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**Blockchain Security | Smart Contract Audits | KYC**

MADE IN GERMANY

# Audit

**Security Assessment**  
**29. January, 2022**

**For**



**Beli Finance**

Disclaimer	3
Description	5
Project Engagement	5
Logo	5
Contract Link	5
Methodology	7
Used Code from other Frameworks/Smart Contracts (direct imports)	8
Tested Contract Files	9
Source Lines	10
Risk Level	10
Capabilities	11
Inheritance Graph	12
CallGraph	13
Scope of Work/Verify Claims	14
Modifiers and public functions	20
Source Units in Scope	23
Critical issues	24
High issues	24
Medium issues	24
Low issues	24
Informational issues	24
Audit Comments	25
SWC Attacks	26

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Version	Date	Description
1.0	29. January 2022	<ul style="list-style-type: none"><li>• Layout project</li><li>• Automated- /Manual-Security Testing</li><li>• Summary</li></ul>

## **Network**

Binance Smart Chain (BEP20)

## **Website**

<https://beli.finance/>



## Description

Beli Finance is a decentralized reserve policy-controlled currency protocol, Multi-Chain Yield Optimizer Aggregator platform that convert yield farm into \$BELI token and still earn small compound interest on their crypto holdings automatically. Each \$BELI token is backed by a basket of assets (e.g., USDT, BNB, BUSD Tokens etc etc) in the treasury, giving it an intrinsic value that it cannot fall below. Beli Finance also introduces economic and game-theoretic dynamics into the market through staking and compounding.

## Project Engagement

During the 27th of January 2022, **Beli Finance Team** engaged Solidproof.io to audit smart contracts that they created. The engagement was technical in nature and focused on identifying security flaws in the design and implementation of the contracts. They provided Solidproof.io with access to their code repository and whitepaper.

## Logo



# Beli Finance

## Contract Link

**v1.0**

- Github
  - <https://github.com/belifinance/beli-finance>
  - Commit: fe03b705871f742e0eabe3cad79ba9e75c781ff6

# Vulnerability & Risk Level

Risk represents the probability that a certain source-threat will exploit vulnerability, and the impact of that event on the organization or system. Risk Level is computed based on CVSS version 3.0.

Level	Value	Vulnerability	Risk (Required Action)
<b>Critical</b>	9 - 10	A vulnerability that can disrupt the contract functioning in a number of scenarios, or creates a risk that the contract may be broken.	Immediate action to reduce risk level.
<b>High</b>	7 – 8.9	A vulnerability that affects the desired outcome when using a contract, or provides the opportunity to use a contract in an unintended way.	Implementation of corrective actions as soon as possible.
<b>Medium</b>	4 – 6.9	A vulnerability that could affect the desired outcome of executing the contract in a specific scenario.	Implementation of corrective actions in a certain period.
<b>Low</b>	2 – 3.9	A vulnerability that does not have a significant impact on possible scenarios for the use of the contract and is probably subjective.	Implementation of certain corrective actions or accepting the risk.
<b>Informational</b>	0 – 1.9	A vulnerability that have informational character but is not effecting any of the code.	An observation that does not determine a level of risk

# Auditing Strategy and Techniques Applied

Throughout the review process, care was taken to evaluate the repository for security-related issues, code quality, and adherence to specification and best practices. To do so, reviewed line-by-line by our team of expert pentesters and smart contract developers, documenting any issues as there were discovered.

## **Methodology**

The auditing process follows a routine series of steps:

1. Code review that includes the following:
  - i) Review of the specifications, sources, and instructions provided to SolidProof to make sure we understand the size, scope, and functionality of the smart contract.
  - ii) Manual review of code, which is the process of reading source code line-by-line in an attempt to identify potential vulnerabilities.
  - iii) Comparison to specification, which is the process of checking whether the code does what the specifications, sources, and instructions provided to SolidProof describe.
2. Testing and automated analysis that includes the following:
  - i) Test coverage analysis, which is the process of determining whether the test cases are actually covering the code and how much code is exercised when we run those test cases.
  - ii) Symbolic execution, which is analysing a program to determine what inputs causes each part of a program to execute.
3. Best practices review, which is a review of the smart contracts to improve efficiency, effectiveness, clarify, maintainability, security, and control based on the established industry and academic practices, recommendations, and research.
4. Specific, itemized, actionable recommendations to help you take steps to secure your smart contracts.

