



**BSI Standards Publication**

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

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Part 232: Application protocol: Technical data  
packaging core information and exchange

## National foreword

This British Standard is the UK implementation of ISO 10303-232:2002.

The UK participation in its preparation was entrusted to Technical Committee AMT/4, Industrial data and manufacturing interfaces.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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

Part 232:  
**Application protocol: Technical data  
packaging core information and exchange**

*Systèmes d'automatisation industrielle et intégration — Représentation et  
échange de données de produits —*

*Partie 232: Protocole d'application: Information centrale et échange de  
paquetage de données techniques*



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## Contents

Page

|        |                                                                                                                                                                      |      |
|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 1      | Scope .....                                                                                                                                                          | 1    |
| 2      | Normative references .....                                                                                                                                           | 4    |
| 3      | Terms, definitions, and abbreviations .....                                                                                                                          | 7    |
| 3.1    | Terms defined in ISO 10303-1 .....                                                                                                                                   | 7    |
| 3.2    | Terms defined in ISO 10303-31 .....                                                                                                                                  | 8    |
| 3.3    | Terms defined in ISO 10303-42 .....                                                                                                                                  | 8    |
| 3.4    | Terms defined in ISO 10303-203 .....                                                                                                                                 | 9    |
| 3.5    | Other terms and definitions .....                                                                                                                                    | 10   |
| 3.6    | Abbreviations .....                                                                                                                                                  | 14   |
| 4      | Information requirements .....                                                                                                                                       | 15   |
| 4.1    | Units of functionality .....                                                                                                                                         | 16   |
| 4.1.1  | data_definition_exchange .....                                                                                                                                       | 26   |
| 4.1.2  | data_list .....                                                                                                                                                      | 31   |
| 4.1.3  | drawing .....                                                                                                                                                        | 34   |
| 4.1.4  | indentured_data_list .....                                                                                                                                           | 36   |
| 4.1.5  | index_list .....                                                                                                                                                     | 40   |
| 4.1.6  | other_list .....                                                                                                                                                     | 42   |
| 4.1.7  | parts_list .....                                                                                                                                                     | 45   |
| 4.1.8  | presentation .....                                                                                                                                                   | 49   |
| 4.1.9  | product_data_set .....                                                                                                                                               | 51   |
| 4.1.10 | reference_document .....                                                                                                                                             | 54   |
| 4.2    | Application objects .....                                                                                                                                            | 55   |
| 4.3    | Application assertions .....                                                                                                                                         | 239  |
| 5      | Application interpreted model .....                                                                                                                                  | 310  |
| 5.1    | Mapping table .....                                                                                                                                                  | 310  |
| 5.2    | AIM EXPRESS short listing .....                                                                                                                                      | 939  |
| 6      | Conformance requirements .....                                                                                                                                       | 1018 |
| 6.1    | Data definition exchange for files, conformance class 1 .....                                                                                                        | 1021 |
| 6.2    | Data definition exchange for TDP elements, conformance class 2 .....                                                                                                 | 1021 |
| 6.3    | Data definition exchange for indentured methods, conformance class 3 .....                                                                                           | 1021 |
| 6.4    | Parts list, conformance class 4 .....                                                                                                                                | 1021 |
| 6.5    | Data list, conformance class 5 .....                                                                                                                                 | 1021 |
| 6.6    | Indentured data list, conformance class 6 .....                                                                                                                      | 1022 |
| 6.7    | Index list, conformance class 7 .....                                                                                                                                | 1022 |
| 6.8    | Other list, conformance class 8 .....                                                                                                                                | 1022 |
| 6.9    | List with presentation, conformance class 9 .....                                                                                                                    | 1022 |
| 6.10   | Reference document identification and drawing identification, Conformance Class 10 ..                                                                                | 1022 |
| 6.11   | Reference document identification and drawing identification with ISO 10303-201 and<br>ISO 10303-202 drawing presentation identification, Conformance Class 11 ..... | 1023 |
| 6.12   | Product data set (PDS) without presentation format, Conformance Class 12 .....                                                                                       | 1023 |
| 6.13   | Product data set (PDS) with shading, conformance class 13 .....                                                                                                      | 1024 |

