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Chain of custody — General terminology and models

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Project Committee ISO/PC 308, *Chain of custody — General terminology and models*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Understanding the origin of input materials, product components, product outputs and the conditions under which they are produced is becoming increasingly important. Manufacturers want to demonstrate compliance with requirements regarding health and safety, as well as environmental, social and quality-related aspects, while consumers or other end users need to be able to trust the claims made for these products. The main drivers are government policies, consumer and business demand. Companies directly active in a chain of custody (e.g. manufacturers, traders, logistic and transport service providers, retailers) as well as those investing in such companies (e.g. financial institutions, governments) need transparency to understand and manage risks, to secure quality and to facilitate the implementation of a reliable chain of custody system.

Chain of custody systems have become an indispensable element of many different applications, such as certification schemes for food safety, sustainable agriculture, forestry, aquaculture or fisheries, social compliance, manufacturing, construction and mineral mining. They enable information associated with a product and/or production characteristics to be shared among various organizations active in the chain of custody such as material and ingredient suppliers, processors, contractors, transportation companies, (private or regulatory) scheme owners, financial institutions, companies active in refurbishing and recycling, governmental organizations, end customers, and consumers or other end users.

Although these many systems differ in scope and use terminology relevant to the sector and product-specific needs, and might also diverge on semantics and presentation, they deal with the same challenges and are based on the same range of chain of custody models. The proliferation of systems and definitions causes unnecessary confusion, complexity and inconsistency. It also reduces the degree of trustworthiness of information (e.g. related claims) and increases costs for organizations active in the chain of custody. These complexities and resulting costs can be a barrier to market access, especially for smaller companies and developing countries.

The aim of this document is to provide

— unambiguous definitions of the different chain of custody models, and

— the corresponding requirements, which are independent of sectors, materials, products, and issues addressed.

These requirements are applicable to any organization operating at any step in the supply chain. Chain of custody models are also referred to as "chain of custody methods" or "chain of custody concepts". In this document, the term "chain of custody models" is used to describe the approach taken to control inputs and outputs and associated information in a particular chain of custody system. This multi-sector globally applicable International Standard serves as a reference point for existing and future commodity or sector specific chain of custody standards.

As each chain of custody model represents a different level of physical presence of the specified characteristic in the output, this document provides general guidance on the application of the defined chain of custody models, including initial guidance on the circumstances under which each chain of custody model might be appropriate.

This document does not specify or recommend a management system. Users can refer to this document, clearly stating which models of chain of custody described in this document are used as a basis in their chain of custody systems.

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Chain of custody — General terminology and models

1 Scope

This document defines a framework for chain of custody by providing:

— a consistent generic approach to the design, implementation and management of chains of custody;

— harmonized terminology;

— general requirements for different chain of custody models;

— general guidance on the application of the defined chain of custody models, including initial guidance on the circumstances under which each chain of custody model might be appropriate.

This document is applicable to all materials and products. It does not apply to services as final outputs.

This document can be used by any organization operating at any step in a supply chain, as well as by standard setting organizations as a reference point for specific chain of custody standards.

This document can enhance the transparency of specific claims regarding materials or products and thereby support the reliability of these claims. It is not intended to be used on its own to make or verify such claims.

This document is not, on its own, able to support claims about an organization's materials or products. This is misleading, especially to consumers and other end customers, as the existence of a chain of custody system alone does not specify the characteristics or the conditions under which materials or products are produced. This document includes requirements and guidance regarding this issue.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1 Terms related to chain of custody design

3.1.1
chain of custody
process by which *inputs* (3.2.2) and *outputs* (3.2.3) and associated information are transferred, monitored and controlled as they move through each step in the relevant *supply chain* (3.2.1)

3.1.2
chain of custody system
set of measures designed to implement a *chain of custody* (3.1.1), including documentation of these measures

Note 1 to entry: The purpose of a chain of custody system is to provide credibility that the given material or product has a set of *specified characteristics* (3.2.5).

Note 2 to entry: The information linked to materials or products is transferred, monitored and controlled throughout the entire *supply chain* (3.2.1) or parts of it.

3.1.3
chain of custody model
approach taken to control *inputs* (3.2.2) and *outputs* (3.2.3) and associated information in a particular *chain of custody system* (3.1.2)

Note 1 to entry: A chain of custody model is typically designed to preserve a set of *specified characteristics* (3.2.5).

Note 2 to entry: The chain of custody models are defined in 3.3 and summarized in Table 1.

3.2 Terms related to supply chain

3.2.1
supply chain
series of processes or activities involved in the production and distribution of a material or product through which it passes from the *source* (3.2.8)

Note 1 to entry: A supply chain is typically composed of a series of different organizations.

3.2.2
input
material or product that enters an organization or part of an organization

Note 1 to entry: Input may be used at any stage of the *supply chain* (3.2.1).

Note 2 to entry: Input may also include reused and recycled materials or products.

Note 3 to entry: Input will have associated information.

[SOURCE: ISO 14044:2006+A1:2017, 3.21, modified — The wording and Note 1 to entry have been modified. Notes 2 and 3 to entry have been added.]

3.2.3
output
material or product that leaves an organization or part of an organization

Note 1 to entry: Output can be created at any stage of the *supply chain* (3.2.1).

Note 2 to entry: Output might include other products resulting from production processes.

Note 3 to entry: Output will have associated information.

[SOURCE: ISO 14044:2006+A1:2017, 3.25, modified — The wording and Note 1 to entry has been modified. Notes 2 and 3 to entry have been added.]

3.2.4
characteristic
distinguishing feature

[SOURCE: ISO 9000:2015, 3.10.1, modified — Notes 1 to 3 to entry have been deleted.]

3.2.5
specified characteristic
set of *product characteristics* (3.2.6) and/or *production characteristics* (3.2.7) that the chain of custody is designed to maintain

3.2.6
product characteristic
distinguishing feature of a material or product

Note 1 to entry: A product characteristic can be qualitative or quantitative.

3.2.7
production characteristic
distinguishing feature of one or more production processes in the *supply chain* (3.2.1)

Note 1 to entry: Production characteristics sometimes create *product characteristics* (3.2.6). Examples include the grinding of wood, the chemical treatment of wood for pulp production and food cooked at a low temperature. Examples of production characteristics that do not normally create a product characteristic include production according to a particular specification, such as the sustainable production of the material; the absence of child labour; particular human rights standards or the identity of the primary processor.

Note 2 to entry: Production characteristics can include the type of transportation and storage.

3.2.8
source
specific originator at a location of a material or product with a *specified characteristic* (3.2.5)

Note 1 to entry: The originator is typically a specific supplier but can also be a specific manufacturer or specific processor adding a particular characteristic.

3.2.9
site
location with geographical boundaries at which defined activities under the control of an organization are carried out

Note 1 to entry: Sites may be in one geographical area but need not be contiguous. For example, a road can separate two geographical areas that are operated as a single site.

Note 2 to entry: Activities can include material extraction, production, manufacturing, recycling, storage, trade and/or transportation.

3.2.10
process
set of interrelated or interacting activities that use *inputs* (3.2.2) to deliver an intended *output* (3.2.3)

Note 1 to entry: A process can include services.

[SOURCE: ISO 9000:2015, 3.4.1, modified — The word “result” has been replaced by “output”. Notes 1 to 6 to entry have been deleted.]

3.3 Terms related to chain of custody models

3.3.1
identity preserved model
chain of custody model (3.1.3) in which the materials or products originate from a single *source* (3.2.8) and their *specified characteristics* (3.2.5) are maintained throughout the *supply chain* (3.2.1)

3.3.2
segregated model
chain of custody model (3.1.3) in which *specified characteristics* (3.2.5) of a material or product are maintained from the initial *input* (3.2.2) to the final *output* (3.2.3)

Note 1 to entry: Addition of material with different characteristics and/or grade to the input is not allowed.

Note 2 to entry: Commonly, material from more than one source contributes to a chain of custody under the segregated model.

3.3.3
controlled blending model
chain of custody model (3.1.3) in which materials or products with a set of *specified characteristics* (3.2.5) are mixed according to certain criteria with materials or products without that set of characteristics resulting in a known proportion of the specified characteristics in the final *output* (3.2.3)

Note 1 to entry: This chain of custody model is also referred to as the "single percentage method".

3.3.4
mass balance model
chain of custody model (3.1.3) in which materials or products with a set of *specified characteristics* (3.2.5) are mixed according to defined criteria with materials or products without that set of characteristics

Note 1 to entry: The proportion of the *input* (3.2.2) with specified characteristics might only match the initial proportions on average and will typically vary across different *outputs* (3.2.3).

3.3.5
book and claim model
chain of custody model (3.1.3) in which the administrative record flow is not necessarily connected to the physical flow of material or product throughout the *supply chain* (3.2.1)

Note 1 to entry: This chain of custody model is also referred to as "certificate trading model" or "credit trading".

