

Australian Standard™

**Industrial automation systems and
integration—Product data
representation and exchange**

**Part 45: Integrated generic resources:
Materials**



Standards Australia

This Australian Standard was prepared by Committee IT/6, Information Technology for Industrial Automation and Integration. It was approved on behalf of the Council of Standards Australia on 3 July 2000 and published on 30 August 2000.

The following interests are represented on Committee IT/6:

Australian Association of Consulting Engineers
Australian Electrical and Electronic Manufacturers Association
Australian Information Industry Association
CSIRO Centre for Planning and Design
CSIRO Manufacturing Science and Technology
Department of Defence (Australia)
Department of Industry Science and Resources (Commonwealth)
Federal Chamber of Automotive Industries
Institution of Engineers Australia
Monash University
New South Wales TAFE Commission
RMIT University
The Royal Australian Institute of Architects
University of Melbourne

Keeping Standards up-to-date

Standards are living documents which reflect progress in science, technology and systems. To maintain their currency, all Standards are periodically reviewed, and new editions are published. Between editions, amendments may be issued. Standards may also be withdrawn. It is important that readers assure themselves they are using a current Standard, which should include any amendments which may have been published since the Standard was purchased.

Detailed information about Standards can be found by visiting the Standards Australia web site at www.standards.com.au and looking up the relevant Standard in the on-line catalogue.

Alternatively, the printed Catalogue provides information current at 1 January each year, and the monthly magazine, *The Australian Standard*, has a full listing of revisions and amendments published each month.

We also welcome suggestions for improvement in our Standards, and especially encourage readers to notify us immediately of any apparent inaccuracies or ambiguities. Contact us via email at mail@standards.com.au, or write to the Chief Executive, Standards Australia International Ltd, GPO Box 5420, Sydney, NSW 2001.

Australian Standard™

**Industrial automation systems and
integration—Product data
representation and exchange**

**Part 45: Integrated generic resources:
Materials**

First published as AS 10303.45—2000.

COPYRIGHT

© Standards Australia International

All rights are reserved. No part of this work may be reproduced or copied in any form or by any means, electronic or mechanical, including photocopying, without the written permission of the publisher.

Published by Standards Australia International Ltd
GPO Box 5420, Sydney, NSW 2001, Australia

ISBN 0 7337 3523 1

PREFACE

This Standard was prepared by the Standards Australia Committee IT/6, Information Technology for Industrial Automation and Integration. This Standard is identical with and has been reproduced from ISO 10303-45:1998, *Industrial automation systems and integration—Product data representation and exchange, Part 45: Integrated generic resource: Materials*. Technical Corrigendum 1:1999 is bound at the back of this Standard.

The objective of this Standard is to provide designers of computer-interpretable representation and exchange of product data with a specification for the resource constructs for the material properties of a product and for the characterisation of a numerical data value as to its uncertainty and reliability.

This Standard is Part 45 of AS 10303, *Industrial automation systems and integration—Product data representation and exchange*, which is published in parts as follows:

- Part 1: Overview and fundamental principles
- Part 11: Description methods: The EXPRESS language reference manual
- Part 12: Description methods: The EXPRESS-I language reference manual
- Part 21: Implementation methods: Clear text encoding of the exchange structure
- Part 22: Implementation methods: Standard data access interface
- Part 31: Conformance testing methodology and framework: General concepts
- Part 41: Integrated generic resources: Fundamentals of product description and support
- Part 42: Integrated generic resources: Geometric and topological representation
- Part 43: Integrated generic resources: Representation structure
- Part 44: Integrated generic resources: Product structure configuration
- Part 45: Integrated generic resources: Materials (this Standard)
- Part 46: Integrated generic resources: Visual presentation
- Part 47: Integrated generic resource: Shape variation tolerances
- Part 49: Integrated generic resources: Process structure and properties
- Part 101: Integrated application resources: Drafting
- Part 105: Integrated application resource: Kinematics
- Part 201: Application protocol: Explicit draughting
- Part 202: Application protocol: Associative draughting
- Part 203: Application protocol: Configuration controlled design
- Part 203: Application protocol—Configuration controlled design (Amendment.1)
- Part 207: Application protocol: Sheet metal die planning and design
- Part 224: Application protocol: Mechanical product definition for process planning using machining features

Annex C is available on a 3½ inch included diskette.

The terms 'normative' and 'informative' have been used in this Standard to define the application of the annex to which they apply. A 'normative annex' is an integral part of a Standard, whereas an 'informative' annex is only for information and guidance.

As this Standard is reproduced from an International Standard, the following applies:

- (a) Its number does not appear on each page of text and its identity is shown only on the cover and title page.
- (b) In the source text 'this part of ISO 10303' should read 'this Australian Standard'.
- (c) A full point should be substituted for a comma when referring to a decimal marker.