|                                                                                   |      |
|-----------------------------------------------------------------------------------|------|
| 6.14 Product data set (PDS) with presentation format, conformance class 14        | 1024 |
| Annex A (normative) AIM EXPRESS expanded listing                                  | 1045 |
| Annex B (normative) AIM short names of entities                                   | 1206 |
| Annex C (normative) Implementation method specific requirements                   | 1219 |
| Annex D (normative) Protocol implementation conformance statement (PICS) proforma | 1223 |
| Annex E (normative) Information object registration                               | 1225 |
| E.1 Document identification                                                       | 1225 |
| E.2 Schema identification                                                         | 1225 |
| Annex F (informative) Application activity model                                  | 1226 |
| F.1 Application activity model definitions                                        | 1227 |
| F.2 Application activity model abbreviations                                      | 1248 |
| F.3 Application activity model diagrams                                           | 1250 |
| Annex G (informative) Application reference model                                 | 1268 |
| Annex H (informative) AIM EXPRESS-G                                               | 1306 |
| Annex J (informative) Computer-interpretable listings                             | 1373 |
| Annex K (informative) Usage Scenarios                                             | 1374 |
| K.1 Information exchange scenarios                                                | 1374 |
| K.2 Definitions and levels of capability for the parts list                       | 1381 |
| K.3 Definitions and levels of capability for the data list                        | 1402 |
| K.4 Definitions and levels of capability for the index list                       | 1417 |
| K.5 Definitions and levels of capability for the Data Definition Exchange         | 1429 |
| K.6 Definitions and levels of capability for the indentured data list             | 1455 |
| Bibliography                                                                      | 1479 |
| Index                                                                             | 1480 |

## Figures

|                                                                        |      |
|------------------------------------------------------------------------|------|
| Figure 1 — PDM information area ISO 10303-232 addresses                | xi   |
| Figure 2 — High level planning model                                   | xii  |
| Figure 3 — Functional usage of technical data                          | 2    |
| Figure 4 — Format style for date                                       | 70   |
| Figure 5 — Graphics utilized in presenting a tabulated listing         | 179  |
| Figure 6 — Page anchor location                                        | 180  |
| Figure 7 — Standard cross sections                                     | 225  |
| Figure C.1 — Exchange structure without ISO 10303-201 or ISO 10303-202 | 1220 |
| Figure C.2 — Exchange structure with ISO 10303-505 as sheet            | 1221 |
| Figure C.3 — Exchange structure with ISO 10303-505 as drawing          | 1222 |

