



**SOLIDProof**  
*Bring trust into your projects*

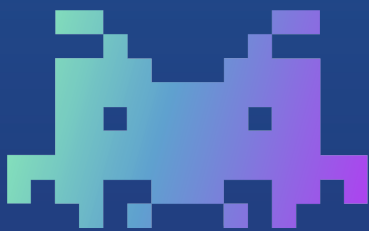
**Blockchain Security | Smart Contract Audits | KYC**

MADE IN GERMANY

# Audit

**Security Assessment**  
**01. March, 2022**

**For**



**BITCRUSH**

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	21
Critical issues	22
High issues	22
Medium issues	22
Low issues	22
Informational issues	22
Audit Comments	22
SWC Attacks	23

# Disclaimer

SolidProof.io reports are not, nor should be considered, an “endorsement” or “disapproval” of any particular project or team. These reports are not, nor should be considered, an indication of the economics or value of any “product” or “asset” created by any team. SolidProof.io do not cover testing or auditing the integration with external contract or services (such as Unicrypt, Uniswap, PancakeSwap etc’...)

**SolidProof.io Audits do not provide any warranty or guarantee regarding the absolute bug- free nature of the technology analyzed, nor do they provide any indication of the technology proprietors. SolidProof Audits should not be used in any way to make decisions around investment or involvement with any particular project. These reports in no way provide investment advice, nor should be leveraged as investment advice of any sort.**

SolidProof.io Reports represent an extensive auditing process intending to help our customers increase the quality of their code while reducing the high level of risk presented by cryptographic tokens and blockchain technology. Blockchain technology and cryptographic assets present a high level of ongoing risk. SolidProof’s position is that each company and individual are responsible for their own due diligence and continuous security. SolidProof in no way claims any guarantee of security or functionality of the technology we agree to analyze.

Version	Date	Description
1.0	18. February 2022	<ul style="list-style-type: none"><li>• Layout project</li><li>• Automated- /Manual-Security Testing</li><li>• Summary</li></ul>
1.1	24. February 2022	<ul style="list-style-type: none"><li>• Reaudit</li></ul>
1.2	01. March 2022	<ul style="list-style-type: none"><li>• Mainnet link has been added</li></ul>

## Network

Binance Smart Chain (BEP20)

## Website

<https://www.bitcrush.com/>

## Telegram

<https://t.me/Bcarcadechat>

## Twitter

<https://twitter.com/bitcrusharcade>



## Description

Bitcrush Arcade is a gaming platform aimed to further integrate the world of Defi and Gaming. It is our belief as technologies progress, the line between iGaming and decentralized finance will continue to blur.

## Project Engagement

During the 15th of February 2022, **Bitcrush 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



### Contract Link

#### v1.0

- Github
  - [https://github.com/Bitcrush-Arcade/crush\\_contracts/tree/bridge](https://github.com/Bitcrush-Arcade/crush_contracts/tree/bridge)
  - Commit: 2a42ed841dfcbdf9fa8fbc5b549b1ab91611fe02

#### V1.2

- <https://bscscan.com/address/0x3a79410a3c758bf5f00216355545f4ed7cf0b34f#code>

# 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:

Dependency / Import Path	Count
@openzeppelin/contracts/access/Ownable.sol	4
@openzeppelin/contracts/interfaces/IERC20.sol	2
@openzeppelin/contracts/interfaces/IERC20Metadata.sol	2
@openzeppelin/contracts/security/ReentrancyGuard.sol	1
@openzeppelin/contracts/token/ERC20/utils/SafeERC20.sol	1
@openzeppelin/contracts/utils/Address.sol	1
@openzeppelin/contracts/utils/Context.sol	2
@openzeppelin/contracts/utils/math/SafeMath.sol	4



## Tested Contract Files

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

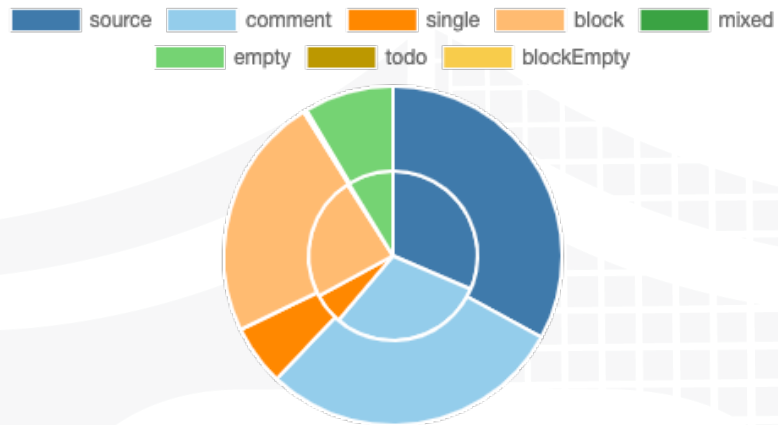
*A file with a different Hash has been modified, intentionally or otherwise, after the security review. A different Hash could be (but not necessarily) an indication of a changed condition or potential vulnerability that was not within the scope of this review.*

