

INTRODUCTION

This Part 1 standard is structured to follow the IEC (International Electrotechnical Commission) guidelines. Therefore, the first three clauses discuss the Scope of the standard, Normative References, and Definitions, in that order.

The models and terminology in this standard are highly interdependent, making many of the definitions in Clause 3 incomplete and circular. Clauses 4 through 8 incrementally complete these definitions by starting at a very high level, progressively detailing a set of conceptual models, and describing how they collectively interact to control batch production.

Clause 4, *Batch processes and equipment*, is normative. The intent of this clause is to provide models and terminology that describe batch processes and the equipment used to perform them.

Clause 5, *Structure for batch control*, is normative. The intent is to describe three types of control used in batch processing and their relationships to the previously defined process and equipment models.

Clause 6, *Recipes and procedural elements*, is normative. The intent is to describe the roles and contents of four types of recipes used in batch manufacturing, their use of the previously defined process and procedural control models, and their connection to equipment control.

Clause 7, *Batch control considerations*, is normative. The intent is to describe additional considerations related to iterative design, exception handling, modes and states, production plans and schedules, and production information.

Clause 8, *Activities and functions in batch control*, is normative. The intent is to describe the control activities that are needed to address the diverse control requirements of batch manufacturing.

Clause 9, *Completeness, compliance, and conformance*, is normative. The intent is to define compliance and conformance relative to the normative models and terminology in this standard.

Annex A is informative. It provides guidance towards understanding the model types used in this standard.

Annex B is informative. It provides a quick summary of the changes made in this update as compared with the original 1995 standard.

Annex C is informative. It provides answers to typical questions that may arise in applying this standard.

Annex D is informative. It provides a more expansive procedural state reference model. The model found in Clause 7 may be considered a collapsed version of this more general model.

Annex E is informative, giving references to further investigation concerning safety.

This standard (Part 1, Models and Terminology) is intended for those who are:

- involved in designing and/or operating batch manufacturing plants;

- responsible for specifying controls and the associated application programs for batch manufacturing plants; or
- involved in the design and marketing of products in the area of batch control.

This standard provides standard models and terminology for defining the control requirements for batch manufacturing plants. The models and terminology defined in this standard:

- emphasize good practices for the design and operation of batch manufacturing plants;
- can be used to improve control of batch manufacturing plants; and
- can be applied regardless of the degree of automation.

This standard provides standard terminology and a consistent set of concepts and models for batch manufacturing plants and batch control that are intended to improve communications between all parties involved, and to:

- reduce the user's time to reach full production levels for new products;
- enable vendors to supply appropriate tools for implementing batch control;
- enable users to better identify their needs;
- make recipe development straightforward enough to be accomplished without the services of a control systems engineer;
- reduce the cost of automating batch processes; and
- reduce life-cycle engineering efforts.

It is important to note that although Clause 3 of this part of the standard provides definitions, the entire document constitutes the models and terminology of batch control. The user should consider Clause 3 as a short glossary of terms with brief descriptions and not rely on Clause 3 for a full understanding of the concepts. The full context of the terms will be found in the body of this standard.

It is not the intent of this standard to

- suggest that there is only one way to implement or apply batch control;
- force users to abandon their current way of dealing with their batch processes; or
- restrict development in the area of batch control.

The key concepts defined in this standard are:

- identification of structure and format for recipes and procedures;
- definition of levels of recipes and procedures;
- recognition of product specific recipes and procedures that are separate from process oriented equipment and its direct control;
- identification of a hierarchy of manufacturing equipment and its dedicated control;
- recognition of equipment capabilities that are utilized during recipe and procedure driven production; and
- recognition of the need for modular and re-usable control functionality.

The models presented in this standard are presumed to be complete as indicated. However, they may be collapsed and expanded as described in the explanation of each model.

The series of batch control standards has several parts, as shown in Figure 1. This Part 1 standard focuses on the definitions of process cells and units, master and control recipes, recipe

coordination control, and recipe procedural control. Other parts of the series have different focus areas which cover other aspects of batch manufacturing, from the product definitions at enterprises and sites to equipment control within units, equipment modules, and control modules.