Note 2 to entry: This is often used where the certified/specified material cannot, or only with difficulty, be kept separate from the non-certified/specified material, such as green credits in an electricity supply.

3.4 Terms related to roles and responsibilities

3.4.1
organization
entity or group of people and facilities with an arrangement of responsibilities, authorities and relationships and identifiable objectives

Note 1 to entry: An organization may encompass multiple (production /geographical) sites.

[SOURCE: ISO 26000:2010, 2.12]

3.4.2
top management
person or group of people who directs and controls an organization at the highest level

[SOURCE: ISO 9000:2015, 3.1.1, modified — Notes 1 to 3 to entry have been deleted.]

3.4.3
requirements setter
person or organization that specifies the requirements for a particular chain of custody

3.5 Terms related to conformity assessment

3.5.1
conformity
fulfillment of a specified requirement

[SOURCE: ISO 9000:2015, 3.6.11, modified — The definition has been modified.]

3.5.2
conformity assessment
demonstration that specified requirements are fulfilled

Note 1 to entry: Conformity assessment can be performed as *first-party activity* (3.5.3), *second-party activity(3.5.4)* or *third-party activity* (3.5.5).

[SOURCE: ISO/IEC 17000:2020, 4.1, modified — Notes 1 to 4 to entry have been deleted. A new Note 1 to entry has been added.]

3.5.3
first-party conformity assessment activity
conformity assessment (3.5.2) activity that is performed by the person or organization that provides or that is the object of conformity assessment

[SOURCE: ISO/IEC 17000:2020, 4.3, modified — Notes 1 and 2 to entry have been deleted.]

3.5.4
second-party conformity assessment activity
conformity assessment (3.5.2) activity that is performed by a person or organization that has a user interest in the object of conformity assessment

[SOURCE: ISO/IEC 17000:2020, 4.4, modified — Notes 1 and 2 to entry have been deleted.]

3.5.5
third-party conformity assessment activity
conformity assessment (3.5.2) activity that is performed by a person or organization that is independent of the provider of the object and has no user interest in the object

[SOURCE: ISO/IEC 17000:2020, 4.5, modified — Note 1 to entry has been deleted.]

3.5.6
audit
process (3.2.10) for obtaining relevant information about an object of *conformity assessment* (3.5.2) and evaluating it objectively to determine the extent to which specified requirements are fulfilled

[SOURCE: ISO/IEC 17000:2020, 6.4, modified — Notes 1 to 3 to entry have been deleted.]

3.5.7
inspection
examination of an object of *conformity assessment* (3.5.2) and determination of its conformity with detailed requirements or, on the basis of professional judgement, with general requirements

[SOURCE: ISO/IEC 17000:2020, 6.3, modified — Notes 1 to 3 to entry have been deleted.]

3.5.8
verification
confirmation of truthfulness, through the provision of objective evidence that specified requirements have been fulfilled

Note 1 to entry: The objective evidence needed for a verification can be the result of an *inspection* (3.5.7), *audit* (3.5.6) or other forms of determination such as performing alternative calculations or reviewing documents.

Note 2 to entry: The activities carried out for verification are sometimes called a "qualification process" and can result in *certification* (3.5.9).

Note 3 to entry: The word “verified” is used to designate the corresponding status.

[SOURCE: ISO 9000:2015, 3.8.12, modified — In Note 2 to entry, the wording has been modified.]

3.5.9
certification
third-party attestation related to an object of *conformity assessment* (3.5.2), with the exception of accreditation

[SOURCE: ISO/IEC 17000:2020, 7.6]

3.5.10
claim
declared information regarding the *specified characteristics* (3.2.5) of a material or product

3.6 Terms related to traceability

3.6.1
traceability
ability to trace the history, application, location or source(s) of a material or product throughout the *supply chain* (3.2.1)

[SOURCE: ISO 9000:2015, 3.6.13, modified — The wording has been modified. Notes 1 and 2 to entry have been deleted.]

3.6.2
traceability system
manual or electronic system that provides the ability to access any or all information relating to the material or product under consideration throughout their life cycle, by means of accessing documented information

Note 1 to entry: "Life cycle" should be understood in the broadest possible sense, to include, for example, raw material extraction, agricultural production, final disposal, and reuse or recycling, as well as all other stages connected with product manufacture and use.

4 Chain of custody design

4.1 General

Although frequently considered as interchangeable, the concepts of traceability and chain of custody are not identical. The difference between these two concepts is described in Annex A.

A chain of custody system encompasses the set of measures supporting responsibility for the custody of materials and products as ownership or control is transferred from one organization to another within the relevant supply chain. A chain of custody usually involves more than one organization.

This document provides a framework and fundamental requirements for a chain of custody system. Depending on, for example, the sector of application, material or product handled, product characteristics and/or specific claim, additional and more specific chain of custody requirements might need to be implemented. When using this document, the organization shall check and evaluate this need.

This document can enhance the transparency of specific claims regarding materials or products by providing common terminology and chain of custody models, and thereby support the reliability of these claims. However, organizations shall not use this document on its own to make or verify such claims. This would be misleading, especially to consumers and other end customers, as the existence of a chain of custody system alone does not specify characteristics or the conditions under which products are produced and therefore cannot support the characteristics or the conditions under which materials or products are produced. Also, any communication associated with materials or products solely concerning conformity to this document shall be avoided, especially towards consumers and other end customers.

In order to make claims about an organization's materials or products, rather than the chain of custody itself, further evidence on conformity with specified characteristics shall be provided.

When materials or products come with a claim of adherence to a certification scheme, which has its own chain of custody rules, for example third-party assessment as certification or verification, and an organization aims to use that claim for its materials or products, the rules of that scheme shall be followed unless that scheme allows the use of this document instead.

4.2 Roles and responsibilities

The identification of actors (e.g. organizations), locations (including sites), inputs, outputs and associated information in the chain of custody is needed to implement any chain of custody model. Understanding which organizations play a role, and sometimes their relationship to each other, in the supply chain is important. In any chain of custody system, it is necessary to distinguish the various actors which play a particular role in the chain of custody or supply chain. Examples of actors in the supply chain include a manufacturer, trader, distributor, carrier, or retailer.

Since a chain of custody is intended to maintain specified characteristics, the functions in such an organized chain of custody are:

— Organizing: overseeing and managing the chain of custody so that there is an unbroken chain that complies with the requirements;

— Requirements setting: setting the specific requirements for the organized chain of custody;

NOTE 1 The specific requirements typically take into account:

— the sector in which the chain of custody system is implemented;

— the specific role of an organization in the supply chain, the materials or products handled;

— their characteristics and/or the type of claims an organization is allowed to make depending on the chain of custody model chosen.

— Conformity assessment: evaluating whether specific requirements are met;

NOTE 2 Verification of the assessment can be performed by the party organizing the chain of custody, managed by a scheme owner, or outsourced to the market. The conformity assessment of the fulfilment of the specific requirements can be a first-party conformity assessment activity (self-assessment), second-party conformity asessment activity (peer assessment) or third-party conformity assessment activity (independent body).

— Implementing: Implementation by individual organizations active in the chain of custody.

Control procedures shall be put in place to avoid materials or products that do not conform to the minimum requirements from entering the chain of custody.

4.3 Properties of chain of custody models

This document defines five different chain of custody models for chain of custody systems. Each model has specific requirements that allow different claims to be made about materials or products and/or production processes that are delivered using that chain of custody model.

The five chain of custody models are:

1) identity preserved model;

2) segregated model;

3) controlled blending model;

4) mass balance model;

5) book and claim model.

One of the basic purposes of this document is to ensure that, whichever chain of custody model or combination of chain of custody models is adopted, its integrity is safeguarded. This subclause provides basic guidance on what the particular chain of custody models achieve.

The choice as to which chain of custody model is appropriate will depend on the benefits and quality the actors in the supply chain aim to achieve. This choice will affect the claims that can be made about materials or products delivered through a particular chain of custody model and how well they match the corresponding expectations of actors in the chain of custody including the consumer or other end users. It will also affect the implementation of administration, logistical and organizational aspects.

Table 1 summarizes the key properties of the five chain of custody models. Examples of the different chain of custody models are given in Annex B.

