%

Blocking flame resistance on the next roll.

Blocker Guide: Vera Gear Example 4

★★★

Upgrade into frost damage%. At this point the only way the piece wouldn't be a physical piece is if rolls into physical attack% the next 2 rolls.

Attack	52
Flame Resistance	215
Physical Attack	2.70%
Frost Damage	2.09%

Blocking flame resistance on the next roll.

Blocker Guide: Vera Gear Example 4

★★★★

Upgrade into frost damage%. The piece is now guaranteed to be a physical piece.

Attack	52
Flame Resistance	215
Physical Attack	2.70%
Frost Damage	2.81%

Blocking flame resistance on the next roll.

Blocker Guide: Vera Gear Example 4

★★★★★

Upgrade into **physical attack%**. The piece will be a very strong **physical** piece after <u>augmentation</u>.

🗡 Attack	52	
🔥 Flame Resistance	215	
🗡 Physical Attack	4.14%	
❄ Frost Damage	2.81%	

Blocker Guide: Vera Gear Conclusion

Obtaining the perfect vera gear will be a long process, as obtaining the piece that has the potential to bring 3 or more stats to the desired element in the first place would take a very long time. So, we have to make sure that blockers are saved and used appropriately.

Regarding pieces that only has potential to give 2 stats to the desired element, my recommendation is to use at most 3 blockers, assuming the current piece is not good. 1 or 2 blockers at most if the current piece is decent.

-End-