## Used Code from other Frameworks/Smart Contracts (direct imports)

Imported packages:

```
./helpers/ERC20.sol  
./libraries/Address.sol  
./libraries/SafeERC20.sol  
./libraries/EnumerableSet.sol  
./helpers/Ownable.sol  
./interfaces/IPancakeswapFarm.sol  
./interfaces/IPancakeRouter01.sol  
./interfaces/IPancakeRouter02.sol  
./interfaces/IWBNB.sol  
./helpers/ReentrancyGuard.sol  
./helpers/Pausable.sol
```



## Tested Contract Files

This audit covered the following files listed below with a SHA-1 Hash.

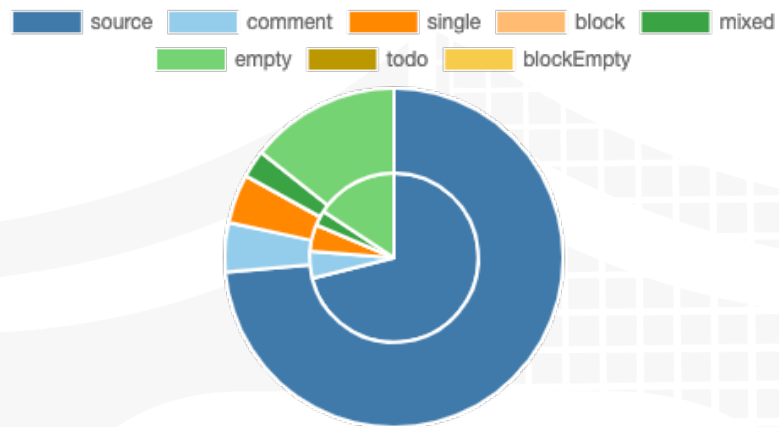
*A file with a different Hash has been modified, intentionally or otherwise, after the security review. A different Hash could be (but not necessarily) an indication of a changed condition or potential vulnerability that was not within the scope of this review.*

### v1.0

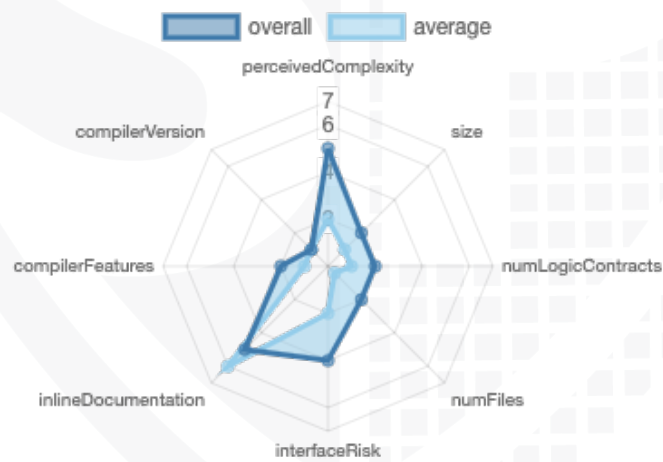
File Name	SHA-1 Hash
contracts/Vault.sol	1b90aca78098f6c7dd98963f42d1a010a056c7d2
contracts/Vault_BELILp.sol	c783f096f1876e434e295e0b688e7adb2150a493
contracts/Vault_Pancakeswap.sol	031a10617bc4e8497eae67b7dbb22e1c0616db1e
contracts/TimelockedVault.sol	891c0e668cf78cbbd83edb0a2fda63e48fd8bb3c
contracts/Vault_BELI.sol	a036c3361c804132e750eaac48f507ead3130bcf

# Metrics

## Source Lines v1.0



## Risk Level v1.0



## Capabilities

### Components

Version	Contracts	Libraries	Interfaces	Abstract
1.0	3	0	0	2

### Exposed Functions

*This section lists functions that are explicitly declared public or payable. Please note that getter methods for public stateVars are not included.*