Table 1 — Summary of the properties of the chain of custody models in this document

	Models without mixing		Models with mixing		
Properties of chain of custody models	**Identity preserved**	**Segregated**	**Controlled blending**	**Mass balance**	**Book and claim**
Connection between administrative document flow and the physical flow of materials and products	Yes	Yes	Yes	Yes	No
Item-based expectations satisfied	Yes	Yes	Yes, for the percentage with specified characteristics	No	No
Market-based expectations satisfied	Yes	Yes	Yes	Yes	Yes
Mixing material with specified characteristics and material with non-specified characteristics is possible	No	No	Yes	Yes	Yes
Assurance that volumes with specified characteristics sold match (or do not exceed) volumes of material with specified characteristics bought	Yes	Yes	Yes	Yes, within the specified time period	No, but claimed volumes shall be in balance with the associated credits
Specified characteristics preservation linked to volume reconciliation over a set time period	No	No	Yes	Yes	Yes
Physical separation of material or products to ensure that the specified characteristics are physically present in the output	Yes	Yes	Yes, for the part with the specified characteristics	No	No
Identify source of a material or product (or material component or product component)	Yes	No	No	No	No

While there can be a great variety in the expectations of those using chain of custody protected materials or products, two main types of expectation can typically be identified:

1) Item-based: the material or product received bears all the characteristics identified by associated information;

2) Market-based: taken as a whole, the market for the material or product received delivers the characteristics identified by associated information.

The identity preserved model satisfies item-based expectations of organizations active in the chain of custody, consumers, or other end users. The segregated model will also satisfy item-based expectations, provided that the exact origin of the received material or product is not one of the claimed characteristics.

Market-based expectations imply that the organizations active in the chain of custody, consumers or other end users are satisfied that on average or in the proportions specified, the purchase of such materials or products will deliver the claimed characteristics. The controlled blending and mass balance models ensure that one of the following applies, as appropriate:

— the claimed proportion of the material or product received will bear the characteristics described in the claim;

— the claimed proportion of a large sample of similar materials or products received (e.g. products within a product group) will bear the characteristics specified in the claim.

The book and claim model is also market-based. While there is no physical custody of material or products involved, the book and claim model aims to ensure that for each purchase for which a claim is made, materials or products with the same specified characteristics have been produced. The book and claim model is most suitable for intangible materials or products and in circumstances where the entire market is controlled.

Market-based expectations can be founded on a desire to promote the production and trade of the material or product with the desired characteristics, independent of any desire actually to purchase materials or products bearing them. Satisfying market-based expectations can lead to, for example, a particular instance of a material or product that may not physically contain the specified characteristics. It is very important that the relevant labelling or other associated information makes such facts clear.

Claims regarding specified characteristics may be based on schemes (e.g. certification schemes or programmes for labels), which specify requirements (e.g. for chain of custody rules or third-party conformity assessment). If the organization aims to use these claims for its outputs, the requirements of that scheme shall be applied, unless the scheme allows the use of this document instead.

5 Chain of custody models

5.1 Principles and requirements

The general requirements when implementing chain of custody models, as defined in Clause 6, apply to all organizations active in a chain of custody and to all chain of custody models that are applied. The organization shall implement and maintain a chain of custody system adequate to the organization's type and complexity to ensure the continuous conformity to all applicable chain of custody requirements. Organizations active in the chain of custody shall fulfill the requirements of the requirements setter.

The organization shall establish and implement one or more of the chain of custody models for all materials or products with specified characteristics and shall be transparent about the model chosen.

The organization shall only use the same chain of custody model as its supplier or a model with lower physical presence of the specified characteristic in the output. The list of chain of custody models, ranked from highest to lowest physical presence of the specified characteristics is illustrated in Figure 1.

NOTE In the book and claim model, the administrative flow is not connected to the physical flows throughout the chain of custody. Within the same chain of custody, it is not possible to switch from the book and claim model to other chain of custody models.

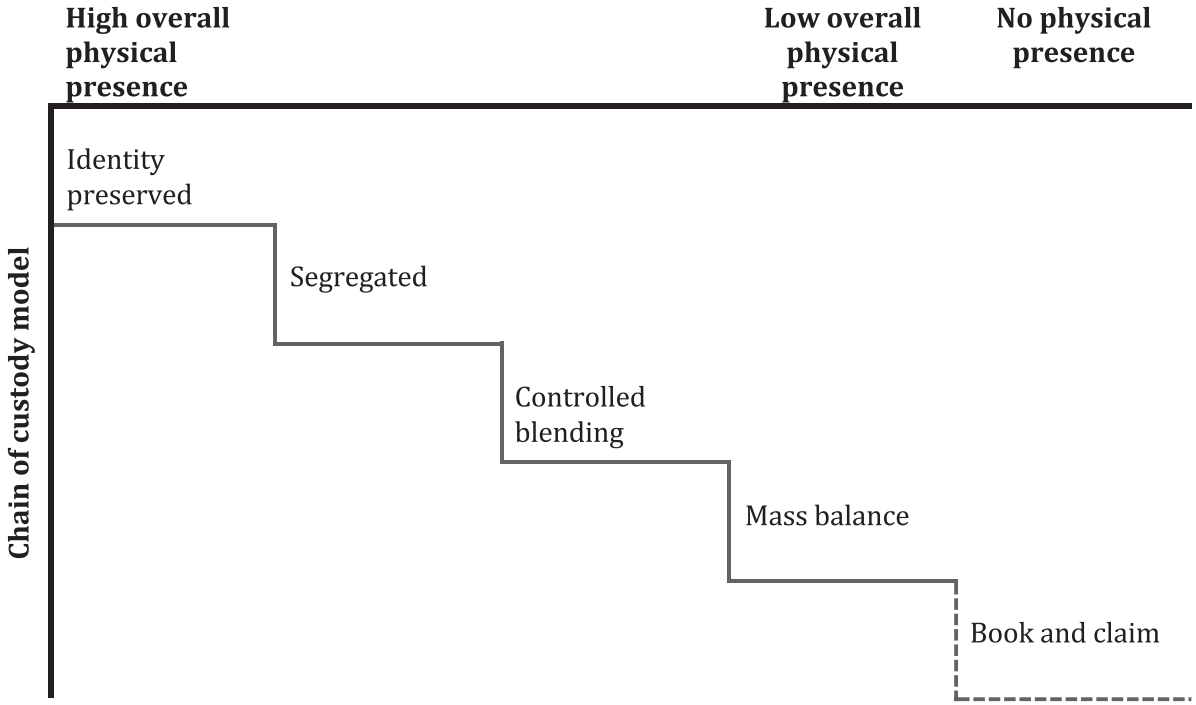


Figure 1 — Indicative illustration of chain of custody models ranked according to the physical presence of specified characteristics

Each of the chain of custody models is linked to different options for making claims regarding the specified characteristics. When using any chain of custody model involving mixing, the requirements setter shall define relevant minimum requirements for all inputs based on associated risks.

NOTE Examples of associated risks are child labour, forced labour, working conditions, environment, etc. To assess and address risk is a significant task and cannot be solved by the implementation of a sound chain of custody system. Further guidance can be found in ISO 26000[16], ISO Guide 73[1] and the ISO 31000[17] series.

5.2 Appropriate use of chain of custody models

In some industries, the existing chain of custody definitions require the physical presence of the specified characteristics of a product or material to be maintained. In these industries, only the identity preserved, the segregated and the controlled blending model are considered as appropriate chain of custody model.

In some private and regulatory frameworks, claims regarding the content can be generated by the mass balance approach. In these cases, it shall be transparently shown how the claimed content is calculated. For communication, it shall be clear that this content does not necessarily correspond directly to physical content in the product.

An organization should apply the rules for ethical claims and supporting information when using chain of custody models to prevent misleading claims on the material or product.

NOTE For applicable requirements for ethical claims and supporting information, refer to, for example, ISO/TS 17033[26], the ISEAL claims good practice guide[23] and national legislation.

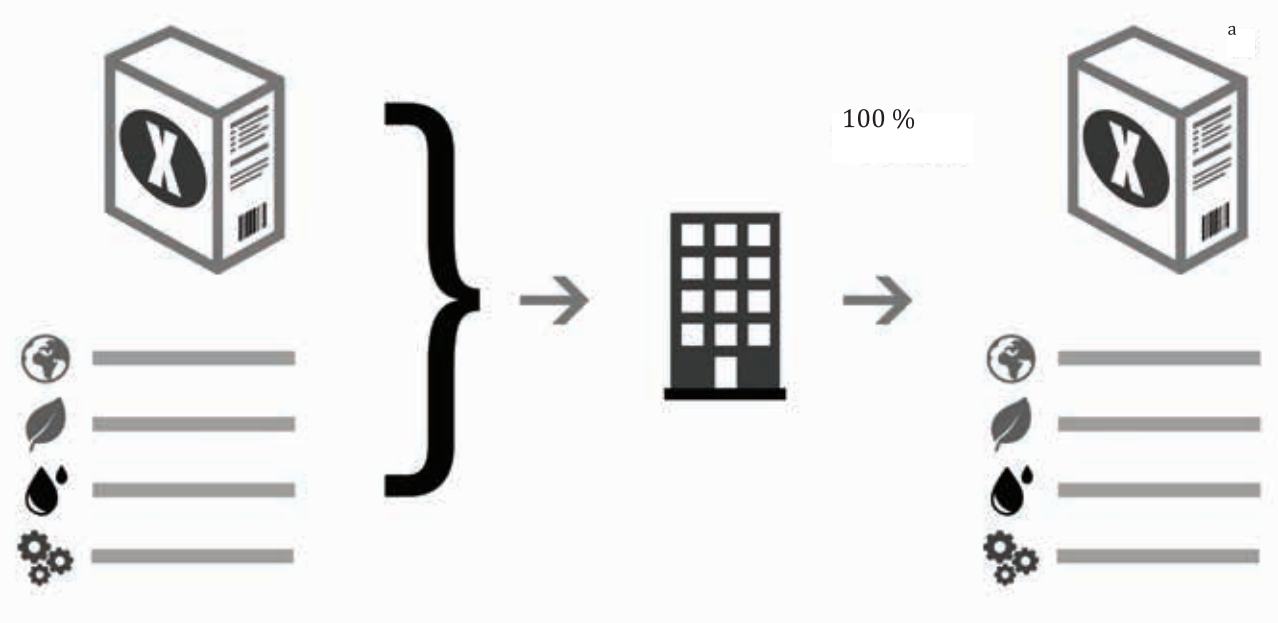
5.3 Chain of custody models without mixing