References to International Standards should be replaced by references to equivalent Australian or Australian/New Zealand Standards, as follows:

<i>Reference to International Standard</i>		<i>Australian or Australian/New Zealand Standard</i>	
ISO		AS	
10303	Industrial automation systems and integration—Product data representation and exchange	10303	Industrial automation systems and integration—Product data representation and exchange
10303-1	Part 1: Overview and fundamental principles	10303.1	Part 1: Overview and fundamental principles
10303-11	Part 11: Description methods: The EXPRESS language reference manual	10303.11	Part 11: Description methods: The EXPRESS language reference manual
10303-41	Part 41: Integrated generic resources: Fundamentals of product description and support	10303.41	Part 41: Integrated generic resources: Fundamentals of product description and support
10303-43	Part 43: Integrated generic resources: Representation structures	10303.43	Part 43: Integrated generic resources: Representation structures
ISO/IEC		AS/NZS	
8824	Information technology—Abstract Syntax Notation One (ASN.1)	8824	Information technology—Abstract Syntax Notation One
8824-1	Part 1: Specification of basic notation	8824.1	Part 1: Specification of basic notation

CONTENTS

	<i>Page</i>
1 Scope	1
2 Normative references	2
3 Definitions	3
3.1 Terms defined in ISO 10303-1	2
3.2 Terms defined in Guide to the Expression of Uncertainty in Measurement	3
3.3 Other definitions	3
3.3.1 material	3
3.3.2 material property	3
3.3.3 material designation	3
3.3.4 qualifier	3
3.3.5 reliability	3
4 material_property_definition_schema	4
4.1 Introduction	4
4.2 Fundamental concepts and assumptions	4
4.3 material_property_definition_schema type definition: characterized_material_property	5
4.4 material_property_definition_schema entity definitions	6
4.4.1 material_property	6
4.4.2 property_definition_relationship	6
4.4.3 material_designation	7
4.4.4 material_designation_characterization	8
4.4.5 product_material_composition_relationship	8
4.5 material_property_definition_schema function definition: acyclic_property_definition_relationship	9
5 material_property_representation_schema	11
5.1 Introduction	11
5.2 Fundamental concepts and assumptions	11
5.3 material_property_representation_schema entity definitions	12
5.3.1 material_property_representation	12
5.3.2 data_environment	12
5.3.3 data_environment_relationship	13
6 classified_measure_schema	15

6.1	Introduction	15
6.2	Fundamental concepts and assumptions	15
6.3	qualified_measure_schema type definition: value_qualifier	16
6.4	qualified_measure_schema entity definitions	17
6.4.1	type_qualifier	17
6.4.2	precision_qualifier	17
6.4.3	uncertainty_qualifier	17
6.4.4	qualitative_uncertainty	18
6.4.5	standard_uncertainty	18
6.4.6	expanded_uncertainty	19
6.4.7	measure_representation_item	19
6.4.8	descriptive_representation_item	19
6.4.9	qualified_representation_item	20
6.4.10	measure_qualification	20

Annexes

A	Short names of entities	22
B	Information object registration	23
B.1	Document identification	23
B.2	Schema identification	23
B.2.1	material_property_definition_schema identification	23
B.2.2	material_property_representation_schema identification	23
B.2.3	qualified_measure_schema identification	23
C	EXPRESS listing	24
D	EXPRESS-G diagrams	25
E	Model scope	28
E.1	Introduction	28
E.2	Example of a product	28
E.3	Material designation	30
E.4	Material composition of a product	30
E.5	Material properties and measurement conditions	31
E.6	Properties of regions of a product	32
E.7	Material structure	32
E.8	Qualification of properties	33
E.9	Other requirements	35
F	Bibliography	36
	Index	37

Figures

D.1	material_property_definition_schema - EXPRESS-G diagram 1 of 1	25
D.2	material_property_representation_schema - EXPRESS-G diagram 1 of 1	26
D.3	qualified_measure_schema - EXPRESS-G diagram 1 of 1	27
E.1	Part 45 example product	29
E.2	The relationship between a property and the conditions in the data environment	32
E.3	Part 45 example product made as a composite	34

Tables

A.1	Short names of entities	22
-----	-----------------------------------	----

Currently in preview, click buy full version

AUSTRALIAN STANDARD

Industrial automation systems and integration — Product data representation and exchange — Part 45 : Integrated generic resource: Materials

1 Scope

This part of ISO 10303 specifies the resource constructs for the material properties of a product and for the characterization of a numerical data value as to its uncertainty and reliability.

The following are within the scope of this part of ISO 10303:

- association of a material property with a product;
- specification of the composition of a product in terms of the amount and type of its constituents;
- specification of the set of qualitative and quantitative conditions under which a material property is valid;
- characterization of a numerical data value as to its uncertainty and reliability;
- specification of the representation of a material property, including properties that are measured or assigned;
- the material properties of the surface of a product, including coatings.

NOTE – This part of ISO 10303 may be used to describe the material properties of a first stage product, such as castings, an intermediate product, such as a tube or sheet; or a final stage product requiring no further processing, such as a part pressed from a sheet.

The following are outside the scope of this part of ISO 10303:

- the combination and transformation of material property values;

EXAMPLE 1 – A design value is determined by statistical analysis of a large number of test results whose values have been combined together. This part of ISO 10303 provides for the representation of the test results and for the representation of their combination but does not address the process of combination.

- the use of material properties in the analysis of product behaviour;

EXAMPLE 2 – Individual property values may be combined into matrices of coefficients for use in analysis models.

- the detailed geometry of the surface modification or surface finish of a product.