|                                                                              |      |
|------------------------------------------------------------------------------|------|
| Figure F.1 — A-0: develop, procure, build, use, and maintain a product ..... | 1251 |
| Figure F.2 — A0: develop, procure, build, use, and maintain a product .....  | 1252 |
| Figure F.3 — A2: manage, design, and support a product .....                 | 1253 |
| Figure F.4 — A22: design and analyze a product .....                         | 1254 |
| Figure F.5 — A223: perform product detail and design analysis .....          | 1255 |
| Figure F.6 — A2232: create detail product design .....                       | 1256 |
| Figure F.7 — A22323: prepare product models and drawings .....               | 1257 |
| Figure F.8 — A223232: create product layouts and models .....                | 1258 |
| Figure F.9 — A223233: create product drawing data .....                      | 1259 |
| Figure F.10 — A2232332: prepare detail product item drawings .....           | 1260 |
| Figure F.11 — A22324: build product associated lists .....                   | 1261 |
| Figure F.12 — A24: prepare product data for use .....                        | 1262 |
| Figure F.13 — A3: use and maintain a product .....                           | 1263 |
| Figure F.14 — A33: support product .....                                     | 1264 |
| Figure F.15 — A331: spares procurement .....                                 | 1265 |
| Figure F.16 — A223: local manufacture .....                                  | 1266 |
| Figure F.17 — A333: develop modifications .....                              | 1267 |
| Figure G.1 — ARM diagram (1 of 33) .....                                     | 1273 |
| Figure G.2 — ARM diagram (2 of 33) .....                                     | 1274 |
| Figure G.3 — ARM diagram (3 of 33) .....                                     | 1275 |
| Figure G.4 — ARM diagram (4 of 33) .....                                     | 1276 |
| Figure G.5 — ARM diagram (5 of 33) .....                                     | 1277 |
| Figure G.6 — ARM diagram (6 of 33) .....                                     | 1278 |
| Figure G.7 — ARM diagram (7 of 33) .....                                     | 1279 |
| Figure G.8 — ARM diagram (8 of 33) .....                                     | 1280 |
| Figure G.9 — ARM diagram (9 of 33) .....                                     | 1281 |
| Figure G.10 — ARM diagram (10 of 33) .....                                   | 1282 |
| Figure G.11 — ARM diagram (11 of 33) .....                                   | 1283 |
| Figure G.12 — ARM diagram (12 of 33) .....                                   | 1284 |
| Figure G.13 — ARM diagram (13 of 33) .....                                   | 1285 |
| Figure G.14 — ARM diagram (14 of 33) .....                                   | 1286 |
| Figure G.15 — ARM diagram (15 of 33) .....                                   | 1287 |
| Figure G.16 — ARM diagram (16 of 33) .....                                   | 1288 |
| Figure G.17 — ARM diagram (17 of 33) .....                                   | 1289 |
| Figure G.18 — ARM diagram (18 of 33) .....                                   | 1290 |
| Figure G.19 — ARM diagram (19 of 33) .....                                   | 1291 |
| Figure G.20 — ARM diagram (20 of 33) .....                                   | 1292 |
| Figure G.21 — ARM diagram (21 of 33) .....                                   | 1293 |
| Figure G.22 — ARM diagram (22 of 33) .....                                   | 1294 |
| Figure G.23 — ARM diagram (23 of 33) .....                                   | 1295 |
| Figure G.24 — ARM diagram (24 of 33) .....                                   | 1296 |
| Figure G.25 — ARM diagram (25 of 33) .....                                   | 1297 |
| Figure G.26 — ARM diagram (26 of 33) .....                                   | 1298 |
| Figure G.27 — ARM diagram (27 of 33) .....                                   | 1299 |
| Figure G.28 — ARM diagram (28 of 33) .....                                   | 1300 |
| Figure G.29 — ARM diagram (29 of 33) .....                                   | 1301 |
| Figure G.30 — ARM diagram (30 of 33) .....                                   | 1302 |
| Figure G.31 — ARM diagram (31 of 33) .....                                   | 1303 |
| Figure G.32 — ARM diagram (32 of 33) .....                                   | 1304 |

