INTERNATIONAL STANDARD

# ISO 8000-66

First edition

# Data quality —

## Part 66: Data quality management: Assessment indicators for data processing in manufacturing operations



PROOF/ÉPREUVE

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# Foreword

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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).

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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 Technical Committee ISO/TC 184, *Automation systems and integration*, Subcommittee SC 4, *Industrial data*.



A list of all parts in the ISO 8000 series can be found on the ISO website.

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

Digital data delivers value by enhancing all aspects of organizational performance, including:

— operational effectiveness and efficiency;

— safety;

— reputation with customers and the wider public;

— compliance with statutory regulations;

— consumer costs, revenues and stock prices.

The influence on performance originates from data being the formalized representation of information. This information enables organizations to make reliable decisions. This decision making can be performed by human beings directly and also by automated data processing including artificial intelligence systems.

Through widespread adoption of digital computing and associated communication technologies, organizations become dependent on digital data. This dependency amplifies the negative consequences of the lack of quality in this data. These consequences are the decrease of organizational performance.

The biggest impact of digital data comes from two key factors:

— the data having a structure that reflects the nature of the subject matter;



— the data also being computer processable (machine readable) rather than just being for a person to read and understand.



ISO 9000 explains that quality is not an abstract concept of absolute perfection. Quality is actually the conformance of characteristics to requirements and, thus, any item of data can be of high quality for one use but not for another use that has differing requirements.

EXAMPLE 1 When storing start times for meetings, a calendar application requires less precision than a control system would for storing the times at which to activate a propulsion unit during a spaceflight.

The nature of digital data is fundamental to establishing requirements that are relevant to the specific decisions that are made by each organization.

EXAMPLE 2 ISO/TS 8000-1 identifies that data has syntactic (format), semantic (meaning) and pragmatic (usefulness) characteristics.

To support the delivery of high-quality data, the ISO 8000 series addresses:

— data governance, data quality management and maturity assessment;

EXAMPLE 3 ISO 8000-61 specifies a process reference model for data quality management.

— creating and applying requirements for data and information;

EXAMPLE 4 ISO 8000-110 specifies how to exchange characteristic data that is master data.

— monitoring and measuring data and information quality;

EXAMPLE 5 ISO 8000-8 specifies approaches to measuring data and information quality.

— improving data and, consequently, information quality;

EXAMPLE 6 ISO/TS 8000-81 specifies an approach to data profiling, which identifies opportunities to improve data quality.

— issues that are specific to the type of content in a data set.

EXAMPLE 7 ISO/TS 8000-311 specifies how to address quality considerations for product shape data.

Data quality management covers all aspects of data processing, including creating, collecting, storing, maintaining, transferring, exploiting and presenting data to deliver information.

Effective data quality management is systemic and systematic, requiring an understanding of the root causes of data quality issues. This understanding is the basis for not just correcting existing nonconformities but also implementing solutions that prevent future reoccurrence of those nonconformities.

EXAMPLE 8 If a data set includes dates in multiple formats including “yyyy-mm-dd”, “mm-dd-yy” and “dd-mm-yy”, then data cleansing can correct the consistency of the values. Such cleansing requires additional information, however, to resolve ambiguous entries (such as, “04-05-20”) and cannot address any process issues and people issues, including training, that have caused the inconsistency.

As a contribution to this overall capability of the ISO 8000 series, this document supports the application of ISO 8000-62 to determine the process maturity of data quality management in manufacturing organizations. This support is provided by specifying assessment indicators for data processing in manufacturing operations management specified by IEC 62264-1.

Organizations can use this document on its own or in conjunction with other parts of the ISO 8000 series.

This document supports activities that affect:

— one or more information systems;

— data flows within the organization and with external organizations;

— any phase of the data life cycle.



By implementing parts of the ISO 8000 series, an organization achieves the following benefits:

— establishing reliable foundations for digital transformation;

— recognizing how data in digital form has become a fundamental asset class that organizations rely on to deliver value;

— securing evidence-based trustworthiness of data and information for all stakeholders;

— creating portable data that protects against the loss of intellectual property and that is reusable across the organization and applications;

— achieving traceability of data back to original sources;

— ensuring all stakeholders work with common understanding of explicit data requirements.

ISO/TS 8000-1 provides a detailed explanation of the structure and scope of the whole ISO 8000 series.