5.3.1 Identity preserved model

5.3.1.1 General

The identity preserved model is a chain of custody model, in which the inputs originate from a single source. In the identity preserved model, the material or product is kept physically separated and its characteristics are maintained throughout the supply chain. Materials or products are clearly identifiable throughout the supply chain as originating from the single source.

The specified characteristics of the material or product determined by the specific source it originates from shall be maintained by the organizations active in the chain of custody. The material or product can be traced all the way back to the source from which it originates. A simplified illustration of the identity preserved model for a single tier in the supply chain is shown in Figure 2.



Key

inputs with specified characteristics

outputs with specified characteristics

organization

a The specified characteristics are clearly identifiable as originating from a single source.

Figure 2 — Simplified illustration of the identity preserved model

5.3.1.2 Supply chain requirements

An organization active in the chain of custody applying the identity preserved model shall ensure that the material or product with specified characteristics is physically separated and clearly identifiable throughout all stages of the production and transportation and the trading process. It shall ensure that the material or product is clearly identifiable to a particular single source.

This shall be achieved by:

— physical separation of inputs and outputs with specified characteristics including single source from any other inputs and outputs during, for example, production, transport and storage;

— clear identification of the materials or products during the process;

— the output quantities corresponding to the input quantities are in line with an appropriate conversion factor (see 6.8).

5.3.1.3 Specified characteristics

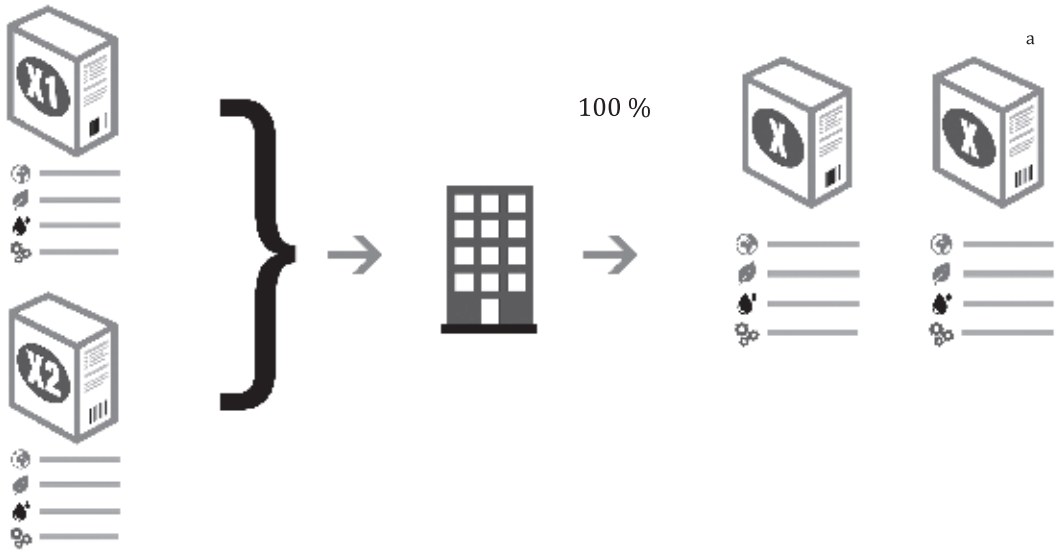
The organization active in the chain of custody shall define which specified characteristics of the material or product are maintained (including the source) and which materials or products are kept physically separated from all others.

5.3.2 Segregated model

5.3.2.1 General

The segregated model is a chain of custody model in which, from initial input to final output, the specified characteristics are maintained. Inputs from different sources may be mixed, based on identical characteristics. However, the identity of any particular source might be lost.

In the segregated model, materials or products with certain specified characteristics are kept physically separated and their characteristics are maintained throughout the supply chain. The inputs will have identical characteristics but may have different sources. A simplified illustration of the segregated model is shown in Figure 3.



Key

	inputs with identical specified characteristics from different sources		outputs with identical specified characteristics
	organization	a	The outputs can contain inputs from different sources with identical specified characteristics.

NOTE The proportions of X1 and X2 need not always be the same unless the specified characteristics require it.

Figure 3 — Simplified illustration of the segregated model

5.3.2.2 Supply chain requirements

The organization active in the chain of custody applying the segregated model shall ensure that the material or product with specified characteristics is physically separated and clearly identifiable throughout all stages of the production and the trading process.

This shall be achieved by:

— physical separation of inputs and outputs with specified characteristics from any other inputs and outputs during, for example, production, transport and storage;

— clear identification of the material or products during the process;

— the output quantities corresponding to the input quantities in line with an appropriate conversion factor (see 6.8).

5.3.2.3 Specified characteristics

The organization active in the chain of custody shall define which specified characteristics are maintained and kept physically separated.

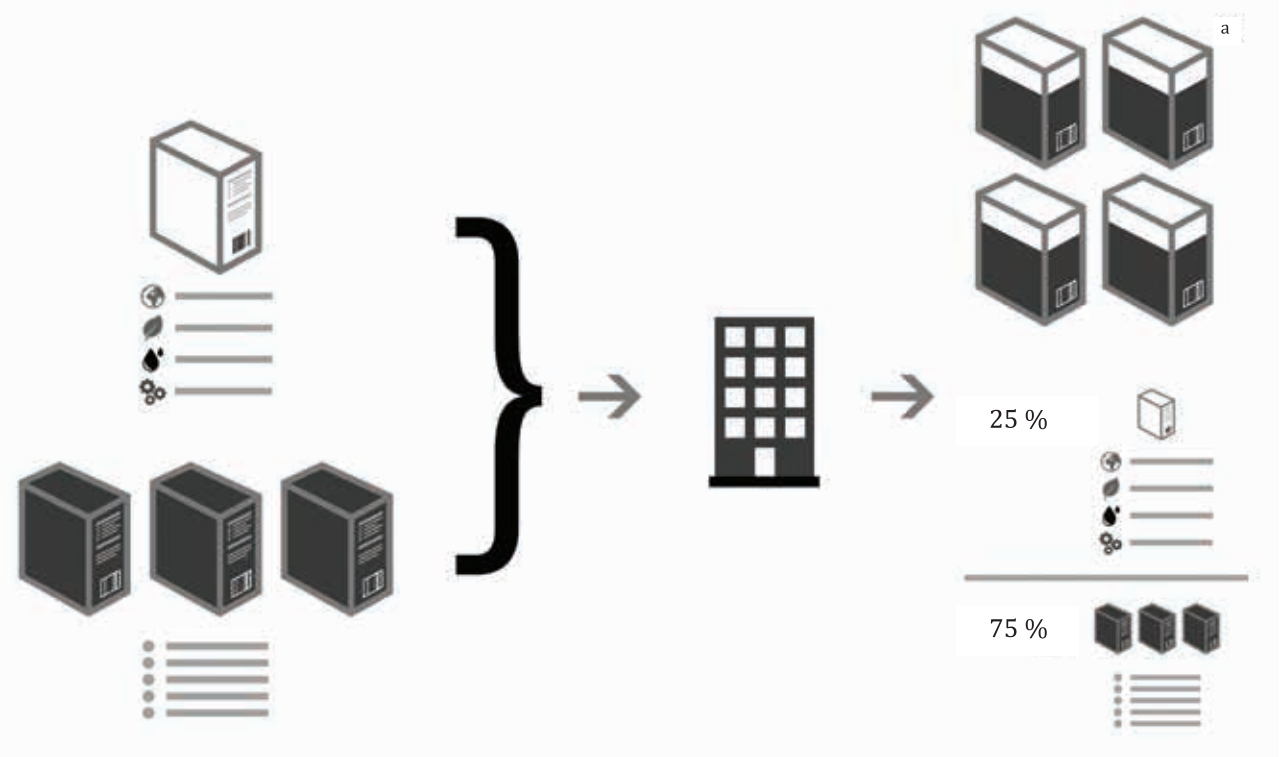
5.4 Chain of custody models with mixing

5.4.1 Controlled blending model

5.4.1.1 General

The controlled blending model is a chain of custody model in which materials or products with a set of specified characteristics are mixed according to certain criteria with materials or products without that set of characteristics. This results in a known proportion of the specified characteristics within all parts of the final output.