|                                                          |      |
|----------------------------------------------------------|------|
| Figure G.33 — ARM diagram (33 of 33) . . . . .           | 1305 |
| Figure H.1 — AIM EXPRESS-G diagram (1 of 66) . . . . .   | 1307 |
| Figure H.2 — AIM EXPRESS-G diagram (2 of 66) . . . . .   | 1308 |
| Figure H.3 — AIM EXPRESS-G diagram (3 of 66) . . . . .   | 1309 |
| Figure H.4 — AIM EXPRESS-G diagram (4 of 66) . . . . .   | 1310 |
| Figure H.5 — AIM EXPRESS-G diagram (5 of 66) . . . . .   | 1311 |
| Figure H.6 — AIM EXPRESS-G diagram (6 of 66) . . . . .   | 1312 |
| Figure H.7 — AIM EXPRESS-G diagram (7 of 66) . . . . .   | 1313 |
| Figure H.8 — AIM EXPRESS-G diagram (8 of 66) . . . . .   | 1314 |
| Figure H.9 — AIM EXPRESS-G diagram (9 of 66) . . . . .   | 1315 |
| Figure H.10 — AIM EXPRESS-G diagram (10 of 66) . . . . . | 1316 |
| Figure H.11 — AIM EXPRESS-G diagram (11 of 66) . . . . . | 1317 |
| Figure H.12 — AIM EXPRESS-G diagram (12 of 66) . . . . . | 1318 |
| Figure H.13 — AIM EXPRESS-G diagram (13 of 66) . . . . . | 1319 |
| Figure H.14 — AIM EXPRESS-G diagram (14 of 66) . . . . . | 1320 |
| Figure H.15 — AIM EXPRESS-G diagram (15 of 66) . . . . . | 1321 |
| Figure H.16 — AIM EXPRESS-G diagram (16 of 66) . . . . . | 1322 |
| Figure H.17 — AIM EXPRESS-G diagram (17 of 66) . . . . . | 1323 |
| Figure H.18 — AIM EXPRESS-G diagram (18 of 66) . . . . . | 1324 |
| Figure H.19 — AIM EXPRESS-G diagram (19 of 66) . . . . . | 1325 |
| Figure H.20 — AIM EXPRESS-G diagram (20 of 66) . . . . . | 1326 |
| Figure H.21 — AIM EXPRESS-G diagram (21 of 66) . . . . . | 1327 |
| Figure H.22 — AIM EXPRESS-G diagram (22 of 66) . . . . . | 1328 |
| Figure H.23 — AIM EXPRESS-G diagram (23 of 66) . . . . . | 1329 |
| Figure H.24 — AIM EXPRESS-G diagram (24 of 66) . . . . . | 1330 |
| Figure H.25 — AIM EXPRESS-G diagram (25 of 66) . . . . . | 1331 |
| Figure H.26 — AIM EXPRESS-G diagram (26 of 66) . . . . . | 1332 |
| Figure H.27 — AIM EXPRESS-G diagram (27 of 66) . . . . . | 1333 |
| Figure H.28 — AIM EXPRESS-G diagram (28 of 66) . . . . . | 1334 |
| Figure H.29 — AIM EXPRESS-G diagram (29 of 66) . . . . . | 1335 |
| Figure H.30 — AIM EXPRESS-G diagram (30 of 66) . . . . . | 1336 |
| Figure H.31 — AIM EXPRESS-G diagram (31 of 66) . . . . . | 1337 |
| Figure H.32 — AIM EXPRESS-G diagram (32 of 66) . . . . . | 1338 |
| Figure H.33 — AIM EXPRESS-G diagram (33 of 66) . . . . . | 1339 |
| Figure H.34 — AIM EXPRESS-G diagram (34 of 66) . . . . . | 1340 |
| Figure H.35 — AIM EXPRESS-G diagram (35 of 66) . . . . . | 1341 |
| Figure H.36 — AIM EXPRESS-G diagram (36 of 66) . . . . . | 1342 |
| Figure H.37 — AIM EXPRESS-G diagram (37 of 66) . . . . . | 1343 |
| Figure H.38 — AIM EXPRESS-G diagram (38 of 66) . . . . . | 1344 |
| Figure H.39 — AIM EXPRESS-G diagram (39 of 66) . . . . . | 1345 |
| Figure H.40 — AIM EXPRESS-G diagram (40 of 66) . . . . . | 1346 |
| Figure H.41 — AIM EXPRESS-G diagram (41 of 66) . . . . . | 1347 |
| Figure H.42 — AIM EXPRESS-G diagram (42 of 66) . . . . . | 1348 |
| Figure H.43 — AIM EXPRESS-G diagram (43 of 66) . . . . . | 1349 |
| Figure H.44 — AIM EXPRESS-G diagram (44 of 66) . . . . . | 1350 |
| Figure H.45 — AIM EXPRESS-G diagram (45 of 66) . . . . . | 1351 |
| Figure H.46 — AIM EXPRESS-G diagram (46 of 66) . . . . . | 1352 |
| Figure H.47 — AIM EXPRESS-G diagram (47 of 66) . . . . . | 1353 |
| Figure H.48 — AIM EXPRESS-G diagram (48 of 66) . . . . . | 1354 |

|                                                                      |      |
|----------------------------------------------------------------------|------|
| Figure H.49 — AIM EXPRESS-G diagram (49 of 66) .....                 | 1355 |
| Figure H.50 — AIM EXPRESS-G diagram (50 of 66) .....                 | 1356 |
| Figure H.51 — AIM EXPRESS-G diagram (51 of 66) .....                 | 1357 |
| Figure H.52 — AIM EXPRESS-G diagram (52 of 66) .....                 | 1358 |
| Figure H.53 — AIM EXPRESS-G diagram (53 of 66) .....                 | 1359 |
| Figure H.54 — AIM EXPRESS-G diagram (54 of 66) .....                 | 1360 |
| Figure H.55 — AIM EXPRESS-G diagram (55 of 66) .....                 | 1361 |
| Figure H.56 — AIM EXPRESS-G diagram (56 of 66) .....                 | 1362 |
| Figure H.57 — AIM EXPRESS-G diagram (57 of 66) .....                 | 1363 |
| Figure H.58 — AIM EXPRESS-G diagram (58 of 66) .....                 | 1364 |
| Figure H.59 — AIM EXPRESS-G diagram (59 of 66) .....                 | 1365 |
| Figure H.60 — AIM EXPRESS-G diagram (60 of 66) .....                 | 1366 |
| Figure H.61 — AIM EXPRESS-G diagram (61 of 66) .....                 | 1367 |
| Figure H.62 — AIM EXPRESS-G diagram (62 of 66) .....                 | 1368 |
| Figure H.63 — AIM EXPRESS-G diagram (63 of 66) .....                 | 1369 |
| Figure H.64 — AIM EXPRESS-G diagram (64 of 66) .....                 | 1370 |
| Figure H.65 — AIM EXPRESS-G diagram (65 of 66) .....                 | 1371 |
| Figure H.66 — AIM EXPRESS-G diagram (66 of 66) .....                 | 1372 |
| Figure K.1 — TDP information exchange activity .....                 | 1375 |
| Figure K.2 — Information creation scenario for TDP development ..... | 1378 |

