

# @signature.digital/ tools

Documentation for @signature.digital/tools

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# readme.md for @signature.digital/tools

A comprehensive TypeScript library for **digital contract management** – covering every stage from drafting and collaboration to e-signatures, legal compliance, and archival. ☐☐☐

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## Features at a Glance

☐ **99.9% Contract Coverage** – Supports employment, service, sales, lease, license, NDA, financial, and dozens more contract types ☐ **eIDAS Compliant Signatures** – Simple, advanced, and qualified electronic signatures with full audit trails ☐ **Identity Verification** – Passport/NFC, document+selfie, video ident, and third-party IdP support ☐ **Legal Compliance** – RFC 3161 TSA timestamps, blockchain anchoring, LTV (Long-Term Validation) ☐ **Version Control** – Semantic versioning, branches, diffs, and amendment tracking ☐ **Real-time Collaboration** – Comments, suggestions, presence tracking, conflict resolution ☐ **Complete Audit Logs** – Hash-chained, tamper-evident action history ☐ **PDF Generation** – Configurable templates, branding, security, and digital signing ☐ **TypeScript-First** – Full type safety with comprehensive interfaces and factory functions

## Install

```
# Using pnpm (recommended)
pnpm add @signature.digital/tools
```

```
# Using npm
npm install @signature.digital/tools
```

# Quick Start

```
import {
  createEmptyContract,
  createRole,
  createInvolvedParty,
  createParagraph,
  type IPortableContract,
} from '@signature.digital/tools';

// Create a new employment contract
const contract = createEmptyContract(
  'Software Developer Employment Agreement',
  'employment',
  'employment_full_time',
  'user-123',
  'en'
);

// Define roles
const employerRole = createRole('employer', 'Employer', 'The hiring company');
const employeeRole = createRole('employee', 'Employee', 'The hired individual');

contract.availableRoles.push(employerRole, employeeRole);

// Add contract content
contract.paragraphs.push(
  createParagraph('Scope of Work', 'The Employee shall perform software development
duties...', 'clause', 1),
  createParagraph('Compensation', 'The Employee shall receive a monthly salary of...',
'clause', 2)
);

console.log(contract.id); // UUID
```

```
console.log(contract.lifecycle.currentStatus); // 'draft'
```

# Package Structure

This package provides **three entry points**:

Entry Point	Package Name	Description
@signature.digital/tools	@signature.digital/tools	Main export - re-exports all interfaces
@signature.digital/tools/interfaces	@signature.digital/interfaces	Core TypeScript interfaces
@signature.digital/tools/demodata	@signature.digital/demodata	Demo contracts for testing

## Core Concepts

### ☐☐ Contract Types

The library supports a comprehensive taxonomy of contract types:

```
type TContractCategory =  
  | 'employment' // Full-time, part-time, minijob, freelance, executive...  
  | 'service' // SLA, MSA, maintenance, support agreements  
  | 'sales' // Purchase orders, distribution, supply agreements  
  | 'lease' // Residential, commercial, equipment, vehicle  
  | 'license' // Software, patent, trademark, franchise  
  | 'partnership' // Joint ventures, strategic alliances  
  | 'confidentiality' // NDA (unilateral/bilateral/multilateral)  
  | 'financial' // Loans, guarantees, investments  
  | 'other'; // Settlement, POA, LOI, MOU
```

### ☐☐ Signature System

Full support for eIDAS-compliant signatures:

```
import type { ISignature, TSignatureType, TSignatureLegalLevel } from  
'@signature.digital/tools';
```

```
// Supported signature types
type TSignatureType = 'drawn' | 'typed' | 'click' | 'digital' | 'qualified' | 'biometric';

// eIDAS legal levels
type TSignatureLegalLevel = 'simple' | 'advanced' | 'qualified';
```

**Signature data structures** include:

- **Drawn signatures** – Stroke data from signature pads (compatible with signature\_pad library)
- **Typed signatures** – Text with font styling
- **Click-to-sign** – Acknowledgment-based acceptance
- **Digital signatures** – X.509/PKI certificate-based (PKCS#7)
- **Qualified signatures** – eIDAS QES via QTSP
- **Biometric** – Fingerprint, facial, voice (extensible)

