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Diligence

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# Audit Report **Poolz Finance**

<https://www.poolz.finance>

Provided By



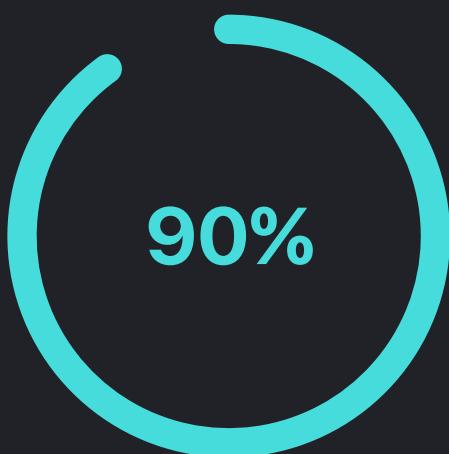
DcentraLab  
Diligence

on March 23, 2023

# Security Audit Score

**Pass**

DcentraLab Diligence team has conducted an extensive audit on the Poolz Token code and has found it to represent adequate code quality and a low risk level given proper deployment and multi-sig permissioning.



- **Low Risk**
- **Small Risk**
- **Medium Risk**
- **High Risk**

## Audit Report | POOLX Token

### CodeBase:

<https://github.com/The-Poolz/PoolzToken>

### Initial Commit Hash:

[9b012e9042b9f65165895847859bf4c6116257f1](#)

### Fixes Commit Hash:

[3c0f2e003b96ed54f4aa99747ac22d3c27a6ed08](#)

### Final Report Git Tag: V1.1.3 (Diff View)

<https://github.com/The-Poolz/PoolzToken/compare/V1.1.0...V1.1.3>

### Contracts Audited:

ERC20BurnableMintableCapped.sol

ERC20Mintable.sol

Roles.sol

POOLZ.sol

### General Recommendations:

Increase pragma version to ^0.8.4 in order to take advantage of the newest gas/bytecode optimizations.

### Risks:

DcentraLab Diligence (DD) has performed all checks and verifications in its capacity to ascertain the safety of the code. However, it should be noted that misuse of the code, bad deployment practices, bad key management, exposing of private keys of the deployer and/or owner address and/or multi-sig signer addresses and/or fee collector address and/or any exposition of the code to malicious actors may result in an exploit of the code and loss of state and/or funds.

Furthermore, there is always a chance that other Smart Contracts code could be written and deployed to cause the provided code by DD to act outside the intended scope by the client, to the point of causing state corruption or loss of funds to the client of the users of the code.

## Issues Severity Reference Table

### Type

#### Informational

This issue is not critical and does not pose an immediate threat to the functionality or security of the smart contract. It is simply an informational item that the auditors have identified and recommends addressing for best practices or to improve the overall performance of the contract.

#### Low

This issue is relatively minor and does not pose a significant risk to the functionality or security of the smart contract. While it is recommended to address these issues to ensure the highest level of quality and security, they are not likely to cause significant problems if left unaddressed.

#### Medium

This issue poses a moderate risk to the functionality or security of the smart contract. While it may not be immediately exploitable, it has the potential to cause problems in the future if left unaddressed. It is recommended to address these issues as soon as possible to prevent any potential negative impact on the contract.

#### High

This issue poses a significant risk to the functionality or security of the smart contract. Addressing these issues as soon as possible is recommended to prevent any potential negative impact on the contract. Failure to address these issues could result in significant problems and potential loss of funds or other assets.

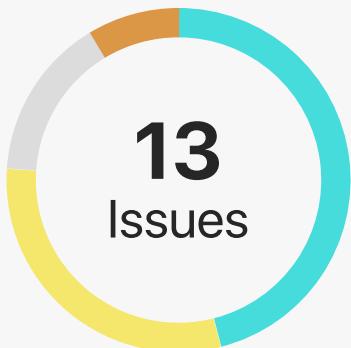
#### Critical

This issue poses an immediate and severe risk to the functionality or security of the smart contract. It is recommended to address these issues immediately to prevent any potential negative impact on the contract. Failure to address these issues could result in catastrophic problems and significant loss of funds or other assets.

#### Discussion

The issue severity is dependent on design, centralization, and product specifications of the project.