Version	Public	Payable
1.0	33	0

Version	External	Internal	Private	Pure	View
1.0	3	50	0	0	5

### State Variables

Version	Total	Public
1.0	50	50

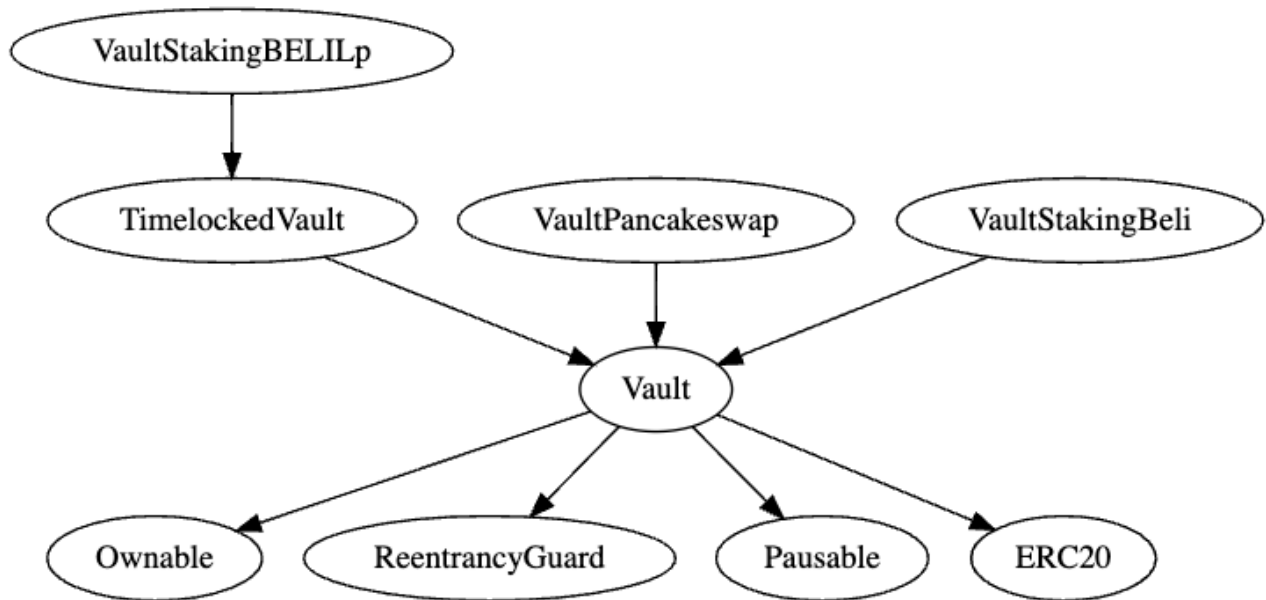
### Capabilities

Version	Solidity Versions observed	Experimental Features	Can Receive Funds	Uses Assembly	Has Destroyable Contracts
1.0	0.6.12	ABIEncoderV2			

Version	Transfers ETH	Low-Level Calls	DelegateCall	Uses Hash Functions	EC Recover	New/Create/Create2
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1.0	yes					
-----	-----	--	--	--	--	--

## Inheritance Graph v1.0



# CallGraph

## v1.0



## Scope of Work/Verify Claims

The above token Team provided us with the files that needs to be tested (Github, Bscscan, Etherscan, files, etc.). The scope of the audit is the main contract (usual the same name as team appended with .sol).

We will verify the following claims:

1. Deployer cannot mint any new tokens
2. Deployer cannot burn or lock user funds
3. Deployer cannot pause the contract
4. Overall checkup (Smart Contract Security)



## Write functions of contract

### v1.0

Vault

deposit  
farm  
withdrawEarly  
withdraw  
transferConvertedEarn  
mintShareToReceipt  
burnReceiptForShare  
earn  
convertDustToEarned  
pause  
unpause  
setSettings  
setGov  
setUniRouterAddress  
setBuyBackAddress  
setRewardsAddress  
inCaseTokensGetStuck  
wrapBNB

renounceOwnership  
transferOwnership

transfer  
approve  
transferFrom  
increaseAllowance  
decreaseAllowance

TimelockVault (inherits from Vault)