The ratio between inputs is known for all outputs at all times for a contained volume (e.g. batch, shipment, storage facility). The output percentages can therefore be ensured in all cases. A simplified illustration of the controlled blending model is shown in Figure 4.



Key

	inputs with specified characteristics		outputs
	inputs with non-specified characteristics	a	Each output contains a verifiable amount of 25 % material with specified characteristics.
	organization		

Figure 4 — Simplified illustration of the controlled blending model

5.4.1.2 Supply chain requirements

The organization active in the chain of custody shall ensure that the quantity of physical inputs and outputs (volume or weight) at the site are monitored and documented.

The organization shall ensure that the output supplied to customers from a site does not exceed the percentage of input with specified characteristics received at the site. The percentage of controlled blended output delivered is always subject of the available percentage as determined by input, current stock or combination thereof. This shall be achieved by:

— physical separation of blended material or product in terms of production, transport and storage;

— clear identification of the blended material or product during the process;

— the output quantities corresponding to the input quantities in line with an appropriate conversion factor (see 6.8).

The requirement setter shall consider and document relevant minimum requirements for all inputs to the chain of custody system based on relevant risks.

5.4.1.3 Specified characteristics

The organization active in the chain of custody shall deliver the required percentage of each output with specified characteristics in accordance with the requirements of the chain of custody system.

5.4.1.4 Volume reconciliation/Reconciliation periods

Materials or products with specified characteristics shall be processed over a specified timeframe. For the inventory balancing period (see 6.9), the incoming percentage of controlled blending input shall be known beforehand in order to determine the percentage of conforming output before delivery. The ratio determines the delivered percentage of controlled blending output per contained volume (e.g. batch, shipment, storage facility).

5.4.2 Mass balance model

5.4.2.1 General

The mass balance model is a chain of custody model in which materials or products with specified characteristics are mixed with materials or products without some or all of these characteristics, resulting in a claim on a part of the output, proportional to the input.

NOTE The achievement of the proportionality on the output can involve intermediate steps with other defined relations to the input.

For this mass balance model, two implementation methods are specified:

1) rolling average percentage method (see 5.4.2.2.1);

2) credit method (see 5.4.2.2.2).

This chain of custody model gives the organization active in the chain of custody the opportunity to monitor input characteristics for:

— continuous processes;

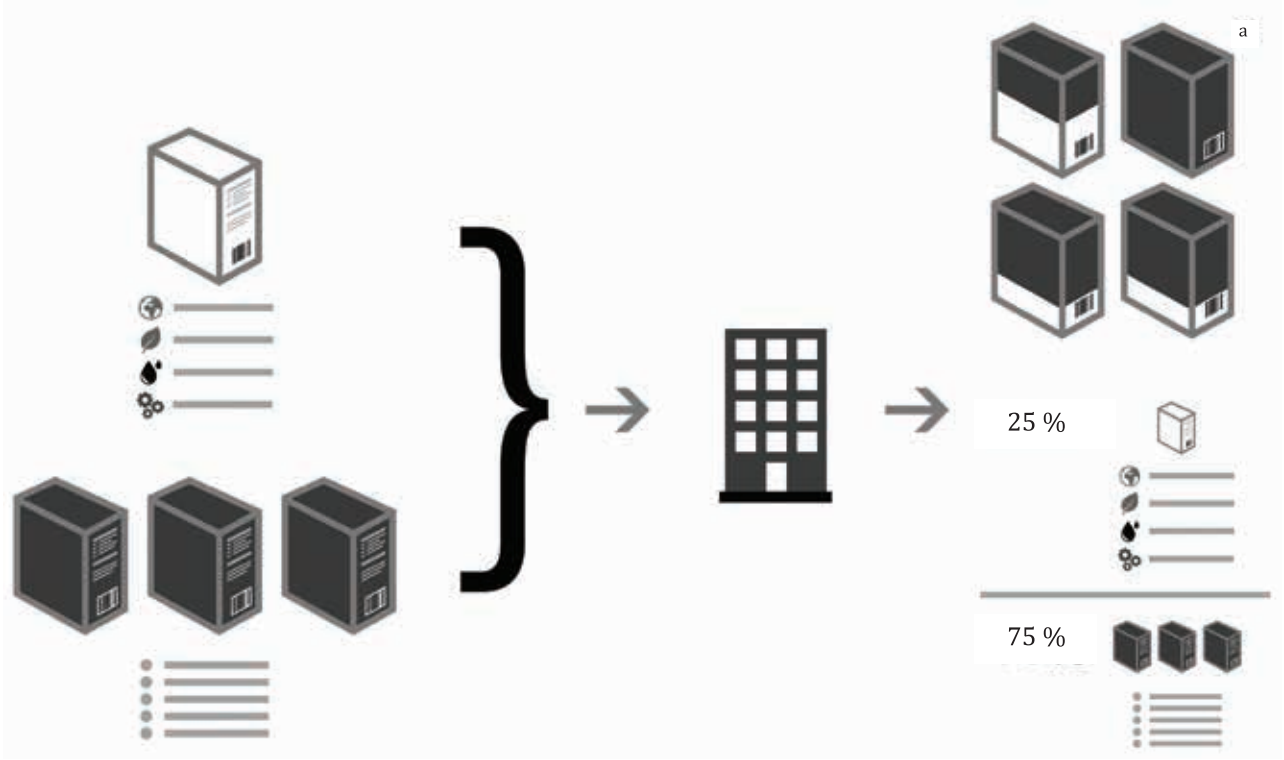
— a single site;

— multiple inputs between multiple sites.

The organization active in the chain of custody shall determine, according to the requirements of the chain of custody system, the geographical area and the timeframe within which the materials or products are mixed.

The requirement setter shall consider and document relevant minimum requirements for all inputs to the chain of custody system based on relevant risks.

A simplified illustration of the mass balance model is shown in Figure 5.



Key

	inputs with specified characteristics		outputs
	inputs with non-specified characteristics	a	On average and over a certain period of time, the outputs contain a minimum of 25 % material with specified characteristics.
	organization		

Figure 5 — Simplified illustration of the mass balance model

5.4.2.2 Mass balance implementation methods

5.4.2.2.1 Rolling average percentage method

The rolling average percentage method is based on the use of a fluctuating proportion of input bearing specified characteristics entering the organization over a defined claim period, allowing a claim of an average percentage to be made for the output over the claim period.

The organization shall calculate the average percentage of the inputs and outputs of a defined category for each material or product. For each material or product, the organization shall define claim periods,

which shall correspond to the claimed relation of the input to the output. These input and output claim periods shall not exceed the specified timeframe.

5.4.2.2.2 Credit method

The credit method is applicable when two or more types of input are used in a material or product. The recorded output amount of each type shall be equivalent to the physical input, taking into account the conversion factor.

The conversion factor shall be defined within each material or product at each site and it shall be applied to define the amount of credit to enter the credit account, when using the output as the basis for calculation, or to withdraw the credit when using the input as the basis for calculation.

The credit account balance shall be calculated for each period according to the formulae given in Annex C. For each material or product, the organization shall set up and maintain a credit account for each type of input used as an output declaration. The organization shall ensure that the credit account is not overdrawn within the balancing period.

An organization using the credit method shall deduct from the credit account the respective credit of the output, up to the limit in, but not exceeding, the credit account within the balancing period.

The balancing period shall not exceed the evaluation period (see 6.5). The balancing period should be as short as possible. The length of the balancing period shall be evaluated, taking into account the varying needs of different sectors and the desired effectiveness of the system.

Credits shall expire after a defined period of time (usually set by the requirements setter).

5.4.2.3 Volume reconciliation/Reconciliation periods

The inputs and outputs shall be balanced. The organization shall ensure a zero or positive balance within the balancing period.

The organization shall provide evidence that volumes of material or products with specified characteristics supplied to customers are balanced with the volumes bought by the organization with the same specified characteristics.

