

---

---

**Environmental management for  
concrete and concrete structures —  
Part 2:  
System boundary and inventory data**

*Management environnemental du béton et des structures en béton —*

*Partie 2: Limite du système et données d'inventaire*

**iTeh STANDARD PREVIEW  
(standards.iteh.ai)**

ISO 13315-2:2014

<https://standards.iteh.ai/catalog/standards/sist/02bbb5c9-7415-4827-8003-9e0ff7eaa980/iso-13315-2-2014>



**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[ISO 13315-2:2014](https://standards.iteh.ai/catalog/standards/sist/02bbb5c9-7415-4827-8003-9e0ff7eaa980/iso-13315-2-2014)

<https://standards.iteh.ai/catalog/standards/sist/02bbb5c9-7415-4827-8003-9e0ff7eaa980/iso-13315-2-2014>



**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2014

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
Case postale 56 • CH-1211 Geneva 20  
Tel. + 41 22 749 01 11  
Fax + 41 22 749 09 47  
E-mail [copyright@iso.org](mailto:copyright@iso.org)  
Web [www.iso.org](http://www.iso.org)

Published in Switzerland

# Contents

	Page
<b>Foreword</b> .....	<b>iv</b>
<b>Introduction</b> .....	<b>v</b>
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Terms and definitions</b> .....	<b>1</b>
<b>4 System boundary</b> .....	<b>2</b>
4.1 General.....	2
4.2 Constituents.....	2
4.3 Reinforcing and prestressing steel.....	7
4.4 Formwork, falsework, and machinery.....	8
4.5 Concrete.....	9
4.6 Precast concrete.....	10
4.7 Execution of concrete structures.....	11
4.8 Use of concrete structures.....	13
4.9 End phase of concrete and concrete structures.....	14
<b>5 Inventory data</b> .....	<b>17</b>
5.1 General.....	17
5.2 Constituents.....	18
5.3 Reinforcing and prestressing steel.....	21
5.4 Formwork, falsework, and machinery.....	22
5.5 Production of concrete.....	23
5.6 Execution of concrete structures.....	24
5.7 Use of concrete structures.....	25
5.8 End phase of concrete and concrete structures.....	26
<b>6 Critical review and its storage</b> .....	<b>27</b>
<b>Bibliography</b> .....	<b>28</b>

## 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](http://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](http://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 on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 71, *Concrete, reinforced concrete and pre-stressed concrete*, Subcommittee SC 8, *Environmental management for concrete and concrete structures*.

ISO 13315 consists of the following parts, under the general title *Environmental management for concrete and concrete structures*:

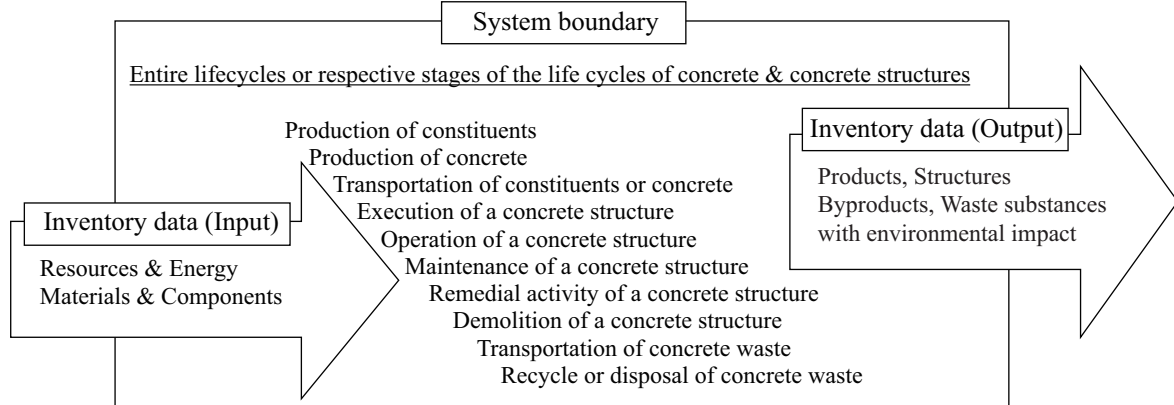
- *Part 1: General principles*
- *Part 2: System boundary and inventory data*

NOTE The ISO 13315 series provides specifications for concrete and ensures consistency with the existing environmental ISO 14000 series, ISO 15392, ISO 21930, etc.