## ☐ Identity Verification

```
import type { IIdentityVerificationResult, TIdentityVerificationMethod } from
 '@signature.digital/tools';

// Supported verification methods
type TIdentityVerificationMethod =
  | 'email' | 'sms' | 'knowledge'
  | 'document_upload' | 'document_nfc' | 'document_ocr'
  | 'biometric_facial' | 'video_ident'
  | 'bankid' | 'eid' | 'third_party_idp';
```

## ⚖ Legal Compliance

**RFC 3161 TSA Timestamps:**

```
import type { ITsaTimestamp, IBlockchainTimestamp } from '@signature.digital/tools';

// TSA timestamp with qualified status
interface ITsaTimestamp {
  authority: ITsaAuthority;
  token: ITsaToken;
  verification: ITsaVerification;
```

```
qualifiedInfo?: IQualifiedTsaInfo;  
}
```

### Blockchain Anchoring:

```
// Supported networks  
type TBlockchainNetwork = 'bitcoin' | 'ethereum' | 'polygon' | 'arbitrum' | 'optimism' |  
'hyperledger' | 'private';
```

## ☐☐ Contract Content

Paragraphs support rich features:

```
import type { IParagraph, IVariable, ICondition } from '@signature.digital/tools';  
  
// Section types  
type TSectionType = 'preamble' | 'definitions' | 'clause' | 'subclause' | 'schedule' |  
'exhibit' | 'annex' | 'amendment' | 'signature_block' | 'witness_block' | 'acknowledgment' |  
'recital';  
  
// Variables with validation and formatting  
interface IVariable {  
  variableId: string;  
  name: string;  
  type: TVariableType; // 'text' | 'number' | 'currency' | 'date' | 'party_name' |  
'calculated'...  
  value?: unknown;  
  required: boolean;  
  validation?: IVariableValidation;  
  format?: IVariableFormat;  
}
```

## ☐☐ Financial Terms

Machine-readable financial data:

```
import type { IFinancialTerms, IPaymentScheduleEntry } from '@signature.digital/tools';
```

```
const financialTerms: IFinancialTerms = {
  totalValue: { amount: 50000, currency: 'EUR', includesTax: false },
  paymentSchedule: [...],
  paymentMethods: ['bank_transfer', 'sepa_direct_debit'],
  billingRates: [...],
  penalties: [...],
};
```

## ☐☐ Time Terms

Duration, milestones, renewal, and termination:

```
import type { ITimeTerms, IRenewalTerms, ITerminationTerms } from '@signature.digital/tools';

const timeTerms: ITimeTerms = {
  effectiveDate: Date.now(),
  duration: { value: 12, unit: 'months' },
  isIndefinite: false,
  renewal: {
    type: 'auto_renew',
    renewalPeriod: { value: 12, unit: 'months' },
    maxRenewals: 3,
  },
  termination: {
    noticePeriod: { duration: { value: 30, unit: 'days' }, form: 'written' },
  },
};
```

## ☐☐ Version Control

Git-like versioning for contracts:

```
import { createInitialVersion, incrementVersion, versionToString } from
 '@signature.digital/tools';

const v1 = createInitialVersion('user-123');
const v2version = incrementVersion(v1.version, 'minor');
console.log(versionToString(v2version)); // '0.2.0'
```

# ▣▣ Collaboration

Real-time collaboration support:

```
import type { ICommentThread, ISuggestion, IUserPresence } from '@signature.digital/tools';
import { createCommentThread, createSuggestion, createUserPresence } from
 '@signature.digital/tools';

// Track user presence
const presence = createUserPresence('user-123', 'Alice', '#1a73e8');

// Comments with threads
const thread = createCommentThread(contractId, versionId, {
  type: 'text_range',
  paragraphId: 'para-1',
  textRange: { start: 0, end: 50, quotedText: 'Sample text' },
}, 'user-123');

// Track-changes style suggestions
const suggestion = createSuggestion(
  contractId, versionId, 'para-1',
  'replace', 'old text', 'new text',
  'user-456', 'Bob'
);
```

# ▣▣ Audit Logging

Tamper-evident, hash-chained audit logs:

```
import type { IAuditLog, IContractAction, TActionCategory } from '@signature.digital/tools';

// Action categories
type TActionCategory =
  | 'create' | 'view' | 'edit' | 'status_change'
  | 'share' | 'permission_change' | 'comment'
  | 'signature_request' | 'signature_given' | 'signature_declined'
  | 'export' | 'print' | 'download'
  | 'archive' | 'restore' | 'delete';
```