5.5 Book and claim model

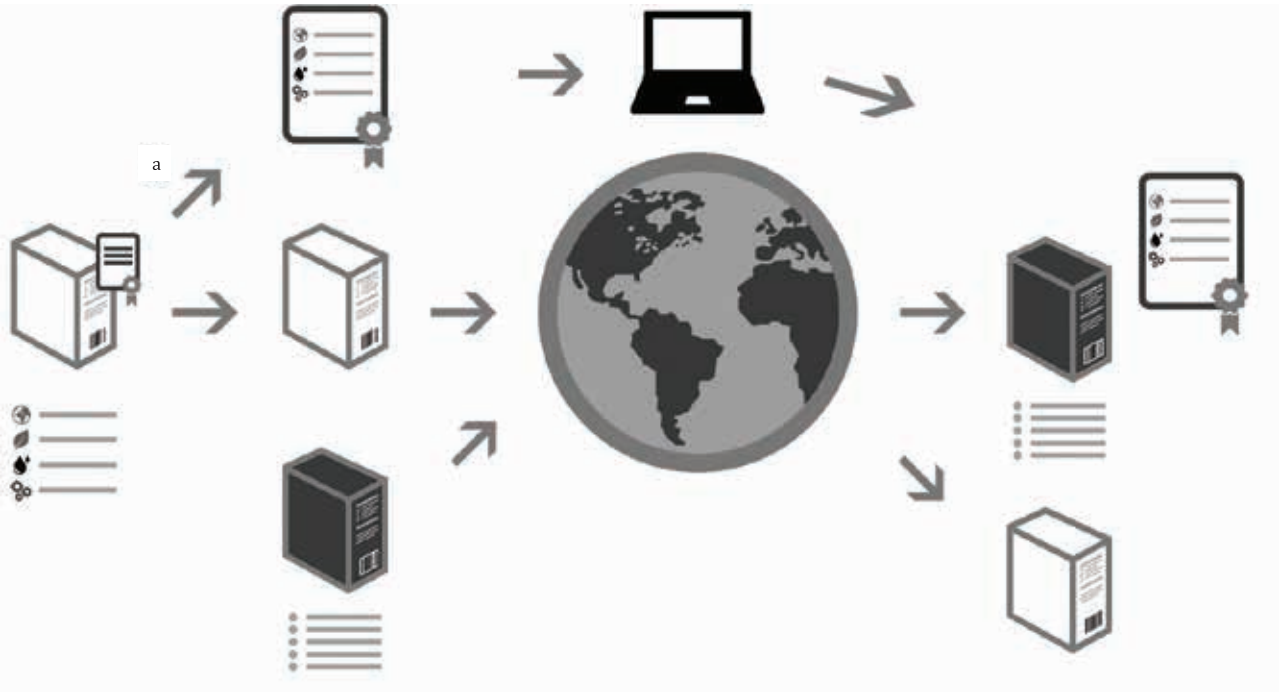
The book and claim model aims to ensure that for each purchase for which a claim is made, materials or products with the same specified characteristics have been produced. The book and claim model is most suitable for intangible materials or products and in circumstances where the entire market is controlled.

The book and claim model is an alternative chain of custody model in which the administrative record flow is not connected to the physical flow of materials or products throughout the supply chain. After production the information on specified characteristics within the supply chain is decoupled from any material or product. Credits are issued when materials or products enter the market. The credits may be traded and sold independently of the physical delivery of materials or products.

The entry to the market of materials or products under book and claim may take place after part of the supply chain has operated under another chain of custody model (see 4.3).

Credits shall be reliably controlled and double counting of credits shall be avoided at all times. The credits shall be cancelled as soon as they have been redeemed, based on use or consumption of corresponding output. Credits shall expire after a defined period of time (usually set by the requirements setter).

A simplified illustration of the book and claim model is shown in Figure 6.



Key

inputs with specified characteristics	controlled market
credit	administrative system
inputs with non-specified characteristics	outputs with credit for specified characteristics
a The administrative records are decoupled from the physical flow of the materials or products.	inputs/outputs with decoupled specified characteristics

Figure 6 — Simplified illustration of the book and claim model

6 General requirements for organizations active in a chain of custody

6.1 General

Clause 6 provides requirements that apply to all organizations active in the chain of custody. The requirements apply to all chain of custody models described in this document.

6.2 General requirements for implementation

The organization shall ensure that the chain of custody system:

a) specifies the boundaries and applicability of the system to establish its scope. The scope shall be documented;

b) specifies the personnel responsible and their roles for implementing the various requirements of a specific chain of custody model (see Clause 5);

c) specifies the procedures needed for the implementation of a specific chain of custody model. These procedures shall:

   — take into account the requirements of the specific chain of custody model;

   — specify the documented information that needs to be kept by the organization;

d) provides documented information, including templates, forms, records, and documents necessary for conformity with this document.

The organization(s) active in an organized chain of custody shall fulfill the requirements of the requirements setter.

6.3 Top management responsibility

The organization's top management shall establish and document its commitment to implement and maintain the chain of custody requirements in accordance with this document. The commitment of the organization shall be made available publicly and to the organization's personnel, suppliers, customers and other stakeholders where relevant.

The organization's top management shall:

a) assign responsibility and authority for ensuring the chain of custody system conforms to the requirements of this document;

b) allocate adequate and appropriate resources to carry out their commitments, including competences needed and the training of personnel and monitoring of the organization's implementation of its chain of custody system;

c) allocate adequate and appropriate resources to ensure that the organization's personnel, suppliers, customers and other stakeholders have access to information on the commitment of the organization regarding the chain of custody system and requirements.

6.4 Competence

The organization shall:

a) determine the necessary competences of person(s) doing work under its control that affect the performance of its chain of custody system;

b) ensure that these persons are competent on the basis of appropriate education, training, and/or experience, where applicable, take actions to acquire the necessary competence, and evaluate the actions taken;

   NOTE Applicable actions can include training, specific and relevant to the task(s) to be performed, for persons carrying out the tasks for the effective implementation of the chain of custody system.

c) retain documented information as evidence of competence.

6.5 Evaluating performance and dealing with non-conformities

The organization shall regularly evaluate the performance of its chain of custody system.

The evaluation shall at least address:

a) monitoring, measuring, analysing and evaluating the performance of the chain of custody system;

b) conducting audits to evaluate the performance of the chain of custody system procedures and the conformance with all applicable requirements. The frequency shall be at least annual, and any additional audits required shall be based on an assessment of risk. The type of audit shall be

appropriate to the risks identified and defined by the organization or the requirement setter. These audits shall cover all processes and the selected sites handling the product;

NOTE 1 "Types of audit" include first-party, second-party or third-party involvement, internal and/or external audits, on-site and/or off-site audits (or a combination thereof).

If annual assessment of all sites is not possible, the organization active in the chain of custody may prioritize particular sites based on a documented risk assessment.

c) review by top management of the organization's chain of custody system, at planned intervals, at least annually. The management review shall be documented.

The organization shall establish and implement documented procedures to handle non-conformities (including those related to delivered materials and products) that are related to the organization's chain of custody. The organization shall ensure that appropriate corrective actions are taken within a defined timeframe. Non-conformities and the resulting actions taken shall be documented.

If the organization becomes aware of any non-conformities, it shall immediately and proactively inform the chain of custody organizer and its relevant partners throughout the supply chain.

NOTE 2 The format requirements described in ISO 21378[13] give guidance on how to effectively share audit data and to improve the accessibility and transparency of audit data by a standardized process of audit data collection.

6.6 Documented information

6.6.1 General

The organization active in the chain of custody shall maintain complete and up-to-date documented information relevant to demonstrating the organization's conformity with all applicable chain of custody requirements.

Retention time for all documented information, including purchase and sales documents, training records, and production records, shall respect the retention time of the relevant chain of custody, and shall be specified considering among other factors, long term effects and the lifetime of the material or product. The organization should be able to confirm the status of materials or products held in stock at all times.

Documented information relating to all transactions shall be available (documents are generated when a transaction is registered, or when an overview of all transactions and events is registered) and should allow verification of the chain of custody model at an appropriate level. This documented information shall identify the material or products at stake and describe their physical flow where relevant. The information may consist of written documents and procedures and/or an automated control of the chain of custody system.

Examples of documented information include:

— supplier assessment of the defined specified characteristics of the inputs and outputs;

— purchase documents including, for example, purchase orders, contracts, invoices and records of incoming goods receipts inspections, delivery notes and received quantities;

— processing information including the conversion factor and specifications, stock records and quantities of materials and products, stored and finished;

— production records;

— sales orders, sales invoices issued by the organization active in the chain of custody, dispatch information including dates, customers to which the batch or lot was dispatched, quantities of delivery records;

— stock records including inventory balancing;

— transporter or shipper details.

6.6.2 Control of documented information

The organization shall establish and maintain documented information in order to demonstrate conformance with all applicable requirements in this document.

Information from external organizations or other stakeholders deemed necessary for planning, operation and management of the chain of custody shall be identified.