## Introduction

Concrete is a material that is indispensable for the construction of infrastructure including civil structures and buildings. Massive amounts of resources are used for construction of this infrastructure and large amounts of concrete rubble are generated when these structures are demolished. Concrete can therefore be regarded as a material having a critical impact on the formation of a recycling-based society from the aspect of not only resource consumption but also future waste generation. Meanwhile, a significant amount of CO<sub>2</sub>, a greenhouse gas, is discharged from activities related to architecture and civil engineering. Various documents indicate that the concrete sector is emitting 5% to 10 % of the global CO<sub>2</sub> by producing and conveying cement and concrete and by construction of concrete structures. On the other hand, concrete can absorb CO<sub>2</sub>. Concrete has to, therefore, play an important role in solving recycling and global warming problems. Consideration has to also be given to the emission of air pollutants, noise, vibration, and other impacts during transportation of constituent materials and concrete, and construction and demolition of concrete structures.

Application of optimum environmental impact-mitigating techniques and use of environmentally conscious products are important issues for concrete structures at each stage of their life cycle: the production of cement and aggregate, the production and transportation of concrete, and the construction, use, and demolition of concrete structures. To meet these requirements, it is necessary to compare the environmental impacts resulting from different concretes as well as the structural forms, using life cycle inventory analysis (LCI) and life cycle assessment (LCA). LCI and LCA has to be conducted under the same conditions. In other words, it is important to clearly define a range of time and space for assessment, and quantitatively grasp the types and amounts of resources, energy, constituents, and components input into the range, as well as the products and structures output as a result of activities within the range, and also the byproducts, waste, and other releases discharged. As shown in [Figure 1](#), the boundary between the system under assessment and the outer region is referred to as 'system boundary,' and the input/output data transferred between the assessment system and the outer region is referred to as 'inventory data.' When conducting LCI and LCA, a system boundary has to be defined, and inventory data has to be quantitatively developed. ISO 13315-2 provides fundamental rules for defining system boundaries and acquiring inventory data.



**Figure 1 — System boundary and inventory data**

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[ISO 13315-2:2014](#)

<https://standards.iteh.ai/catalog/standards/sist/02bbb5c9-7415-4827-8003-9e0ff7eaa980/iso-13315-2-2014>

# Environmental management for concrete and concrete structures —

## Part 2: System boundary and inventory data

### 1 Scope

This part of ISO 13315 provides a general framework, principles, and requirements related to the determination of system boundaries and the acquisition of inventory data necessary for conducting a life cycle assessment (LCA) of concrete, precast concrete, and concrete structures.

### 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 13315-1, *Environmental management for concrete and concrete structures — Part 1: General principles*

ISO 14025, *Environmental labels and declarations — Type III environmental declarations — Principles and procedures*

ISO 14050, *Environmental management — Vocabulary*  
<https://standards.iteh.ai/catalog/standards/sist/02bbb5c9-7415-4827-8003-9e0ff7eaa980/iso-13315-2-2014>

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 13315-1 and ISO 14050 and the following apply.

#### 3.1

##### **data collection boundary**

boundary between the region, within which data shall be collected, and another region

#### 3.2

##### **input**

resources, energy, materials, or components which enter a product system

#### 3.3

##### **inventory data**

set of items that should be considered in an LCA and the corresponding quantitative measurements

#### 3.4

##### **life cycle inventory analysis**

phase of LCA involving the compilation and quantification of inputs and outputs, for a given product system throughout its life cycle

#### 3.5

##### **output**

products, byproducts, emissions to air and water, wastes, and other releases which leave a product system

**3.6  
system boundary**

boundary between the system under assessment and the outer region, specifying which unit processes are part of a product system

**3.7  
unit-based inventory data**

inventory data per unit quantity in time, mass, length, area, volume, etc.

## **4 System boundary**

### **4.1 General**

When conducting an LCA of concrete or a concrete structure, its system boundary shall be demarcated. Demarcation of a system boundary means defining the range of consideration for the assessment. For comparison among multiple alternatives, the system boundary shall be the same for all alternatives. When the acquisition of inventory data are difficult or cost-constrained, the target data can be excluded from the system boundary, but the exclusion should be expressly indicated.