Annex A contains an identifier that unambiguously identifies this document in an open information system.

# Data quality —

## Part 66:
## Data quality management: Assessment indicators for data processing in manufacturing operations

## 1 Scope

This document specifies assessment indicators to support the assessment of organizational process maturity for data quality management in the context of manufacturing operations management as specified by IEC 62264-1.

The following are within scope of this document:

— assessment indicators that are work products generated by data processing (as specified by ISO 8000-61) and, thus, enable rating of process performance, a process attribute specified by ISO/IEC 33020;

— the role played by each work product in the processes of manufacturing operations management;

— the connection of each work product to the outcomes of the processes of manufacturing operations management.



The following are outside the scope of this document:

— assessment indicators for any of the other process attributes specified by ISO/IEC 33020;

— methods or procedures to measure process capability.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 8000-2, *Data quality — Part 2: Vocabulary*

ISO 8000-61, *Data quality — Part 61: Data quality management: Process reference model*

ISO 8000-62, *Data quality — Part 62: Data quality management: Organizational process maturity assessment: Application of standards relating to process assessment*

IEC 62264-1, *Enterprise-control system integration — Part 1: Models and terminology*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 8000-2 and IEC 62264-1 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 https://www.electropedia.org/

NOTE The term "product" appears in both ISO 8000-2 and IEC 62264-1 but with different definitions. Both definitions provide, however, a useful and relevant explanation of the meaning of the term.

## 4 Process maturity assessment

Given the fundamental role of data in decision making, any type of organization can deliver significant benefits through data quality management. This delivery is sustainable, however, only when the organization understands and continually improves existing capability to perform data quality management. This understanding is the primary outcome of process maturity assessment.

This document applies to process maturity assessment in the specific context of (see Figure 1):

— implementations of the data processing as specified by the process reference model for data quality management in ISO 8000-61;

— implementations of the data processing as part of manufacturing operations management as specified by the functional model in IEC 62264-1 and as identified by this document (see Clause 5).

In this context, the process maturity assessment shall:

— conform to ISO 8000-62;

— assess implementations of data processing that conforms to ISO 8000-61;

— perform process attribute rating of process performance using the work products specified by Clause 7.



NOTE 1 Process performance is a process attribute specified by ISO/IEC 33020 (see Clause 6).

NOTE 2 These work products are assessment indicators that conform to the requirements of ISO/IEC 33004.



NOTE 3 The work products are information inputs to and outputs from individual processes of manufacturing operations management.

This document harmonizes the different ways of describing processes in IEC 62264-1, ISO 8000-61 and ISO/IEC 33063 (see Annex B).

## 5 Manufacturing operations management

### 5.1 Scope of manufacturing operations management

IEC 62264-1 specifies manufacturing operations management to cover the categories of:

— production operations management;

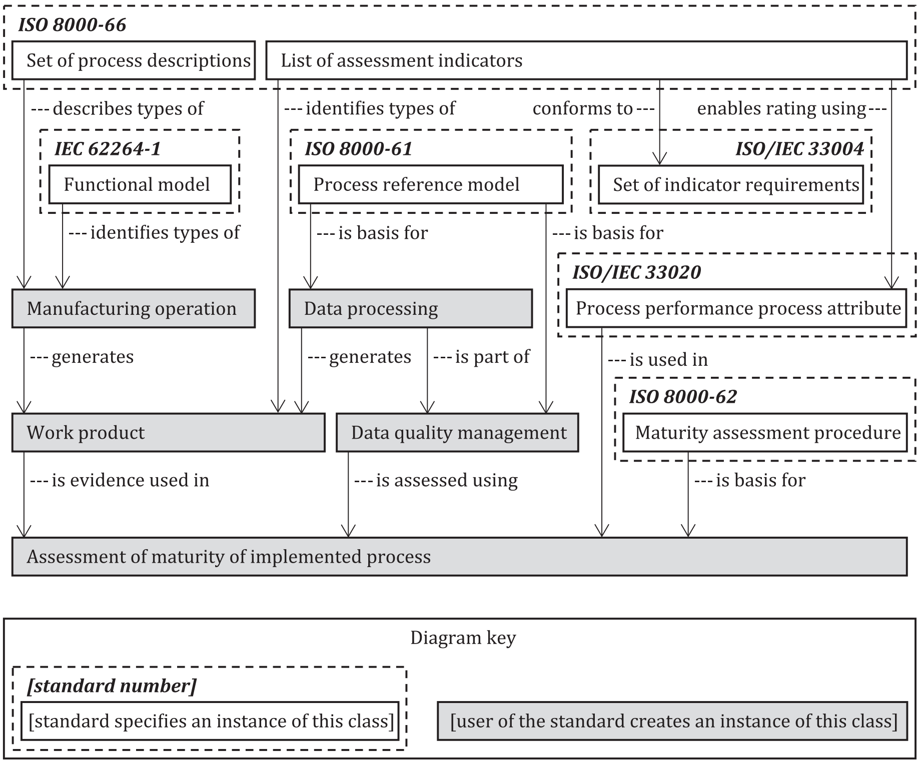
— inventory operations management;