For the control of documented information, the organization shall at least define:

a) distribution, access, retrieval and use;

b) adequate protection (e.g. from loss of confidentiality, improper or malicious use, or loss of integrity);

c) storage and preservation, including preservation of legibility;

d) change(s) in version;

e) retention time and disposal (considering e.g. confidentiality);

f) who in the organization authorized any changes in version.

The organization shall allow relevant organizations in the chain of custody to have access to the documented information. The need and opportunity for visits to production sites by organizations active in the chain of custody shall be considered by the requirements setter.

NOTE Access can imply a decision regarding the permission to view the documented information only, or the permission and authority to view and change the documented information.

6.7 Assurance

The organization in the chain of custody shall operate a control system for ensuring, assessing, and monitoring that the materials or products received are delivered to specification. The scheduling for such checks shall be defined and documented. The organization shall be transparent about the type of assessment used, i.e. first-party, second-party or third-party conformity assessment activity. The requirements setter may impose specific requirements to the organizations involved in the chain of custody system, with regard to the type of assessment they are subject to. All inputs shall comply with the minimum requirements in 5.1.

This chain of custody system shall include:

a) confirmation that the supplied input complies with the specified characteristics;

b) confirmation that all inputs complies with the minimum requirements in 5.1;

c) confirmation that input and output characteristics have met requirements, as appropriate to the chain of custody model;

d) identification of the material or product based on the defined specified characteristics (where relevant);

e) confirmation of purchase, sale, complaints and transportation documents associated with the output;

f) ensuring that each transaction is clearly identifiable;

g) documentation relating to the sale of material or product, including a reference to the corresponding chain of custody model;

h) a process that ensures that suppliers and outsourced activites are assessed initially, and periodically thereafter, at least annually, to ensure that they meet all of the relevant requirements.

NOTE There is a trade-off between independence and costs depending on the type of conformity assessment activity used.

6.8 Conversion factor

The conversion factor shall be defined for each material or product with specified characteristic at each site depending on the processing or handling performed.

The organization shall ensure that the conversion factor is accurate and justifiable.

The conversion factors used within each processing facility are determined by the organization and are indicated in documented information relating to the transformation of the material or product, and kept up-to-date.

When using the credit method (see 5.4.2.2.2), the conversion factor shall be applied to define the amount of credit to enter the credit account, when using the output as basis for calculation, or to withdraw the credit when using the input as basis for calculation.

6.9 Inventory balancing

Within the chain of custody, the quantities received and supplied to customers shall be reconciled within a defined accounting period in order to verify that the outputs relate appropriately to the inputs.

The organization active in the chain of custody shall document the total quantity (volume or mass or units) of materials or products received and supplied to customer within the appropriate specified timeframe. The documentation shall include:

— stock remaining from the previous accounting period;

— inputs received;

— inputs still in stock;

— outputs still in stock;

— outputs supplied to customer.

6.10 Complaints procedure

The organization active in the chain of custody shall ensure that complaints received regarding the organization's conformity to the requirements applicable to the scope of the organization's chain of custody system are considered. The complaints procedure shall at least provide that the organization:

— acknowledges the receipt of the complaint to the complainant within an appropriate timeframe defined by the organization;

— investigates the complaint and specifies its proposed actions in response to the complaint within an appropriate timeframe defined by the organization;

— notifies the complainant if more time is needed to complete this investigation;

— takes appropriate actions with respect to complaints and any deficiencies found in processes that affect conformity to the requirements;

— notifies the complainant when the complaint is considered to be adequately addressed and closed.

Documented information shall be maintained on complaints and consequent action, including resolution. The procedure for handling complaints shall be made publicly available.

NOTE Further guidance can be found in ISO 10002[4].

6.11 Outsourcing

The organization active in the chain of custody shall have responsibility for all outsourcing and contractors related to the organization's chain of custody. The organization's chain of custody shall include all outsourced operations. This includes those involved in the manufacturing of materials or products whether onsite or offsite.

The organization shall establish written outsourcing agreements with their contractor(s). The agreement shall give the organization or the organization's representative access to the contractor's operations in order to ensure that requirements connected to the chain of custody and the requirements of this document are met.

6.12 Communication

The organization active in the chain of custody shall determine the internal and external communication relevant to the chain of custody system applied.

The organization shall ensure that the relevant requirements for implementation of the chain of custody system applied are communicated effectively across all relevant stakeholders, including personnel and suppliers.

Annex A
(informative)

Traceability and chain of custody

Traceability is defined as the ability to trace the history, application or location of a product[3]. It delivers the ability to follow the movement of a product and its components through specified stages of production, processing and distribution. For example, ISO 22005[15] defines the requirements for the design of a traceability system within the food supply chain or in the plastics industry EN 15343[25].

Although frequently considered as interchangeable, the concepts of traceability and chain of custody are not identical. A chain of custody is a chain of responsibility for the custodianship of materials or products as they move through a supply chain. Its purpose is to ensure that the specified characteristics that are claimed for a particular material or product (or for the market as a whole) are indeed the ones that are actually delivered in the output.

A chain of custody system can use traceability records to identify the supply chain actors that take legal ownership or physical control over a material or product. While the implementation of some chain of custody models will imply a particular level of the physical presence of specified characteristics, the implementation of other chain of custody models (for some sectors) may reduce the need to trace specific materials or products to support the claims being made.

Annex B
(informative)

Practical examples for using chain of custody models

B.1 Overview

This annex includes practical examples for the implementation of the chain of custody models described in Clause 5.

B.2 Chain of custody models without mixing

B.2.1 Identity preserved model

B.2.1.1 Example from the food sector, meat

Each organization active in the food chain of custody ensures that the lamb meat originates from a single lamb farm and is kept physically separated throughout the transportation, storage and production. The specified characteristic in this example is lamb meat from farm A.

B.2.1.2 Example of a claim

The organization may use the claim that the product is or contains lamb meat from farm A.

B.2.2 Segregated model

B.2.2.1 Example from the apparel sector, using recycled materials

Each organization active in the apparel chain of custody ensures that the minimum supply chain requirements for the segregated model are met. The specified characteristic in this example is 100 % recycled material, being input that has been recovered from post consumer use at some point.

B.2.2.2 Supply chain requirements

To fulfill the supply chain requirements for the segregated model the organization shall ensure that:

— 100 % recycled material (possibly from various sources) is kept physically separated from the virgin material during transportation, storage and production so that it can be clearly identified during the production process;

— the output quantities of recycled material are corresponding to the input quantities in line with an appropriate conversion factor.

B.2.2.3 Example of a claim

The organsiation may use the claim that the product **contains** 100 % recycled material.

B.3 Chain of custody models with mixing

B.3.1 Controlled blending model

B.3.1.1 Example from the food sector, fruit juice

Each organization active in the fruit juice chain of custody defines the specified set of characteristics and ensures that the requirements for the applied chain of custody model are met.

B.3.1.2 Specified characteristics

The specfied characteristics in this example are:

a) For input 1, apple juice:

   1) type of the input apples: Granny Smith

   2) source of the input apples: one specific farmer in The Netherlands.

b) For input 2, pear juice:

   1) type of the input pears: Anjou

   2) source of the input pears: three different farmers in The Netherlands

B.3.1.3 Supply chain requirements

The input apples are mixed with the input pears according to a decided percentage (50/50), and the organization adheres to the supply chain requirements for the controlled blending model while producing the fruit juice output:

— physical separation of input apples coming from the farmer in The Netherlands and of input pears from the three specified farmers from The Netherlands in terms of production, transport and storage until the point of mixing;

— clear identification of the apples coming from the farmer in the Netherlands and of the input pears until the point of mixing during the process; and

— during the production process, juice from the input apples and the input pears are mixed in a way that ensures that each final containment contains 50 % apple juice and 50 % pear juice.

B.3.1.4 Example of a claim

The organization may choose to deliver the fruit juice to another organization active in the fruit juice chain of custody with two options of specified product characteristics for the origin as follows:

a) “This fruit juice has been produced by Dutch farmers”.

b) “This fruit juice contains 50 % of Dutch apples and 50 % Dutch pears.

B.3.2 Controlled blending model

B.3.2.1 Example from the steel sector

Each organization active in the steel reinforcement bar chain of custody defines the specified set of characteristics and ensures that the requirements for the claimed chain of custody model are met.

B.3.2.2 Specified characteristics

a) At least two different types of materials or products with clearly specified characteristics are mixed – for example, steel scrap is melted with the controlled addition of alloys (of at least one type) and, after subsequent casting and rolling processes, the final steel reinforcement bar is produced, which has a third set of characteristics according to the steel grade specified.

b) The specification of reinforcement bars for use in a construction project is according to its target market and client requirements, and is typically based on an established standard which determines this third set of product characteristics.

c) Additional characteristics linked to the production process can be associated with the product, based on client requirements.