For system boundary demarcation, the life cycle stages and geographical system ranges to consider should be appropriately defined.

The system boundary of concrete and concrete structures shall be based on a cradle-to-gate or cradle-to-grave basis and shall precisely describe what is included in the following activities: production of cement, water, additions, admixtures, and aggregates, which are constituents of concrete; production of reinforcing steel; production of concrete; construction of concrete structures; use of concrete structures; demolition of concrete structures; reuse of concrete members; recycling and disposal of demolished concrete.

It is not necessary in principle to include in the system boundary the environmental impacts related to the production of equipment/machinery necessary for the production of concrete or the construction, use, demolition, and recycling of concrete structures.

When explicit consideration of environmental impacts related to the production of equipment/machinery is deemed necessary, care shall be taken to eliminate double counting or omissions.

Activities indirectly related to the production of each material or to the construction of concrete structures, such as sales/administration, might have to be included in the system boundary.

### **4.2 Constituents**

#### **4.2.1 Cement**

The system boundary related to the production of cement is generally expressed in [Figure 2](#).

The system boundary for the production of cement shall include the following:

- the processes of quarrying, transporting, and treating raw materials necessary for the production of clinker;
- transportation of the fuel necessary for the production of clinker;
- transportation of byproducts;
- transportation related to waste-derived fuels;
- all of the processes of material/fuel treatment, calcination, and finishing of cement;
- the process of additional treatment to byproducts used for the production of clinker;