deposit  
withdraw  
withdrawEarly  
setPenaltyAddress  
setMinTimeToWithdraw

VaultPancakeswap inherits from Vault

VaultStakingBeli inherits from Vault

VaultStakingBELILp inherits from TimelockedVault

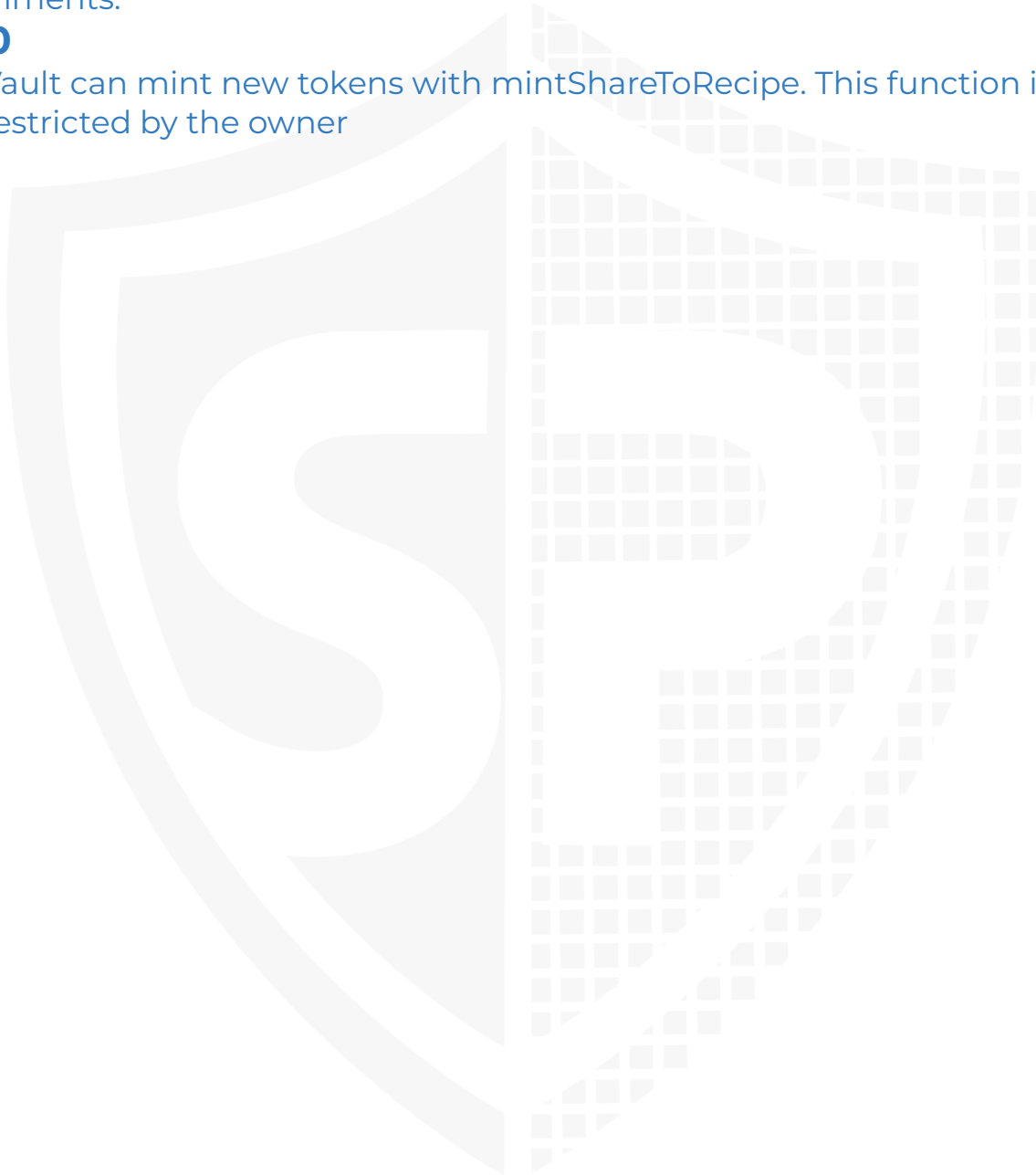
## Deployer cannot mint any new tokens

Name	Exist	Tested	Status
cannot mint	✓	✓	✗

Comments:

### v1.0

- Vault can mint new tokens with mintShareToRecipe. This function is restricted by the owner