## Tables

|                                                                                     |      |
|-------------------------------------------------------------------------------------|------|
| Table 1 — Applicability of selects and enumerations to units of functionality ..... | 17   |
| Table 2 — Applicability of types and entities to the units of functionality .....   | 18   |
| Table 3 — Change_identification attribute relationships .....                       | 68   |
| Table 4 — Mapping table for common .....                                            | 312  |
| Table 5 — Mapping table for data_definition_exchange .....                          | 389  |
| Table 6 — Mapping table for data_list .....                                         | 519  |
| Table 7 — Mapping table for drawing .....                                           | 566  |
| Table 8 — Mapping table for indentured_data_list .....                              | 594  |
| Table 9 — Mapping table for index_list .....                                        | 694  |
| Table 10 — Mapping table for other_list .....                                       | 719  |
| Table 11 — Mapping table for parts_list .....                                       | 749  |
| Table 12 — Mapping table for presentation .....                                     | 853  |
| Table 13 — Mapping table for product_data_set .....                                 | 874  |
| Table 14 — Mapping table for reference_document .....                               | 931  |
| Table 15 — Conformance classes .....                                                | 1019 |
| Table 16 — Conformance class elements .....                                         | 1024 |
| Table K.2.1 — Levels of capability for PL selects and enumerations .....            | 1383 |
| Table K.2.2 — Levels of capability for PL application objects and attributes .....  | 1384 |
| Table K.3.1 — Levels of capability for DL selects and enumerations .....            | 1404 |
| Table K.3.2 — Levels of capability for DL application objects and attributes .....  | 1405 |
| Table K.4.1 — Levels of capability for IL selects and enumerations .....            | 1419 |
| Table K.4.2 — Levels of capability for IL application objects and attributes .....  | 1419 |
| Table K.5.1 — Parent child relationships used in indenture list types .....         | 1432 |
| Table K.5.2 — Levels of capability for DDE, selects, and enumerations .....         | 1435 |
| Table K.5.3 — Levels of capability for DDE application objects and attributes ..... | 1438 |
| Table K.6.1 — Parent child relationships used in indenture list types .....         | 1458 |

Table K.6.2 — Levels of capability for IDL selects, and enumerations ..... 1461

Table K.6.3 — Levels of capability for IDL application objects and attributes ..... 1463

## 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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this part of ISO 10303 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 10303-232 was prepared by Technical Committee ISO/TC 184, *Industrial automation systems and integration*, Subcommittee SC 4, *Industrial data*.

This International Standard is organized as a series of parts, each published separately. The structure of this standard is described in ISO 10303-1.

Each part of this International Standard is a member of one of the following series: description methods, implementation methods, conformance testing methodology and framework, integrated generic resources, integrated application resources, application protocols, abstract test suites, application interpreted constructs, and application modules. This part is a member of the application protocols series.

A complete list of parts of ISO 10303 is available from the Internet:

<<http://www.nist.gov/sc4/editing/step/titles/>>

Should further parts of ISO 10303 be published, they will follow the same numbering pattern.

Annexes A, B, C, D and E form a normative part of this part of ISO 10303. Annexes F, G, H, J and K are for information only.

## Introduction

ISO 10303 is an International Standard for the computer-interpretable representation of product information and for the exchange of product data. The objective is to provide a neutral mechanism capable of describing products throughout their lifecycle. This mechanism is suitable not only for neutral file exchange, but also as a basis for implementing and sharing product databases and as a basis for archiving.

This part of ISO 10303 is a member of the application protocol series. This part of ISO 10303 specifies an application protocol (AP) for packaging product data so that configuration controlled access and data exchanges can be achieved among Product Data Management (PDM) systems.