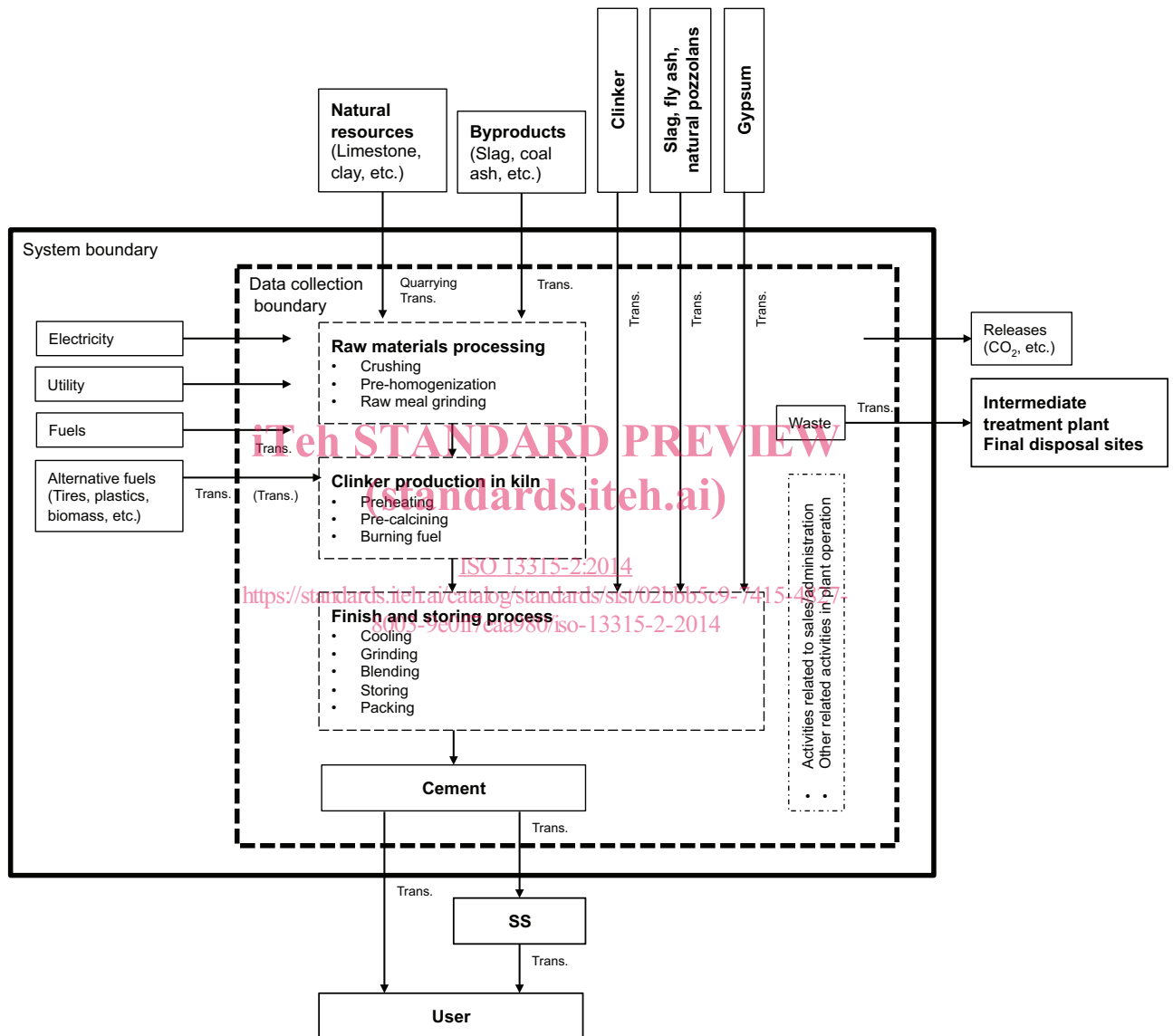


- the process of additional treatment to waste-derived fuels for the production of clinker;
- transportation of cement from cement plants to supply stations (SS).

NOTE 1 The material/fuel treatment process includes crushing and adjustment of the materials/fuels.

NOTE 2 The finishing process includes clinker crushing and addition blending.

The system boundary for the production of cement shall not include transportation of cement from SS or cement plants to the place of use.



NOTE Activities related to sales/administration and/or other related activities in plant operation might have to be considered.

Figure 2 — System boundary of cement production

#### 4.2.2 Additions and admixtures

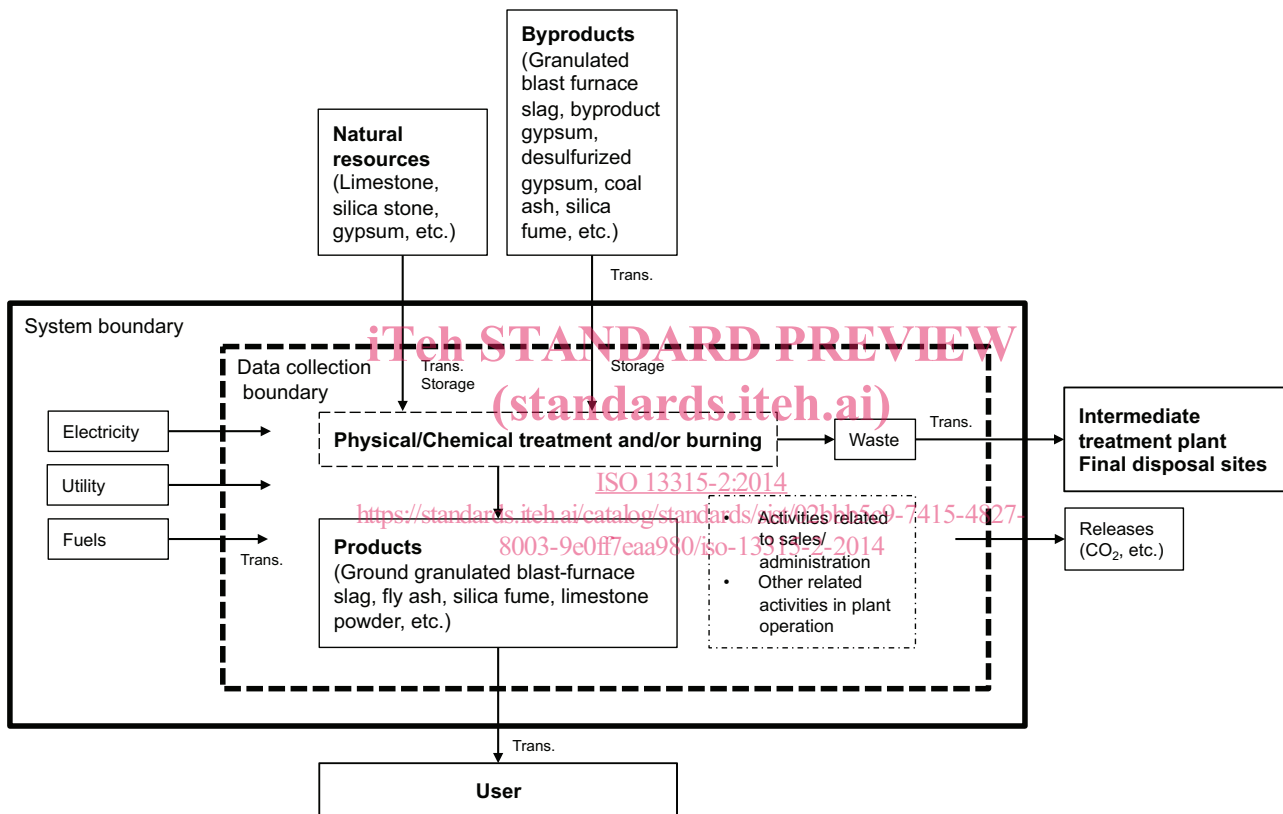
The system boundary related to the production of additions and admixtures is generally expressed in Figures 3 and 4, respectively.