— quality operations management;

— maintenance operations management.

Within these categories are eight functions of manufacturing operations management (see Table 1). These functions are connected by a series of information flows (see Figures 2 to 4).




NOTE See ISO/IEC 19505-1 for details on the notation in this diagram.



**Figure 1 — Key concepts covered by this document and related standards**



This document provides details on these eight functions, each one with the following process descriptions:

— production scheduling (see 5.2);

— production control — process support engineering (see 5.3);

— production control — production operations control (see 5.4);

— production control — production operations planning (see 5.5);

— material and energy control (see 5.6);

— product inventory control (see 5.7);

— quality assurance (see 5.8);

— maintenance management (see 5.9).

**Table 1 — Categories and constituent functions of manufacturing operations management as specified by IEC 62264-1**

| Category | Function |
|---|---|
| Production operations management | Production scheduling (A11) |
| | Production control: process support engineering (A12) |
| | Production control: production operations control (A13) |
| | Production control: production operations planning (A14) |
| Inventory operations management | Material and energy control (A3) |
| | Product inventory control (A2) |
| Quality operations management | Quality assurance (A5) |
| Maintenance operations management | Maintenance management (A4) |
| NOTE The identifier in brackets (i.e. "A11") is the node number of the corresponding function in the model of manufacturing operations management represented by Figures 2 to 4. | |

Each process description consists of the following information:

— process label: identifying the process;

NOTE 1 The process label is also known as the process name.

— process purpose: describing the benefit that the process delivers to the executing organization or other stakeholders;

— process outcomes: identifying the information generated or modified by the function;

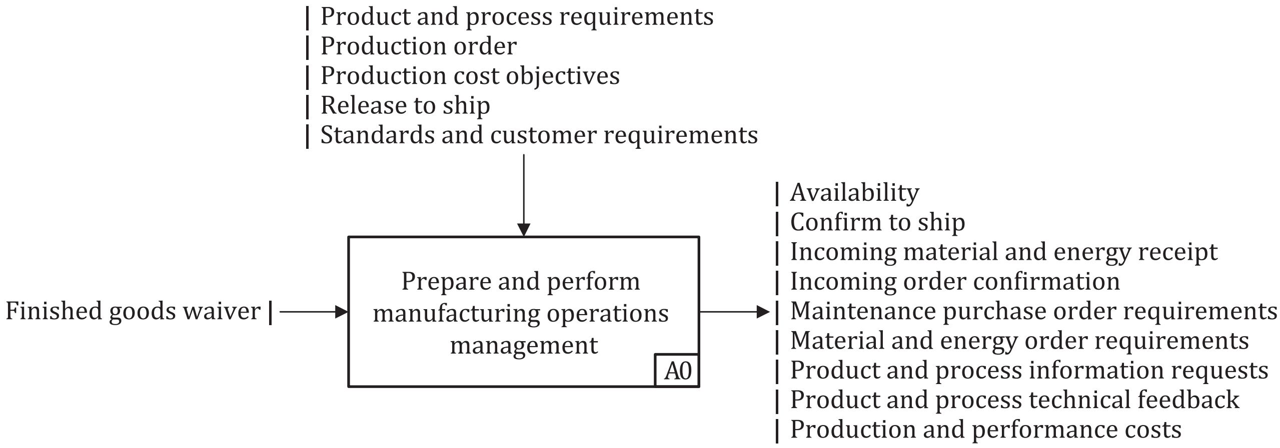
NOTE 2 These outcomes are specified by IEC 62264-1.



— process activities: identifying at a generic level how the function delivers the outcomes.