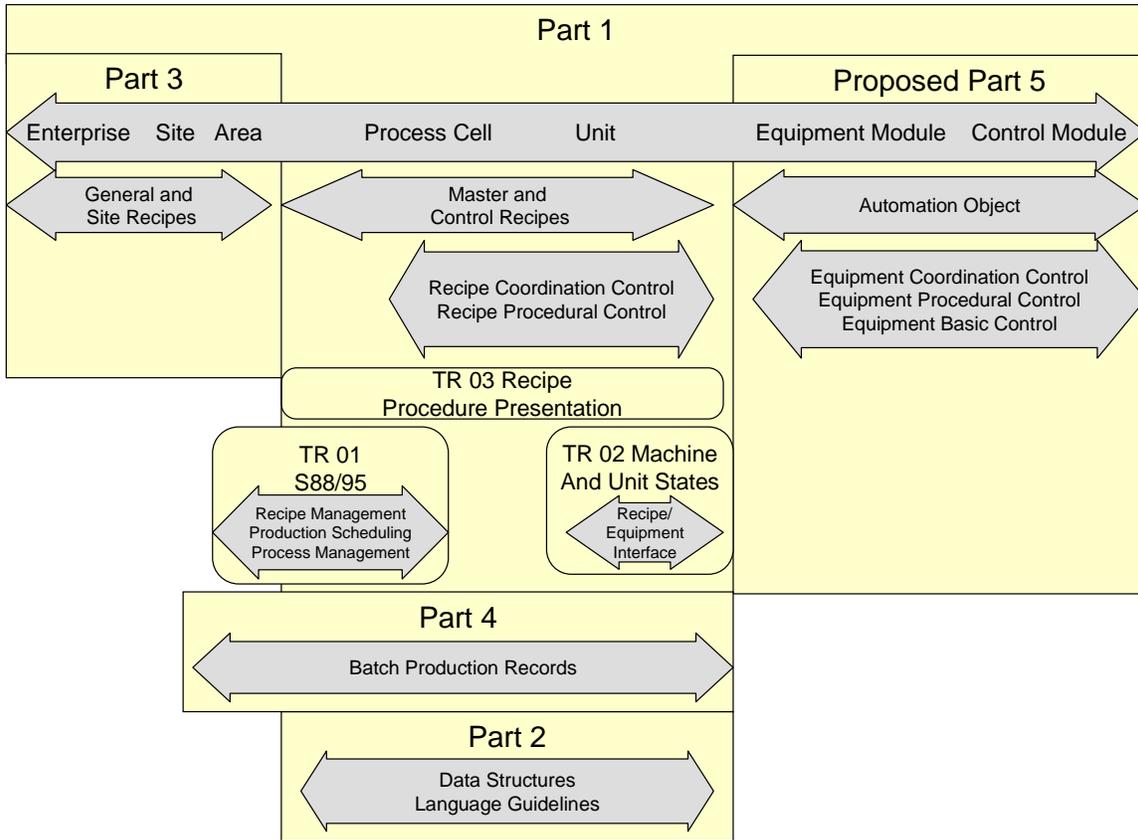


Figure 1 — Standards in the batch control series

Batch Control Part 1: Models and terminology

1 Scope

This Part 1 standard on Batch Control defines reference models for batch and related procedure-oriented manufacturing as used in the process industries, and terminology that helps explain the relationships between these models and terms. Conformance criteria to this standard are defined in Clause 9.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. ISA, ANSI, IEC and ISO maintain registers of currently valid normative documents.

- IEC 60848: 2002, GRAFCET specification language for sequential function charts
- IEC 60050-351: 2006, International Electrotechnical Vocabulary – Part 351: Control technology.
- ANSI/ISA-95.00.01-2010 (IEC 62264-1 Mod), Enterprise-Control System Integration – Part 1: Models and Terminology
- ANSI/ISA-95.00.02-2010 (IEC 62264-2 Mod), Enterprise-Control System Integration – Part 2: Object Model Attributes
- IEC/ISO 62264-1, Enterprise-Control System Integration - Part 1: Models and Terminology
- IEC/ISO 62264-2, Enterprise-Control System Integration - Part 2: Object Model Attributes
- ANSI/ISA-18.2-2009, Management of Alarm Systems for the Process Industries