## Deployer cannot burn or lock user funds

Name	Exist	Tested	Status
Deployer cannot lock	✓	✓	✓
cannot burn	✓	✓	✗

Comments:

### v1.0

- Vault can burn tokens with burnReceiptForShare function. This function is restricted by the owner

## Deployer cannot pause the contract

Name	Exist	Tested	Status
Deployer cannot pause	✓	✓	✗

Comments:

### v1.0

- Deployer can pause following functions
  - Deposit
  - Earn
  - convertDustToEarned



## Overall checkup (Smart Contract Security)

Tested	Verified
✓	✓














































### Legend

Attribute	Symbol
Verified / Checked	✓
Partly Verified	🚩
Unverified / Not checked	✗
Not available	—






# Modifiers and public functions

v1.0

Vault

✓  <b>deposit</b>	✓  <b>renounceOwnership</b>
 onlyOwner	 onlyOwner
 nonReentrant	
 whenNotPaused	✓  <b>transferOwnership</b>
✓  <b>farm</b>	 onlyOwner
 nonReentrant	
✓  <b>withdrawEarly</b>	
 onlyOwner	
 nonReentrant	
✓  <b>withdraw</b>	
 onlyOwner	
 nonReentrant	
✓  <b>transferConvertedEarn</b>	
 onlyOwner	
✓  <b>mintShareToReceipt</b>	
 onlyOwner	
✓  <b>burnReceiptForShare</b>	
 onlyOwner	
✓  <b>earn</b>	
 nonReentrant	
 whenNotPaused	
✓  <b>convertDustToEarned</b>	
 whenNotPaused	
✓  <b>pause</b>	
 onlyAllowGov	
✓  <b>unpause</b>	
 onlyAllowGov	
✓  <b>setSettings</b>	
 onlyAllowGov	
✓  <b>setGov</b>	
 onlyAllowGov	
✓  <b>setUniRouterAddress</b>	
 onlyAllowGov	
✓  <b>setBuyBackAddress</b>	
 onlyAllowGov	
✓  <b>setRewardsAddress</b>	
 onlyAllowGov	
✓  <b>inCaseTokensGetStuck</b>	
 onlyAllowGov	
✓  <b>wrapBNB</b>	
 onlyAllowGov	

## TimelockVault

- ✓  deposit
  - Ⓜ onlyOwner
  - Ⓜ nonReentrant
  - Ⓜ whenNotPaused
- ✓  withdraw
  - Ⓜ onlyOwner
  - Ⓜ nonReentrant
- ✓  withdrawEarly
  - Ⓜ onlyOwner
  - Ⓜ nonReentrant
- ✓  setPenaltyAddress
  - Ⓜ onlyAllowGov
- ✓  setMinTimeToWithdraw
  - Ⓜ onlyAllowGov













## Comments

- Deployer can set following state variables without any limitations
- Deployer can enable/disable following state variables
- Vault
  - OnlyOwner can call following functions
    - Deposit
    - withdrawEarly
    - Withdraw
    - transferConvertedEarn
    - mintShareToReceipt
    - burnReceiptForShare
  - Only govAddress can call following function
    - Earn
    - Pause
    - Unpause
    - setSettings
    - setGov
    - setUniRouterAddress
    - setBuyBackAddress
    - setRewardsAddress
    - inCaseTokensGetStuck
    - wrapBNB
- TimelockedVault
  - onlyOwner
    - Deposit
    - Withdraw
    - withdrawEarly
  - Only govAddress can call following function
    - setPenaltyAddress
    - setMinTimeToWithdraw

**Please check if an OnlyOwner or similar restrictive modifier has been forgotten.**

# Source Units in Scope

## v1.0

Type	File	Logic Contracts	Interfaces	Lines	nLines	nSLOC	Comment Lines	Complex. Score	Capabilities
	contracts/Vault.sol	1	————	615	554	446	41	327	
	contracts/Vault_BELILp.sol	1	————	59	59	45	3	11	
	contracts/Vault_Pancakeswap.sol	1	————	51	51	42	2	7	
	contracts/TimelockedVault.sol	1	————	180	147	115	3	96	
	contracts/Vault_BELI.sol	1	————	55	55	43	1	11	
	<b>Totals</b>	<b>5</b>	————	<b>960</b>	<b>866</b>	<b>691</b>	<b>50</b>	<b>452</b>	

### Legend

Attribute	Description
Lines	total lines of the source unit
nLines	normalized lines of the source unit (e.g. normalizes functions spanning multiple lines)
nSLOC	normalized source lines of code (only source-code lines; no comments, no blank lines)
Comment Lines	lines containing single or block comments
Complexity Score	a custom complexity score derived from code statements that are known to introduce code complexity (branches, loops, calls, external interfaces, ...)