NOTE 3 This content builds on the constituent detailed functions specified by IEC 62264-1.

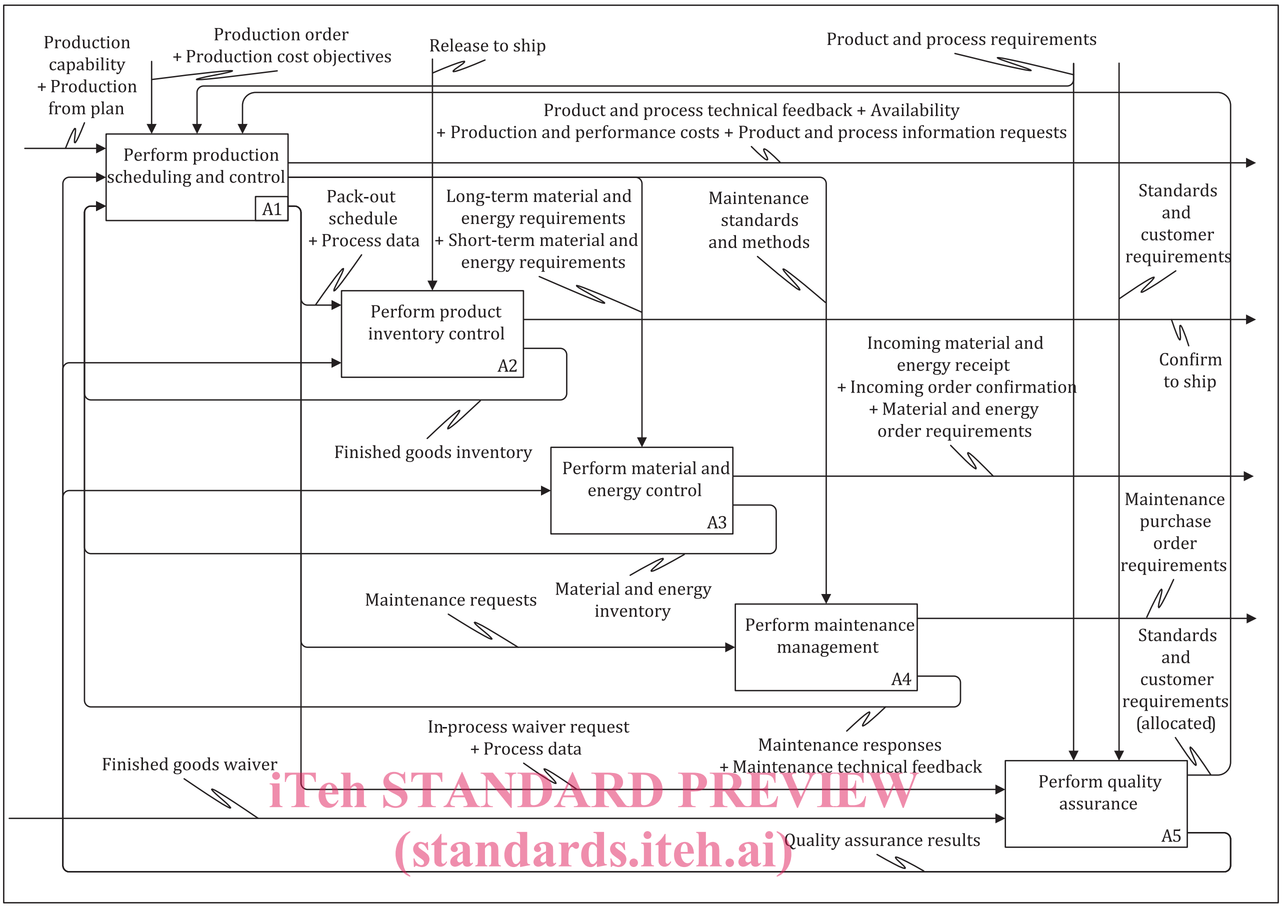
NOTE 4 This approach to process descriptions is consistent with ISO 8000-61.




NOTE See ISO/IEC/IEEE 31320-1 for details on the notation in this diagram.

