Tech Design Spec – CBAM Express Fix

Product: CBAM Express Fix (Schema-Only Tier)

Version: v1.0

Prepared By: Filentra Founder

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1. PURPOSE

This document defines the full technical specification for the CBAM Express Fix product. The purpose is to generate schema-compliant CBAM XML filings from importer data inputs while running fallback audits, quality control checks, and optional output bundling (PDF memo, ZIP). This spec fully aligns with the official EU CBAM User Manual (v1.81) and XSD schema.

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2. INPUT STRUCTURE

2.1 Required Format

Client must provide a structured XLSX file (based on Filentra's template), matching all required CBAM quarterly reporting fields.

2.2 Data Elements (per Quarterly Report)

Header Section:

- Declarant EORI

- Declarant Legal Name

- Reporting Period (Quarter, Year)

- Document Language: Hardcoded to 'en'

- Is Adjustment: Y/N

- Indirect Representative: Optional

Goods Section (Multi-row, one per good):

- Goods Item Number (auto-generated)

- CN Code / HS Code

- Country of Origin

- Quantity (Net Mass)

- Quantity (Supplementary, if applicable)

- Emission Type: Actual / Default

- Emissions (Scope 1, Scope 2, Embedded)

- Emission Determination Type

- Default Value Used (Y/N)

- Verifier Present (Y/N) — optional until Jan 2026

- Fallback Reason (text) — if fallback used

- Carbon Price Paid (Y/N)

- Instrument Name, Exchange Rate, Rebate Claimed

Installation Section (if actual emissions declared):

- Installation ID (O3CI ID)

- Operator ID

- Legal Name

- Address, Country

- Economic Activity

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3. OUTPUT STRUCTURE

3.1 Main Deliverables:

- XML file (schema-validated against EC’s official XSD)

- Audit Memo PDF (generated from Markdown)

- ZIP bundle containing:

- XML

- Audit Memo PDF

- Optional source XLS (if selected)

3.2 XML Header Settings:

- documentLanguage = 'en'

- reportingPeriod, declarantId, declarantName from XLS

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4. CORE MODULES

4.1 XLS Parser:

- Reads structured XLS, validates required fields

- Rejects if critical columns are missing or renamed

- Converts rows into internal JSON model matching XSD

4.2 XML Generator:

- Converts JSON model into EC schema XML

- Applies defaults where necessary

- Injects document header fields

- Validates against .xsd (live)

4.3 Fallback Audit Engine:

Outlier Detection Logic (Updated):

Since the EU does not publish a full distribution dataset for emissions per CN code, Filentra applies conservative buffers against the EU default values.

- If declarant-reported emissions ≥ 2× EU default → flag as outlier

- If declarant-reported emissions ≤ 0.5× EU default → flag as outlier

This logic applies to Scope 1, Scope 2, and Embedded Emissions fields, wherever applicable.

- Calculates fallback share per CN Code

- Flags >20% fallback use

- Detects exact-match emissions = EU default

- Flags missing verifier (if required)

4.4 Markdown Audit Memo Generator:

- Captures fallback audit summary

- Lists each flagged CN code

- Describes fallback justification (if present)

- Lists warnings and recommendations

4.5 ZIP Exporter:

- Packages XML + Audit Memo PDF into single ZIP

- Optional: includes source XLS

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5. EDGE CASES HANDLED

- Blank input file → immediate reject

- Missing required column → reject with field name

- Duplicate CN codes → allowed if from distinct installations

- Adjustment flag = Y → add reportingPeriodCorrection node

- Special characters in company name → XML escape (&, <, >)

- Country of Origin mismatch → flagged

- Emission missing + no fallback → reject

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6. FILE VALIDATION & SCHEMA

- Uses EU official CBAM XML Schema Definition (XSD v1.4.1.1)

- Full validation before file delivery

- All namespaces and tags conform to EC spec

- Fails if undeclared fields are added

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7. STORAGE & SECURITY

- Uploads stored temporarily (max 30 days)

- Only schema-valid files retained

- Audit Memo stored only if fallback used

- GDPR-compliant purge mechanism

- No personal data stored (supplier names not required)

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8. API ENDPOINTS (Planned Internal)

- POST /upload-cbam-xls → Upload XLS

- GET /generate-xml → Returns XML file

- GET /generate-audit → Returns PDF

- GET /download-zip → ZIP file with XML + PDF

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9. POST-LAUNCH ENHANCEMENTS (Planned)

- O3CI Registry validation API (if public)

- EC Registry auto-upload bot (if login APIs open)

- Fallback reason classification (semantic grouping)

- PostHog event tracking: schema\_pass, audit\_flagged, zip\_downloaded

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10. OWNER

- Product Owner: Founder

- Tech Reviewer: TBD

- Audit Logic Author: Internal CBAM compliance lead