### v1.0

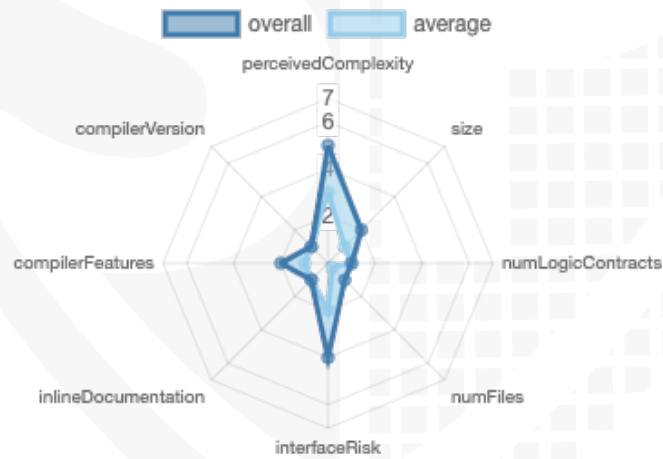
File Name	SHA-1 Hash
contracts/CrushErc20.sol	3830c858cf177d34e284f9609693542f887c9215
contracts/NiceTokenErc20.sol	803ca43cd47553f50b3abde428a4150171f7771f
contracts/InvaderverseBridge.sol	dae011788c376a61b9473e5b37a78237539b9038
contracts/NiceTokenBep20.sol	902193a52a1fc1332edb7ad51b02f252be68a1fe

# Metrics

## Source Lines v1.0



## Risk Level v1.0



## Capabilities

### Components

Version	Contracts	Libraries	Interfaces	Abstract
1.0	4	0	0	0

### 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	60	0

Version	External	Internal	Private	Pure	View
1.0	26	72	0	0	18

### State Variables

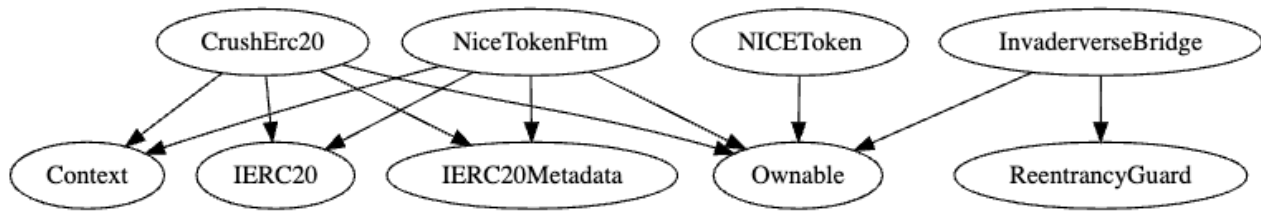
Version	Total	Public
1.0	35	16

### Capabilities

Version	Solidity Versions observed	Experimental Features	Can Receive Funds	Uses Assembly	Has Destroyable Contracts
1.0	^0.8.0				

Version	Transfers ETH	Low-Level Calls	DelegateCall	Uses Hash Functions	EC Recover	New/Create/Create2
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. Correct implementation of Token standard
2. Deployer cannot mint any new tokens
3. Deployer cannot burn or lock user funds
4. Deployer cannot pause the contract
5. Overall checkup (Smart Contract Security)

### Correct implementation of Token standard

Function	Description	Exist	Tested	Verified
TotalSupply	provides information about the total token supply	✓	✓	✓
BalanceOf	provides account balance of the owner's account	✓	✓	✓
Transfer	executes transfers of a specified number of tokens to a specified address	✓	✓	✓
TransferFrom	executes transfers of a specified number of tokens from a specified address	✓	✓	✓
Approve	allow a spender to withdraw a set number of tokens from a specified account	✓	✓	✓
Allowance	returns a set number of tokens from a spender to the owner	✓	✓	✓

## Write functions of contract v1.0

NicetokenErc20

approve
bridgeBurn
bridgeBurnFrom
burn
decreaseAllowance
increaseAllowance
mint
renounceOwnership
setBridge
toggleMinter
transfer
transferFrom
transferOwnership

CrushErc20

approve
bridgeBurn
bridgeBurnFrom
burn
decreaseAllowance
increaseAllowance
mint
renounceOwnership
setBridge
transfer
transferFrom
transferOwnership

NicetokenBep20

approve
bridgeBurn
bridgeBurnFrom
burn
decreaseAllowance
increaseAllowance
mint
renounceOwnership
setBridge
toggleMinter
transfer
transferFrom
transferOwnership