**Figure 2 — A-0 context diagram for manufacturing operations management**

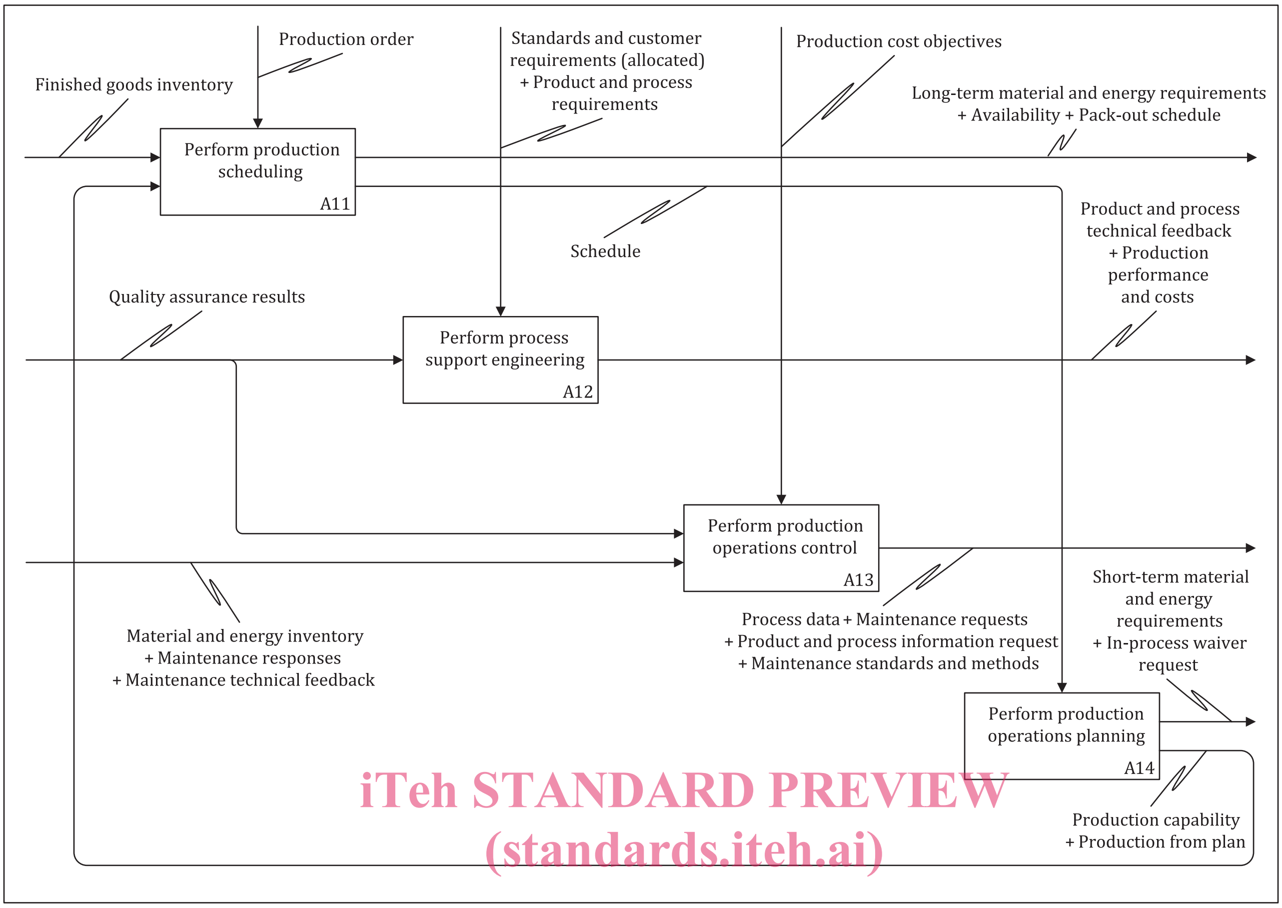





NOTE See ISO/IEC/IEEE 31320-1 for details on the notation in this diagram.



**Figure 3 — A0 diagram for prepare and perform manufacturing operations management**






NOTE See ISO/IEC/IEEE 31320-1 for details on the notation in this diagram.



**Figure 4 — A1 diagram for perform production scheduling and control**

## 5.2 Production scheduling

### 5.2.1 Purpose of production scheduling

The purpose of production scheduling is to arrange, control and optimize work and workloads in manufacturing operations. This scheduling is the basis for allocating plant and machinery resources, planning human resources and production processes and purchasing materials.

### 5.2.2 Outcomes of production scheduling

The process generates the following information items:

a) production schedule;

b) actual production versus planned production;

c) production capacity and resource availability;

d) current order status.