This part of ISO 10303 identifies specific groupings of product information for the access or exchange of data, such as part lists and drawings. An integrated packing list of these product information groups can be captured by this part of ISO 10303 which satisfies data accountability requirements during data access or a data exchange. The actual format of the data being accessed or exchanged may be through ISO 10303 applications protocols (including this part of ISO 10303), through other ISO standards that define computer file formats, or any other computer file format that is agreed to by parties involved in the data access or data exchange agreement. This capability will satisfy the industrial need to communicate and share the total design definition of a product from an overall product data configuration structure perspective among organizations, partners, vendors, and customers. Portions of product data can be exchanged with the knowledge of where that portion belongs in the overall product data configuration structure. The goal of this part of ISO 10303 is to provide an information structure wherein product information can be electronically captured and managed from both a product information item perspective and a document based perspective, such as in PDM systems.

Current PDM systems being installed in industry manage documents from a product view point. No ISO 10303 Application Protocol addresses a document configuration for product data structures. This part of ISO 10303 addresses this document configuration structure void. Enterprises and industries that have large infrastructures that rely on document based management systems will utilize this part of ISO 10303 to migrate from their current implementations into a configuration control of product data from a product item perspective.

There are two aspects to this part of ISO 10303. The first is the packaging of product data for exchange or access. The second is to provide the exchange requirements of individual product data groupings focusing on associated list information such as data list, index list, indented data list, and parts list.

The packaging aspect provides the requirements for collecting, organizing, and managing the exchange of a complex set of data files or database views representing the different product data groupings that identify and define a product. These packaging aspects reside in a PDM's underlying metadata. A product data grouping defines a particular view of product information and may be identified and managed as a document, or a product data set or a unique view within a database. Drawings, Associated Lists, and Reference Documents are considered product data groupings. The practice of packaging product data into groupings is called an Engineering Data Package or a Technical Data Package (TDP). As a result of this packaging, this part of ISO 10303 defines the interoperation of other parts of ISO 10303 (for example, ISO 10303-203 and ISO 10303-202) and the managed inclusion of a mixed set of standards for representation of the various TDP elements, such as simple product data groupings.

Figure 1 is the high level functions of a PDM system. The areas enclosed in Figure 1 identify the information this part of ISO 10303 will support.

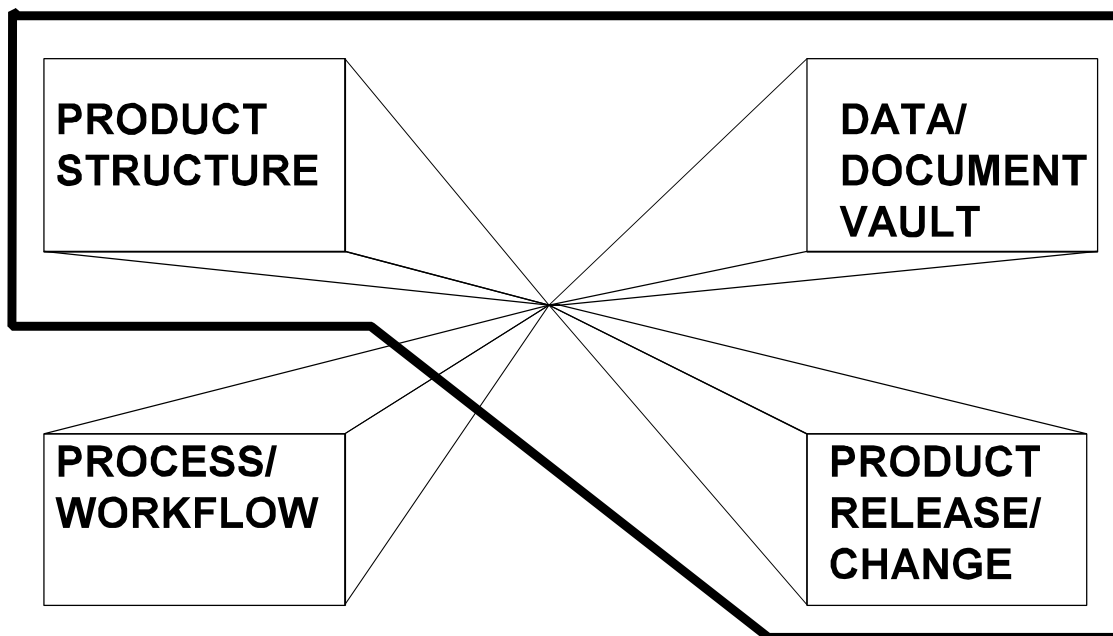


**Figure 1 — PDM information area ISO 10303-232 addresses**

Figure 2 is a high level planning model that describes some of the basic information concepts and their relationships contained in this part of ISO 10303. These concepts and relationships include the following:

- identification of a product and the relationship of that product to its constituents;
- identification of the TDP elements and the relationship of those TDP elements to each other;
- identification of the relationship between a product and its TDP element or the relationship among products and their TDP elements;
- the documentation of formal change level and release status of product information and the TDP elements for the product information;
- the definition and presentation of associated list information;
- the packaging of the TDP elements for access or exchange.

NOTE 1 Annex K provides comprehensive descriptions for many of the capabilities this part of ISO 10303 provides.

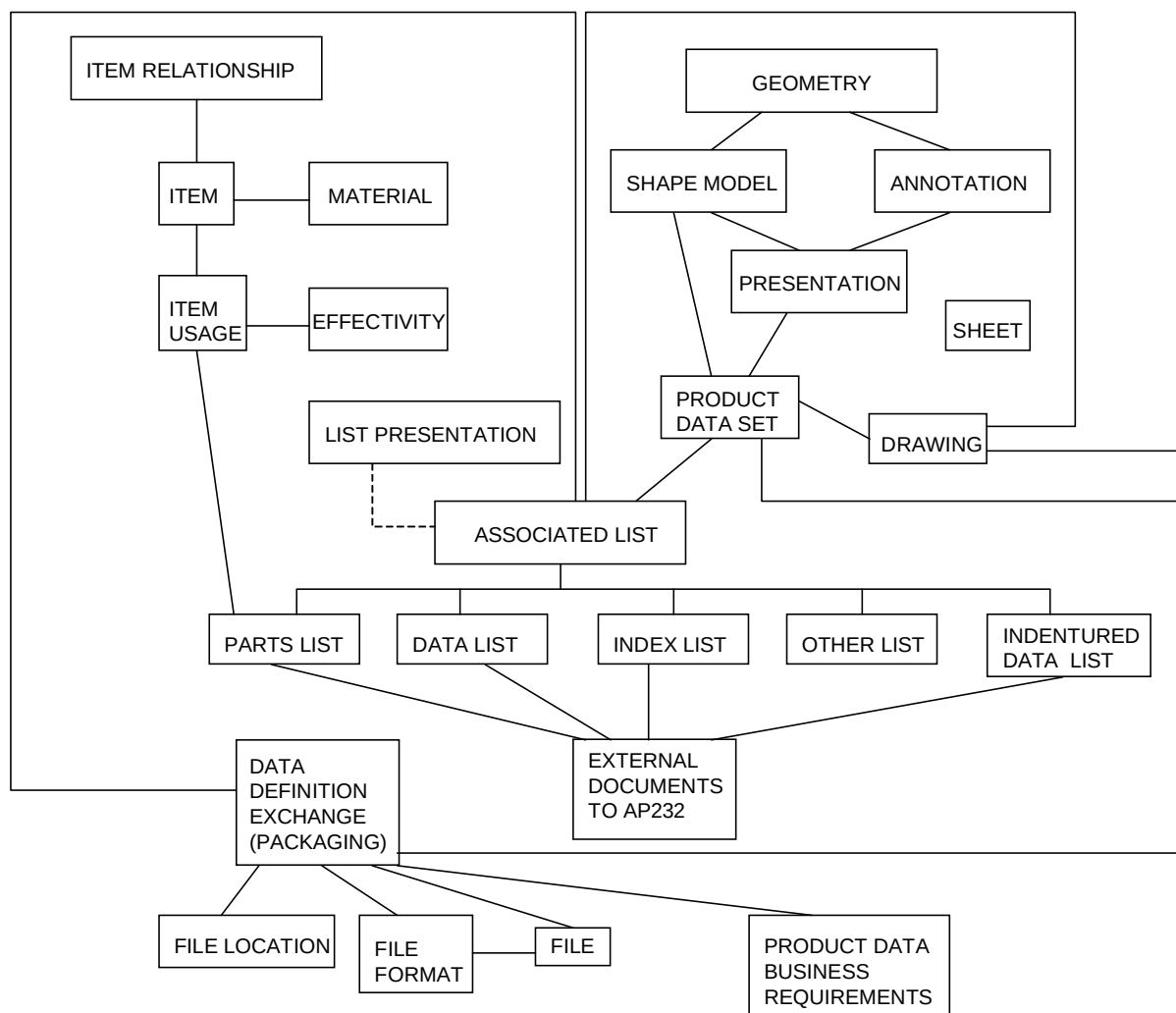


**Figure 2 — High level planning model**

This application protocol defines the context, scope, and information requirements for the content and exchange of technical data packages and specifies the integrated resources necessary to satisfy these requirements.

NOTE 2 Technical data packages may define products, component parts, assemblies, and their related documentation. TDPs are not confined to mechanical definitions of a product, but may define TDPs that define functionality of a product, TDPs that define concepts for a product, or TDPs that define form and fit of a product.

NOTE 3 This part of ISO 10303 may define interoperation of other ISO 10303 APs within a TDP.

NOTE 4 This part of ISO 10303 may identify the co-existence of ISO 10303 APs with different data representations for the same product information.

NOTE 5 This part of ISO 10303 may identify product data stored in other computer data file formats and the relationship of the data contained in the file with other product data contained in other computer data files.

Application protocols provide the basis for developing implementations of ISO 10303 and abstract test suites for the conformance testing of AP implementations.

Clause 1 defines the scope of the application protocol and summarizes the functionality and data covered by the AP. Clause 3 lists the words defined in this part of ISO 10303 and gives pointers to words defined elsewhere. An application activity model that is the basis for the definition of the scope is provided in annex F. The information requirements of the application are specified in clause 4 using terminology appropriate to the application. A graphical representation of the information requirements, referred to as the application reference model, is given in annex G.

Resource constructs are interpreted to meet the information requirements. This interpretation produces the application interpreted model (AIM). This interpretation, given in 5.1, shows the correspondence between the information requirements and the AIM. The short listing of the AIM specifies the interface to the integrated resources and is given in 5.2. Note that the definitions and EXPRESS provided in the integrated resources for constructs used in the AIM may include select list items and subtypes which are not imported into the AIM. The expanded listing given in annex A contains the complete EXPRESS for the AIM without annotation. A graphical representation of the AIM is given in annex H. Additional requirements for specific implementation methods are given in annex C.