## Findings Summary



	Informational		High Risk
	Medium Risk		Discussion

ID	Title	Severity	Status
1	Role struct	Informational	Resolved
2	Roles library internal usage	Informational	Partially Resolved
3	_addMinter and _removeMinter functions visibility	Informational	Resolved
4	Impossible renouncement of malicious minter	Medium	Partially Resolved
5	Mint function unnecessary virtualization	Informational	Resolved
6	Potential irreversible lock on minting	Medium	Partially Resolved
7	Missing deployment script verifying proper access control	High	Partially Resolved
8	Missing implementation of Multi-Sig	Medium	Partially Resolved
9	Missing Upgradability Schema	Discussion	Acknowledged



## Findings Summary

ID	Title	Severity	Status
10	Missing Security Measures	Discussion	Acknowledged
11	Potentially volatile use of Roles	Medium	Partially Resolved
12	Unconventional naming	Informational	Acknowledged
13	Event won't get emitted on initial minter addition	Informational	Acknowledged

## Complete Analysis

ID 1:

Status: Resolved

Informational | Role struct

### Roles library:

Description: While defining a struct that contains only one mapping inside a library is logical due to the inability of libraries to contain descriptions of simple types, it is unnecessarily increasing code complexity and a number of performed operations.

Recommendation: We recommend parsing bearers mapping directly as a functions argument and removing Role struct as this will reduce the number of operations needed to access the mapping values.

ID 2:

Status: Partially Resolved

Informational | Roles library internal usage

### Roles library:

Description: Roles library consists solely of internal functions, which means that it will be an integrated part of token bytecode. We consider this as an unnecessary bytecode increase.

Recommendation: Prepare library for separate deployment in order to optimize contract code by changing function visibility to external. This way library bytecode will not be directly contained inside token logic.

Fixes Feedback: The visibility of the Roles functions has indeed been changed to external. However, Roles is now a contract that is inherited by ERC20Mintable, so it is still an integrated part of the token bytecode.

## Complete Analysis

ID 3:

Status: Resolved

Informational | `_addMinter` and `_removeMinter` functions visibility

### ERC20Mintable contract:

Description: Mentioned functions act as a middleware between their accessors which is not necessary in this case.

Recommendation: Events from functions can be moved to the library and used in library function logic. This way, functions will still be directly accessible to the constructor, and external functions defined in ERC20BurnableMintableCapped.sol, and internal functions in ERC20Mintable.sol can be removed.

ID 4:

Status: Partially Resolved

Medium | Impossible renouncement of malicious minter

### ERC20BurnableMintableCapped contract:

Description: In case of minter wallet being taken over there is no possibility to remove its role, as minter can only renounce himself.

Recommendation (+): In order to make your role system safer, take a look at AccessControl.sol by openzeppelin. This contract is considered a standard for role-based security systems in EVM dApps. In that system, there's an admin role that can, as a higher authority, apply and renounce roles of other accounts in the system. One of the best solutions could be to create an admin role and assign it to a multi-signature wallet owned by your organization, or just use the AccessControl.sol solution directly as that is considered safest and most optimized gas wise. In case you choose the second, library issues found are not applied anymore.

## Complete Analysis

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Fixes Feedback: No code changes were made.

Comment: Team did set multi-sig contract as an only minter, which is their approach to solving this problem. While this solution makes contract more secure in current conditions, we are marking this issue as "Partially Resolved" as there is no safety improvement to the code.

ID 5:

**Status: Resolved**

**Informational | Mint function unnecessary virtualization**

**ERC20BurnableMintableCapped contract:**

Description: Mint function is not overridden in POOLZ.sol contract, which inherits the contract to which this paragraph is dedicated.

Recommendation: Remove virtual keyword from mint function if you are not planning to override it in the future (this relates to some other contract that would inherit this logic, as current architecture is non-upgradeable).

We recommend you reading the following:

- From pragma 0.8.4 you are able to use custom errors which optimize gas usage and bytecode size: <https://blog.soliditylang.org/2021/04/21/custom-errors/>
- This really informative article about libraries: <https://jeancvllr.medium.com/solidity-tutorial-all-about-libraries-762e5a3692f9>
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Fixes Feedback: Code was changed in such a way that this issue is no longer applicable.

## Complete Analysis

ID 6:

Status: Partially Resolved

Medium | Potential irreversible lock on minting

### ERC20BurnableMintableCapped contract:

Description: renounceMinter() - It is possible to have no minters by mistake, and this is irreversible. If there is only one minter, and they want to add another minter, they may mistakenly call the renounceMinter() function first, resulting in no one being able to add another minter.

Recommendation: add an address parameter for the renounceMinter() function. Inside the function implementation, add the new minter by calling \_addMinter(). If you wish to just remove a minter, simply call the function with a zero address parameter.

Notice: do not call \_addMinter() if the parameter is zero address.

Fixes Feedback: No code changes were made.