InvaderVerseBridge

addToken
emergencyCancelBridge
fulfillBridge
mirrorBurn
renounceOwnership
requestBridge
sendTransactionFailure
sendTransactionSuccess
setDev
setGateway
toggleChain
transferOwnership

## Deployer cannot mint any new tokens

Name	Exist	Tested	Status
Deployer cannot mint	✓	✓	✗

Comments:

### v1.0

- CrushErc20
  - onlyBridge can mint new tokens
- NiceTokenBep20
  - onlyMinter can mint new tokens
- NiceTokenErc20
  - onlyMinter can mint new tokens



## Deployer cannot burn or lock user funds

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

Comments:

### v1.0

- CrushErc20
  - Everybody can burn tokens
- NiceTokenBep20
  - Everybody can burn tokens
- NiceTokenErc20
  - Everybody can burn tokens
- InvaderverseBridge
  - onlyOwner can lock following functions
    - requestBridge
  - onlyGateway can use mirrorBurn
    - tokens will burn from niceToken

Deployer cannot pause the contract

Name	Exist	Tested	Status
Deployer cannot pause	-	-	-



## 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








<div><div>▼ 🔹 requestBridge</div><div>🔒 nonReentrant</div><div>▼ 🔹 emergencyCancelBridge</div><div>🔒 nonReentrant</div><div>▼ 🔹 sendTransactionSuccess</div><div>🔒 onlyGateway</div><div>🔒 nonReentrant</div><div>▼ 🔹 sendTransactionFailure</div><div>🔒 onlyGateway</div><div>🔒 nonReentrant</div><div>▼ 🔹 fulfillBridge</div><div>🔒 onlyGateway</div><div>🔒 nonReentrant</div><div>▼ 🔹 mirrorBurn</div><div>🔒 onlyGateway</div><div>🔒 nonReentrant</div><div>▼ 🔹 toggleChain</div><div>🔒 onlyOwner</div><div>▼ 🔹 addToken</div><div>🔒 onlyOwner</div><div>▼ 🔹 setGateway</div><div>🔒 onlyOwner</div><div>▼ 🔹 setDev</div><div>🔒 onlyOwner</div></div>	<div><div>🔹 transfer</div><div>🔹 approve</div><div>🔹 transferFrom</div><div>🔹 increaseAllowance</div><div>🔹 decreaseAllowance</div><div>🔹 burn</div><div>▼ 🔹 setBridge</div><div>🔒 onlyOwner</div><div>▼ 🔹 mint</div><div>🔒 onlyBridge</div><div>▼ 🔹 bridgeBurn</div><div>🔒 onlyBridge</div><div>▼ 🔹 bridgeBurnFrom</div><div>🔒 onlyBridge</div></div>	<div><div>🔹 transfer</div><div>🔹 approve</div><div>🔹 transferFrom</div><div>🔹 increaseAllowance</div><div>🔹 decreaseAllowance</div><div>🔹 burn</div><div>▼ 🔹 setBridge</div><div>🔒 onlyOwner</div><div>▼ 🔹 mint</div><div>🔒 onlyMinter</div><div>▼ 🔹 bridgeBurn</div><div>🔒 onlyBridge</div><div>▼ 🔹 bridgeBurnFrom</div><div>🔒 onlyBridge</div><div>▼ 🔹 toggleMinter</div><div>🔒 onlyOwner</div></div>
---	--	---

## Comments

- Deployer can enable/disable following state variables
  - validChains
  - validMinters
- Deployer can set following addresses
  - bridge
  - gateway
  - devAddress

**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/CrushErc20.sol	1	————	364	352	134	168	104	Σ
	contracts/NiceTokenErc20.sol	1	————	370	358	140	170	108	Σ
	contracts/InvaderverseBridge.sol	1	————	223	218	150	53	117	
	contracts/NiceTokenBep20.sol	1	————	343	331	145	147	111	————
	<b>Totals</b>	<b>4</b>	————	<b>1300</b>	<b>1259</b>	<b>569</b>	<b>538</b>	<b>440</b>	 Σ

### 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

**No low issues**

## Informational issues

**No informational issues**

## Audit Comments

We recommend you to use the special form of comments (NatSpec Format, Follow link for more information <https://docs.soliditylang.org/en/v0.5.10/natspec-format.html>) for your contracts to provide rich documentation for functions, return variables and more. This helps investors to make clear what that variables, functions etc. do.

### 18. February 2022:

- Read whole report for more information

### 24. February 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 words "Solid Proofed" in a white, elegant script font. The word "Solid" is positioned above "Proofed". Behind the text is a faint, stylized shield emblem with a grid-like pattern, rendered in a darker shade of blue. The entire composition is set against a solid blue background.

Solid  
Proofed

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

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

MADE IN GERMANY