The system boundary for the production of additions and admixtures shall include the following:

- transportation and storage of raw materials;
- transportation of fuels necessary for the production of additions and admixtures;
- physicochemical treatment of raw materials at addition and admixture production plants;
- transportation of waste to intermediate treatment sites and/or final disposal sites.

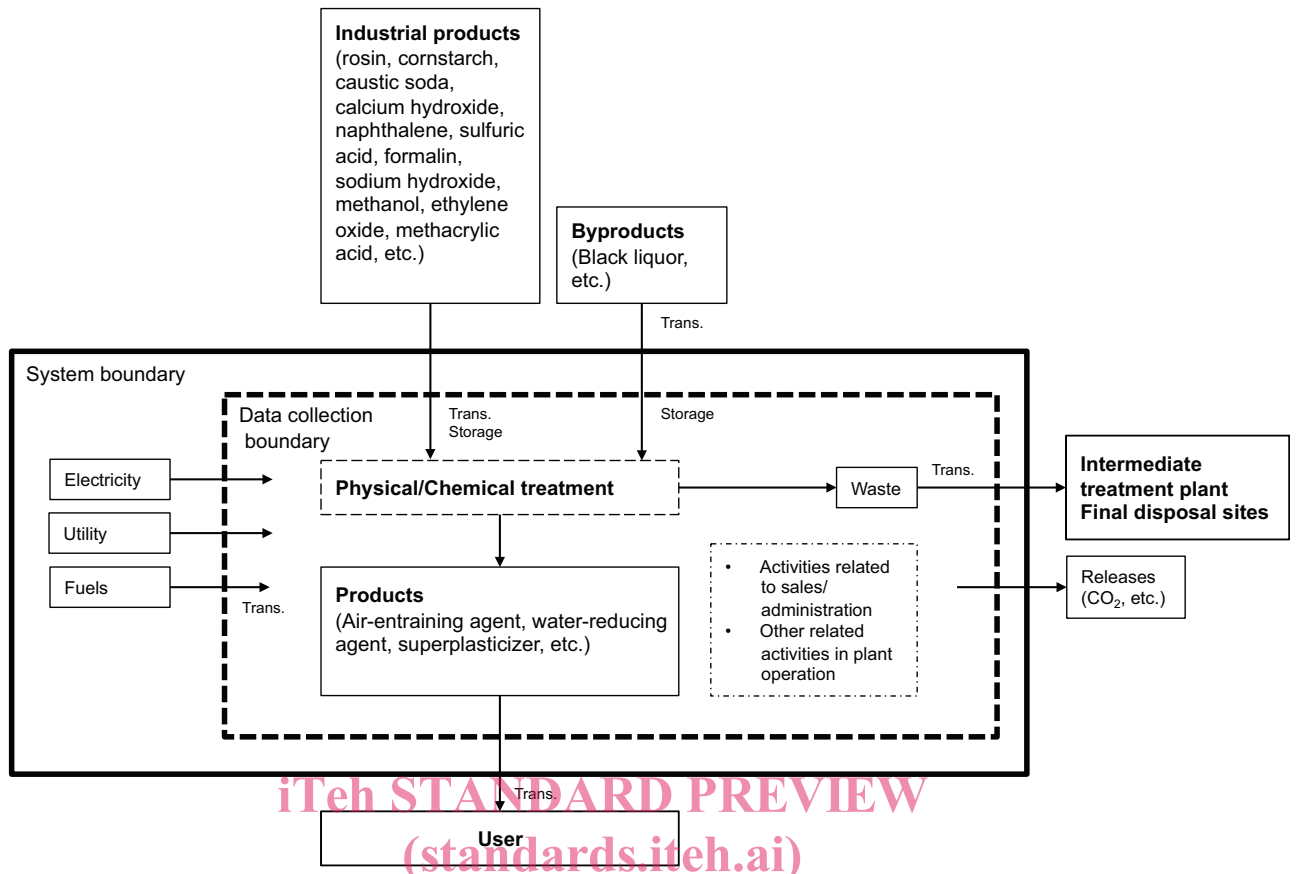
NOTE Since the combinations of raw materials for concrete admixtures widely vary, it is advisable to define the system boundary based on whether the raw materials are supplied at the expense of the user or the supplier.