Comment: While this flow of events is still possible, the project considers this issue inapplicable to their use cases. With using only one minter, which is a multi-signature wallet, the issue gets marked as "Partially Resolved" as there is no in-code prevention of described undesired behavior.

ID 7:

Status: Partially Resolved

High | Missing deployment script verifying proper access control

Description: The repo is missing a deployment script that will effectively remove the hot wallet as owner and minter. Without this, it is not possible to ascertain that minting will not be compromised.

## Complete Analysis

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Recommendation: Please add a full deployment script that removes deployer (which is usually hot address) as owner and minter, and applies a multi-sig / properly guarded address as minter.

Comment: Project team decided to continue forward without providing a deployment script. Deployment was done successfully so the issue remains marked as "Partially resolved."

ID 8:

**Status: Partially Resolved**

### Medium | Missing Implementation of Multi-Sig

Description: If minting is intended to be permissioned by a multi-sig, as the code for such is not in the scope of the audit, it's not possible to verify that ownership and minting permissions will be well kept, potentially exposing the token to exploit.

Recommendation: Include the multi-sig code in the audit, or utilize a well-established, battle-tested implementation of a multi-sig (e.g., Gnosis)

Comment: Project decided not to add the multi-sig contract to the audit scope, but attests that the Token has been deployed with a multi-sig contract as sole minter, and that the hot deployer role as minter has been removed:

Deployed Token on Ethereum: <https://etherscan.io/token/0xeeef66125bfcffdb1642c7e85a432cd1b78038399>

Multisig Contract: <https://github.com/The-Poolz/MultiSig> <https://etherscan.io/address/0x3e4588c3C4E6ff3da84ab5401490d9c9eA820d3E>

Adding Multisig as Minter: <https://etherscan.io/tx/0xcdcf563f5dce5e98f90c2cf0eb96725a3abe5ac6a794976416c65157f08559c7f>

Remove Hot Wallet as Minter: <https://etherscan.io/tx/0x9ac9e5e8c14ac4d89a0494ced7e2ce794a6fe053c2931f0c20488eb8a36d7c15>

## Complete Analysis

ID 9:

Status: Acknowledged

### Discussion | Missing Upgradability Schema

Description: Current contract is not upgradeable, limiting team ability to respond in case of requirement for adding new features (e.g. taxation, security measures). On the other hand, token being non-upgradable is seen at times to be more secure.

Recommendation: Enable upgradability with high level security multi-sig vault or DAO contract of token holders as owner of proxy admin for upgradability, to keep both security and flexibility and adaptability to changing conditions in market, token use case, client product, tokenomics etc.

Comment: Team is intentionally using the non-upgradeable architectural scheme.

ID 10:

Status: Acknowledged

### Discussion (Low to Medium) | Missing Security Measures

Description: Current token does not hold security measures capabilities, e.g., freeze token, blacklist address, destroy black funds, etc. Some might see such capabilities as centralized and unwanted, but they are very useful to mitigate emergencies, and can be set to be controllable by a highly secure multi-sig.

Recommendation: Discuss internally and decide whether to add such features, or enable upgradability to allow potential to add such later. In general, we recommend tokens to have such capabilities owned by a highly secure multi-sig.

Comment: This way of functioning was intentionally implemented by the team. They're accepting this architectural risk

## Complete Analysis

ID 11:

Status: Unresolved

Medium | Potentially volatile use of Roles

### Roles library:

Description: Currently, a lib for roles is inefficiently being used and only allows in indirect manner to specify a list of allowed minters used in another contract. Beyond potential state manipulation risks and inefficiencies of using complex mappings to store a simple list/mapping of minters, having a complex setup leads to more exposure also on security side.

### Recommendations:

- Manage minter privileges directly on the EC20Mintable contract.
- Enable only multi-sig owner to mint , and use simple address state to track the single minter (owner), which can upgrade itself only
- If absolutely required to appoint more than one minter or non multi-sig minter, allow only multi-sig owner to appoint minters, don't allow minters to appoint other minters arbitrarily.

Fixes Feedback: Sub-issues of number 2 and 3 were not fixed. There is no proper privilege segregation implemented and therefore issues connected with minter role management still persist.

## New Issues Post Audit:

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ID 12:

**Status: Acknowledged**

**Informational | Unconventional naming**

Description: Unconventional variable naming present at line 9 @ MinterRole.sol

Recommendation: Apply valid naming convention to the variable.

ID 13:

**Status: Acknowledged**

**Informational | Event won't get emitted on initial minter addition**

Description: During initial minter addition in a constructor, an event will not emit on state change on line 10 @ ERC20Mintable.sol

Recommendation: Implement logic in such a way that event reflects the state change.

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