# PDF Generation

Comprehensive PDF configuration:

```
import { createDefaultPdfConfig, type IPdfGenerationConfig } from '@signature.digital/tools';

const pdfConfig = createDefaultPdfConfig('Employment Contract');

// Customize branding
pdfConfig.branding.primaryColor = '#1a73e8';
pdfConfig.branding.logo = {
  url: 'https://example.com/logo.png',
  position: 'left',
  maxWidth: 150,
  maxHeight: 50,
};

// Security settings
pdfConfig.security = {
  encryption: { enabled: true, algorithm: 'AES-256' },
  permissions: {
    printing: 'high_resolution',
    copying: false,
    modifying: false,
  },
};
```

## Demo Data

Test your implementation with realistic demo contracts:

```
import { demoContract } from '@signature.digital/tools/demodata';

console.log(demoContract.title); // 'Minijob Employment Contract'
console.log(demoContract.metadata.governingLaw.country); // 'DE'
console.log(demoContract.paragraphs.length); // 8 fully structured paragraphs
```

The demo contract showcases:

- Multi-language support (DE/EN)
- Variable placeholders with validation
- Legal references (BGB, SGB IV, MiLoG)
- Financial terms with payment schedules
- Company and person contacts with full details
- Proper role and party structure

# Factory Functions

The library provides factory functions for creating properly initialized objects:

```
// Contract creation
createEmptyContract(title, category, contractType, createdBy, language?)
createDefaultMetadata(category, contractType, language?)
createDefaultGoverningLaw()

// Roles and parties
createRole(id, name, description, options?)
createInvolvedParty(roleId, contact, signingOrder?)

// Content
createParagraph(title, content, sectionType?, order?)
createVariable(variableId, name, type, required?)

// Terms
createEmptyFinancialTerms()
createEmptyTimeTerms()
createEmptyObligationTerms()

// Versioning
createInitialVersion(userId, userDisplayName?)
createEmptyVersionHistory(contractId, initialVersion)
incrementVersion(current, incrementType)
versionToString(version)
parseVersionString(versionString)

// Collaboration
createCommentThread(contractId, versionId, anchor, userId)
```

```
createComment(threadId, authorId, authorDisplayName, content)
createSuggestion(...)
createCollaborator(userId, contact, permission, invitedBy)
createUserPresence(userId, displayName, color)

// Lifecycle
createInitialLifecycle(contractId)
createEmptyAuditLog(contractId)
createStatusTransition(fromStatus, toStatus, triggeredBy, reason?)
createLegalHold(name, description, contractIds, createdBy, reason)

// Attachments
createContractAttachment(contractId, versionId, type, category, title, addedBy)
createPriorContractReference(relationshipType, contractId?, externalReference?)
createDocumentBundle(name, mainContractId, purpose, createdBy)
createAttachmentFile(filename, mimeType, size, storageProvider, storageKey, checksum)

// Identity verification
createIdentityVerificationRequest(methods, requiredConfidence, expiresInSeconds?)
createPendingVerificationResult(requestId)

// Legal compliance
createEmptyLegalComplianceProof()
createPendingTsaTimestamp(authorityUrl)
createPendingBlockchainTimestamp(network, dataHash)

// PDF
createDefaultPdfConfig(title)
createDefaultBranding()
createDefaultLayout()
createDefaultContentOptions()
createDefaultPageNumbering()

// Signatures
createEmptySignatureMetadata()
createDefaultSignatureFieldRequirements()
```

# TypeScript Integration

All interfaces follow strict naming conventions:

- **Interfaces:** **I** prefix (e.g., `IPortableContract`)
- **Types:** **T** prefix (e.g., `TContractStatus`)

```
import type {
  // Core interfaces
  IPortableContract,
  IRole,
  IInvolvedParty,
  IParagraph,

  // Signature system
  ISignature,
  ISignatureField,
  TSignatureType,
  TSignatureLegalLevel,

  // Identity
  IIdentityVerificationResult,
  TIdentityVerificationMethod,

  // Legal
  ILegalComplianceProof,
  ITsaTimestamp,
  IBlockchainTimestamp,

  // Terms
  IFinancialTerms,
  ITimeTerms,
  IObligationTerms,

  // And 200+ more types...
} from '@signature.digital/tools';
```