Transportation of additions and admixtures from their production plants to the place of use shall not be included in the system boundary.



NOTE Activities related to sales/administration and/or other related activities in plant operation might have to be considered.

Figure 3 — System boundary of additions



NOTE Activities related to sales/administration and/or other related activities in plant operation might have to be considered.

ISO 13315-2:2014

[https://standards.iteh.ai/catalog/standards/sist/02bbb5c9-7415-4827-](https://standards.iteh.ai/catalog/standards/sist/02bbb5c9-7415-4827-8003-9e0ff7eaa980/iso-13315-2-2014)

[8003-9e0ff7eaa980/iso-13315-2-2014](https://standards.iteh.ai/catalog/standards/sist/02bbb5c9-7415-4827-8003-9e0ff7eaa980/iso-13315-2-2014)

**Figure 4 — System boundary of admixtures**

#### 4.2.3 Aggregate

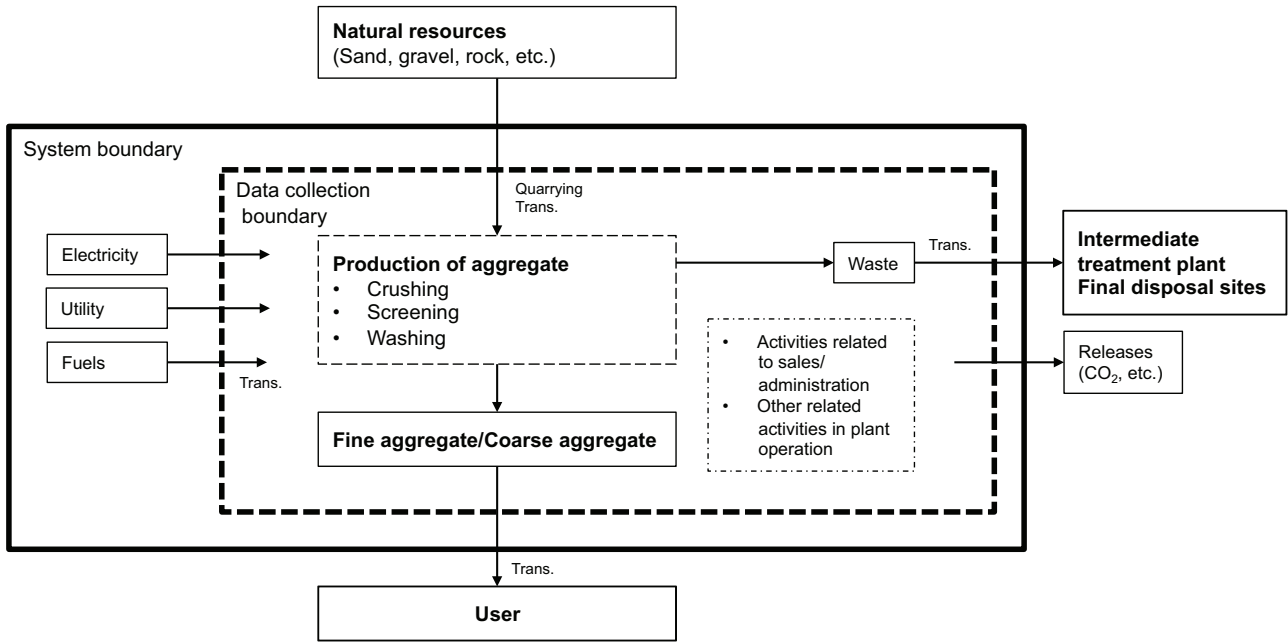
The system boundary related to the production of aggregate is generally expressed in [Figures 5, 6, and 7](#).