B.3.2.3 Supply chain requirements

The raw materials can be provided from different sources if the characteristics are the same and they meet any additional specified characteristics of the production process.

There is a known proportion of the specified characteristics within all parts of the final output – the reinforcement bar, which can be certified by very accurate laboratory analysis methods, provided also that the supply chain requirements in 5.3.1.2 have been fulfilled.

This is achieved by:

— effective controls and record keeping relating to the use of the raw materials in the production process at the steel mill;

— clear identification through all production processes: from the reception of raw materials; cast number tracing from the preparation of furnace charging, through the steel making processes and casting steel to form steel billets; rolling of billets into final reinforcement bar product; storage and final release to the customer;

— forming coils tied with strands or straps in standard weights or bundling of manufactured bars in standard lengths and weight according to customer contract requirements;

— attaching labels onto individual product bundles or coils showing full identification information including cast number;

— physical separation of product in terms of production bundles and coils, storage and transportation;

— retention of physical bar identification marks and record-keeping (e.g. bar schedule reference) if further fabrication (cutting, bending and welding) of steel reinforcement in accordance with the relevant standard/specification is required;

— auditing at the steel mill and manufacturer (as appropriate) to confirm all above requirements have been met.

The final user of the output, (the construction company) can be confident of the specified characteristics of all material and the chain of custody based on the product conformity and quality management system certification of its concrete reinforcement bar supplier by the third-party conformity assessor.

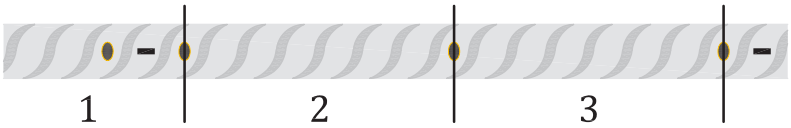
In effect, in this example the steel reinforcement bar value chain makes use of two chain of custody models: the controlled blending process is used during the reinforcement bar manufacturing and then, once manufactured, the identity of the manufacturer is preserved until use.

However, as detailed in 5.1, the model with the lower physical presence, ‘controlled blending’ is the overall chain of custody model claimed in this example. The specified characteristics are the grade of steel reinforcement bar and the identity of the manufacturer.

B.3.2.4 Example of a claim

Reinforcing steel approved by the scheme is identified by rolling marks on the surface of the bar. The marking system (dot-dash-dot) complies with EN 10080[21] and indicates the country of origin and the unique steel producer number. The steel producer numbers are allocated by the scheme and shown in the scheme's online certificate database.

An example of steel reinforcement bar marking is given in Figure B.1.



Key

1 scheme mark
2 country = 7 ribs
3 mill = 7 ribs

Figure B.1 — Example of steel reinforcement bar marking

B.3.3 Mass balance model

B.3.3.1 Example from the palm oil sector

An organization active in the palm oil chain of custody may receive input from two or more different palm oil suppliers. One (or multiple) of the input can be fully sustainable including the necessary certificates while other input is non-certified. Often these inputs are mixed due to the physical (fluid) nature of the input and/or logistical supply chain constraints.

If, in total, 40 tons of the input is certified sustainable and 60 tons is non-certified input, the organization may sell the output as "Mass balance certified sustainable palm oil" to multiple customers. The total output sold as mass balance certified volume is not allowed to exceed the total of 40 tons certified sustainable input ingredient within the specified period of time set by the standard setter for certified sustainable palm oil.

The mixed output does not fulfill the requirements for the segregated model (among others physical separation of inputs and outputs with specified characteristics from any other inputs and outputs during e.g. production, transport and storage) and cannot be sold with a segregated claim.

B.3.3.2 Supply chain requirements

— The organization active in the chain of custody should determine the geographical area and the timeframe within which the materials or products are mixed.

— For each material or product the organization shall define claim periods, which shall reflect the input in relation to the output. These input and output claim periods shall not exceed the specified timeframe.

In the example of sustainable palm oil, schemes are available, which explicitly specify these periods.

B.3.3.3 Example of a claim

In the specific example of certified sustainable palm oil, the organizations active in the chain of custody have agreed on the claim "This product contributes to the production of certified sustainable palm oil" and shall transparently disclose the used chain of custody model (mass balance). This can be done in a more detailed communication publically available. This claim can be used for a maximum of 40 tons of the palm oil.

The rest of the palm oil (at least 60 tons) is not allowed to use any claim regarding the sustainability of the palm oil.

B.4 Book and claim model

A consumer buys 100 % renewable electricity/energy from a supplier of an amount specified on their bill. The supplier, in turn, purchases electricity; this will usually be from an electricity generator and of the quantity that has been certified to the appropriate standard as renewably generated. The supplier will then have generated or purchased an equivalent certified amount to that consumed. However, the actual electricity delivered to the consumer is taken from the grid. Double counting shall be avoided, which can be assured by appropriate certification schemes and standards.

In a book and claim system the credit and certificate transactions are usually achieved electronically.

The book and claim model is not suitable for managing supply chain organisations or for ensuring the traceability of food items. The book and claim model is therefore most suitable for intangible products such as electricity and in circumstances in which the entire market is controlled.

Organizations using the book and claim model cannot guarantee that a particular physical output, even when accompanied by the appropriate credit or certificate, actually contains items from a certified source or with the specified characteristics such as the specific conditions under which they were produced.

Annex C
(normative)

Mass balance implementation

C.1 General

The credit method formula is calculated for each period according to one of the following.

Use Formula (1) when the conversion factor is applied before the material enters the account:

$$C_b = C_{bp} + (M_{in} \times cf) - M_o \quad (1)$$

Use Formula (2) when the conversion factor is applied when the material leaves the account:

$$C_b = C_{bp} + M_{in} - (M_o / cf) \quad (2)$$

where

C_{bp} is the credit balance by the end of previous period;
C_b is the credit balance;
M_{in} is the purchased material or product, into the credit account;
M_o is the produced material or product, deducted from the credit account;
cf is the conversion factor.

The given symbols are calculated on the basis of units, volumes or weights.

NOTE The calculations shown above are designed to illustrate the principle of the credit method. Other more complex scenarios can also be used in practice. In particular, in some cases the credit amount is administered before the conversion factor is applied. In addition, the amount of input and output are often not the same as most organizations are likely to have a balance in their credit account before more input is added to the chain of custody system.

C.2 Credit method

C.2.1 Example for wood and woodbased products

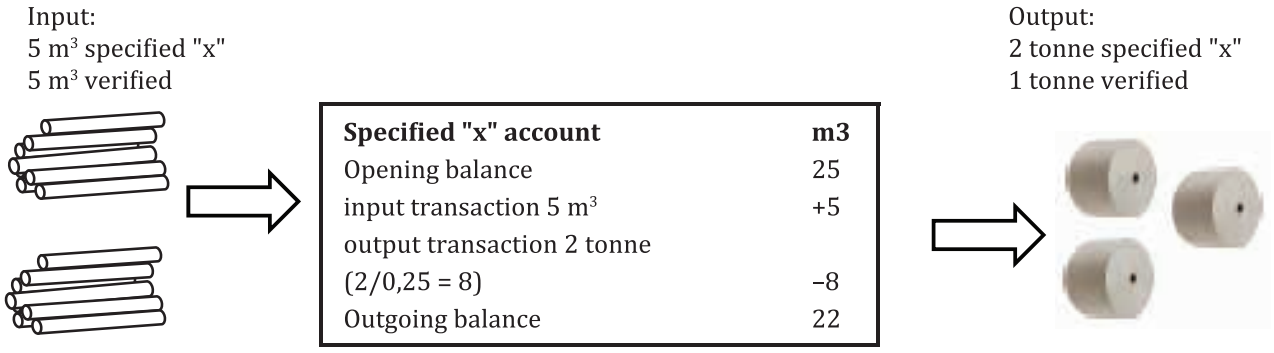
In the example of the credit method in Figure C.1, the input consists of 10 m^3 of purchased input material.

5 m^3 of the input material is specified “x”, and 5 m^3 of the input material is verified by a requirements setter.

The output consists of 3 tonnes of manufactured products, 2 tonnes of which is specified “x” and 1 tonne of which is verified by the requirements setter.

The credit account is handled as input material before the material is converted. The conversion factor between tonne and m^3 is 0,25. The credit account for the specified type of input is 25 m^3 prior to, and 22 m^3 after, both transactions.

NOTE The account balance never reaches less than zero after any transaction.



NOTE Example taken from ISO 38200[20].

Figure C.1 — Example of the credit method

C.2.2 Applying the conversion factor

Example by-products from refined fat with a conversion factor of 0,8 (i.e. 1 t ethylene from 1,25 t made from refined fat):

The credit balance is kept in tonnes of output (ethylene) and thus all stock of purchased input material (refined fat) that the company has on the credit balance shall be multiplied with the conversion factor of 0,8.

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