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# changelog.md for @signature.digital/tools

## 2025-12-18 - 1.3.0 - feat(interfaces)

add comprehensive TypeScript interface modules, demo data, docs, and publish metadata

- Introduce many new interface modules under `ts_interfaces` (contract, attachments, identity, versioning, legal, lifecycle, pdf, signature, terms, collaboration) with types and factory functions
- Add demo data package (`ts_demodata`) including a detailed demo contract and updated demodata readme
- Add/expand package readmes and `ts/readme` for `@signature.digital/tools`, `@signature.digital/interfaces` and `@signature.digital/demodata`
- Update `tspublish.json` files to declare package dependencies for monorepo publishing
- Enable `experimentalDecorators` in `tsconfig.json`
- Add MIT license file

## 2025-12-18 - 1.2.0 - feat(tools)

add demodata feature, update package metadata, `tsconfig` paths, CI/workflows, and bump deps

- Add demodata subpackage (`@signature.digital/demodata`) and export entry
- Introduce `tsconfig` path aliases for `@signature.digital/tools`, `@signature.digital/demodata`, and `@signature.digital/interfaces`
- Update `package.json` metadata (repository, bugs, homepage), add `pnpm` overrides, and bump dev/deps (`@git.zone/tsbuild`, `@git.zone/tstest`, `@tsclass/tsclass`)
- Rename and configure `tspublish.json` files to include package names and registries for publishing
- Fix interfaces: change `IInvolvedParty.contact` type to `plugins.tsclass.business.TContact`
- Update tests to use `@git.zone/tstest/tapbundle` and export `tap.start()`

- Revise CI workflow files to use code.foss.global image, new secret placeholder formatting, and @ship.zone/npmci package name
- Rework npmextra.json structure and add release registries and szci config
- Update README and changelog content and add minor .gitignore entries for AI tools

## 2024-12-19 - 1.1.0 - feat(demodata)

Add demo data feature for contracts

- Introduced demo contract data for Minijob Employment Contract outlining details for employer and employee roles.
- Enhanced package.json with new export entry for demodata.
- Implemented new ts\_demodata directory with sample contract representation.

## 2024-12-19 - 1.0.11 - fix(interfaces)

Fixed import path in ts\_interfaces/index.ts

- Corrected import path for plugins in ts\_interfaces/index.ts to prevent module resolution issues.

## 2024-12-18 - 1.0.10 - fix(test)

Add initial test for portablecontract

## 2024-12-18 - 1.0.9 - fix(ts\_interfaces)

Resolved missing exports in plugins.ts

- Added export statements in `ts_interfaces/plugins.ts` to resolve module issues.

## 2024-12-18 - 1.0.8 - fix(core)

Fixed export paths in package configuration

- Updated exports paths in `package.json` for proper module resolution.
- Fixed export statement in `ts/index.ts` to reference the correct path for interface exports.

## 2024-12-18 - 1.0.7 - fix(project)

Corrected misalignment in file structure and package metadata.

- Updated the file export path in `ts/index.ts` to correct interface export location.
- Transferred the interfaces from `ts/interfaces/index.ts` to `ts_interfaces/index.ts` maintaining consistency in folder structure.
- Synchronized package description and keywords between `package.json` and `npmextra.json`.
- Ensured proper build script path in `package.json`.

## 2024-12-18 - 1.0.6 - fix(core)

No code changes detected.

## 2024-12-18 - 1.0.5 - fix(core)

Corrected package and npm extra configuration to ensure consistent naming.

- Updated 'name' field in `package.json` from '@signature.digital/portablecontract' to '@signature.digital/tools'.
- Updated 'gitrepo' in `npmextra.json` from 'portablecontract' to 'tools'.
- Updated 'npmPackagename' in `npmextra.json` from '@signature.digital/portablecontract' to '@signature.digital/tools'.

# 2023-11-22 to 2023-11-28 - 1.0.1 to 1.0.4 - core updates

Fixes and updates in the core component.

- Updated core module to enhance performance and fix minor bugs in version 1.0.1
- Subsequent updates to core module for improved stability in version 1.0.2
- Applied additional fixes and improvements in version 1.0.3
- Finalized core updates in version 1.0.4