The system boundary for the production of aggregate shall include the following:

- mining and transportation of natural resources;
- transportation of fuels necessary for the production of aggregate;
- all processes related to the production of aggregate;
- transportation of waste generated in the process of aggregate production to intermediate treatment plants and/or final disposal sites.

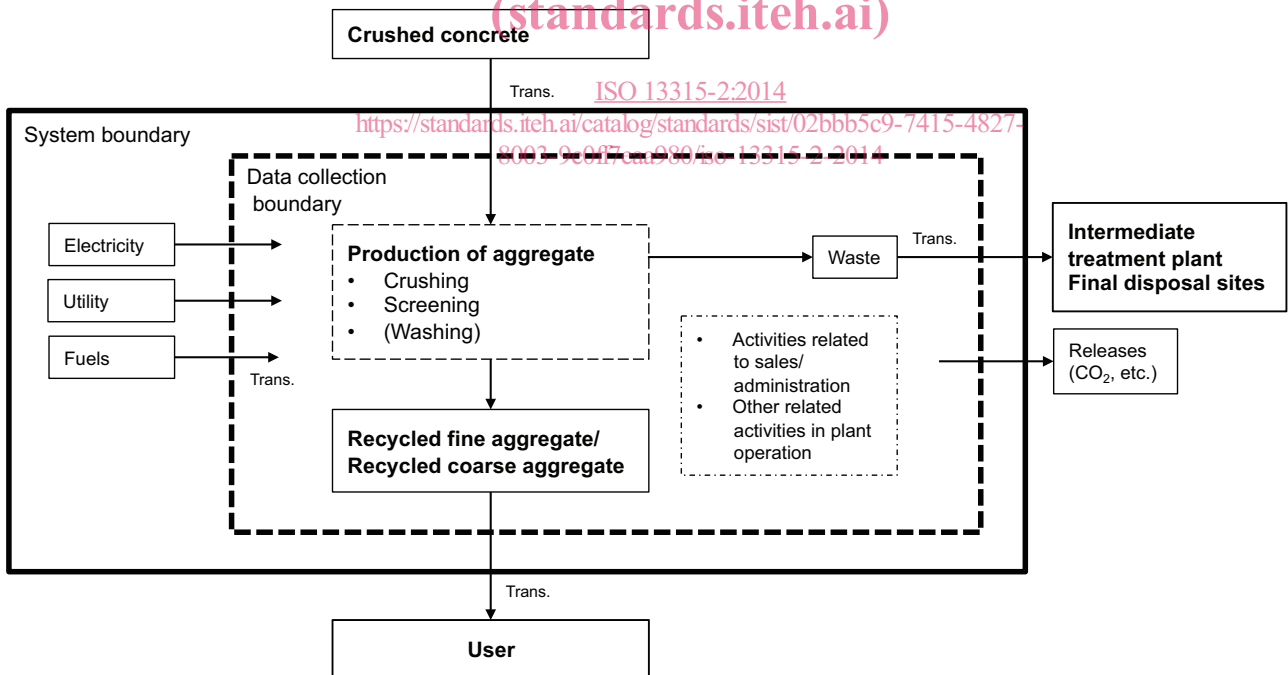
The system boundary for the production of aggregate shall not include the following:

- transportation of crushed concrete and byproducts necessary for the production of aggregate;
- transportation of aggregate from aggregate production plants to the place of use.



NOTE Activities related to sales/administration and/or other related activities in plant operation might have to be considered.

Figure 5 — System boundary of natural resource-derived aggregate



NOTE Activities related to sales/administration and/or other related activities in plant operation might have to be considered.

Figure 6 — System boundary of recycled aggregate