# Audit Results

# AUDIT PASSED

## Critical issues

**No critical issues**

## High issues

**No high issues**

## Medium issues

**No medium issues**

## Low issues

Issue	File	Type	Line	Description
#1	Main	Contract doesn't import npm packages from source (like OpenZeppelin etc.)	-	We recommend to import all packages from npm directly without flatten the contract. Functions could be modified or can be susceptible to vulnerabilities
#2	Vault	Missing Zero Address Validation (missing-zero-check)	554, 540, 563, 545	Check that the address is not zero

## Informational issues

Issue	File	Type	Line	Description
#1	TimelockedVault	State variables that could be declared constant (constable-states)	12	Add the `constant` attributes to state variables that never change



#2	Main	NatSpec documentation missing		If you start to comment your code, also comment all other functions, variables etc.
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## Audit Comments

### 29. January 2022:

- [Read whole report for more information](#)



## SWC Attacks

ID	Title	Relationships	Status
<a href="#">SW C-1 36</a>	Unencrypted Private Data On-Chain	<a href="#">CWE-767: Access to Critical Private Variable via Public Method</a>	PASSED
<a href="#">SW C-1 35</a>	Code With No Effects	<a href="#">CWE-1164: Irrelevant Code</a>	PASSED
<a href="#">SW C-1 34</a>	Message call with hardcoded gas amount	<a href="#">CWE-655: Improper Initialization</a>	PASSED
<a href="#">SW C-1 33</a>	Hash Collisions With Multiple Variable Length Arguments	<a href="#">CWE-294: Authentication Bypass by Capture-replay</a>	PASSED
<a href="#">SW C-1 32</a>	Unexpected Ether balance	<a href="#">CWE-667: Improper Locking</a>	PASSED
<a href="#">SW C-1 31</a>	Presence of unused variables	<a href="#">CWE-1164: Irrelevant Code</a>	PASSED
<a href="#">SW C-1 30</a>	Right-To-Left-Override control character (U+202E)	<a href="#">CWE-451: User Interface (UI) Misrepresentation of Critical Information</a>	PASSED
<a href="#">SW C-1 29</a>	Typographical Error	<a href="#">CWE-480: Use of Incorrect Operator</a>	PASSED
<a href="#">SW C-1 28</a>	DoS With Block Gas Limit	<a href="#">CWE-400: Uncontrolled Resource Consumption</a>	PASSED

<a href="#">SW C-1 27</a>	Arbitrary Jump with Function Type Variable	<a href="#">CWE-695: Use of Low-Level Functionality</a>	<b>PASSED</b>
<a href="#">SW C-1 25</a>	Incorrect Inheritance Order	<a href="#">CWE-696: Incorrect Behavior Order</a>	<b>PASSED</b>
<a href="#">SW C-1 24</a>	Write to Arbitrary Storage Location	<a href="#">CWE-123: Write-what-where Condition</a>	<b>PASSED</b>
<a href="#">SW C-1 23</a>	Requirement Violation	<a href="#">CWE-573: Improper Following of Specification by Caller</a>	<b>PASSED</b>
<a href="#">SW C-1 22</a>	Lack of Proper Signature Verification	<a href="#">CWE-345: Insufficient Verification of Data Authenticity</a>	<b>PASSED</b>
<a href="#">SW C-1 21</a>	Missing Protection against Signature Replay Attacks	<a href="#">CWE-347: Improper Verification of Cryptographic Signature</a>	<b>PASSED</b>
<a href="#">SW C-1 20</a>	Weak Sources of Randomness from Chain Attributes	<a href="#">CWE-330: Use of Insufficiently Random Values</a>	<b>PASSED</b>
<a href="#">SW C-11 9</a>	Shadowing State Variables	<a href="#">CWE-710: Improper Adherence to Coding Standards</a>	<b>PASSED</b>
<a href="#">SW C-11 8</a>	Incorrect Constructor Name	<a href="#">CWE-665: Improper Initialization</a>	<b>PASSED</b>
<a href="#">SW C-11 7</a>	Signature Malleability	<a href="#">CWE-347: Improper Verification of Cryptographic Signature</a>	<b>PASSED</b>

<a href="#">SW C-11 6</a>	Timestamp Dependence	<a href="#">CWE-829: Inclusion of Functionality from Untrusted Control Sphere</a>	<b>PASSED</b>
<a href="#">SW C-11 5</a>	Authorization through tx.origin	<a href="#">CWE-477: Use of Obsolete Function</a>	<b>PASSED</b>
<a href="#">SW C-11 4</a>	Transaction Order Dependence	<a href="#">CWE-362: Concurrent Execution using Shared Resource with Improper Synchronization ('Race Condition')</a>	<b>PASSED</b>
<a href="#">SW C-11 3</a>	DoS with Failed Call	<a href="#">CWE-703: Improper Check or Handling of Exceptional Conditions</a>	<b>PASSED</b>
<a href="#">SW C-11 2</a>	Delegatecall to Untrusted Callee	<a href="#">CWE-829: Inclusion of Functionality from Untrusted Control Sphere</a>	<b>PASSED</b>
<a href="#">SW C-11 1</a>	Use of Deprecated Solidity Functions	<a href="#">CWE-477: Use of Obsolete Function</a>	<b>PASSED</b>
<a href="#">SW C-11 0</a>	Assert Violation	<a href="#">CWE-670: Always-Incorrect Control Flow Implementation</a>	<b>PASSED</b>
<a href="#">SW C-1 09</a>	Uninitialized Storage Pointer	<a href="#">CWE-824: Access of Uninitialized Pointer</a>	<b>PASSED</b>
<a href="#">SW C-1 08</a>	State Variable Default Visibility	<a href="#">CWE-710: Improper Adherence to Coding Standards</a>	<b>PASSED</b>
<a href="#">SW C-1 07</a>	Reentrancy	<a href="#">CWE-841: Improper Enforcement of Behavioral Workflow</a>	<b>PASSED</b>
<a href="#">SW C-1 06</a>	Unprotected SELFDESTRUCT Instruction	<a href="#">CWE-284: Improper Access Control</a>	<b>PASSED</b>

<a href="#">SW</a> <a href="#">C-1</a> <a href="#">05</a>	Unprotected Ether Withdrawal	<a href="#">CWE-284: Improper Access Control</a>	<b>PASSED</b>
<a href="#">SW</a> <a href="#">C-1</a> <a href="#">04</a>	Unchecked Call Return Value	<a href="#">CWE-252: Unchecked Return Value</a>	<b>PASSED</b>
<a href="#">SW</a> <a href="#">C-1</a> <a href="#">03</a>	Floating Pragma	<a href="#">CWE-664: Improper Control of a Resource Through its Lifetime</a>	<b>PASSED</b>
<a href="#">SW</a> <a href="#">C-1</a> <a href="#">02</a>	Outdated Compiler Version	<a href="#">CWE-937: Using Components with Known Vulnerabilities</a>	<b>PASSED</b>
<a href="#">SW</a> <a href="#">C-1</a> <a href="#">01</a>	Integer Overflow and Underflow	<a href="#">CWE-682: Incorrect Calculation</a>	<b>PASSED</b>
<a href="#">SW</a> <a href="#">C-1</a> <a href="#">00</a>	Function Default Visibility	<a href="#">CWE-710: Improper Adherence to Coding Standards</a>	<b>PASSED</b>

The logo features the word "SolidProofed" in a white, handwritten-style script. The "P" is particularly large and stylized, with a long horizontal stroke that extends to the left. The background is a solid blue color with a faint, large shield emblem in the center. The shield has a grid-like pattern on its right side and a solid blue area on its left side.

SolidProofed

**Blockchain Security | Smart Contract Audits | KYC**

A small horizontal bar representing the German flag, with black, red, and gold stripes.

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