NOTE 6 ISO 10303 standards are referenced throughout the documentation of the requirements of this part of ISO 10303. This part utilizes ISO 10303 standards through the use of application interpreted constructs.



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

Part 232:

## Application protocol: Technical data packaging core information and exchange

### 1 Scope

This part of ISO 10303 specifies the use of the integrated resources necessary for the scope and information requirements for Technical Data Packages (TDPs) (see 3.5.28) to be exchanged among product data management systems.

Each enterprise uses content, format, and the level of configuration control as parameters when establishing its product exchange or access requirements among business partners. Because of the diverse set of products, product data, and lifecycle processes PDM systems support, this part of ISO 10303 allows many combinations of these parameters and their values.

Using a defined set of these parameters, the disclosure of product information needs to be sufficient to satisfy the business purpose of the TDP.

NOTE 1 TDPs may be prepared to a level where the product information is sufficient to evaluate a product definition concept. Or a TDP may be prepared to a level where the product information is sufficient to enable full design disclosure (see 3.5.9).

Requirements for this part of ISO 10303 were derived from functions that create and use TDPs and reside throughout the product's life cycle. The key informational aspects addressed in this part of ISO 10303 are shared and exchanged throughout the product's life cycle.

NOTE 2 Within a product's life cycle, there are many functions that create and use the technical information about a product. Figure 3 illustrates the functional usage of technical data within each life cycle phase of a product. The largest percentage of the technical data is developed in the concept development, concept and validation, and product and process development lifecycle phases. The operations and support lifecycle phase, for most products or commodities, is the longest and is impacted the greatest by the quality and usability of the TDP information. The production lifecycle phase typically has the second largest usage of the information contained within the TDP. In the production and product process development lifecycle phase, TDP data is used to build and deliver the product.

NOTE 3 The application activity model in annex F provides a graphical representation of the processes and information flows that are the basis for the definition of the scope of this part of ISO 10303.

## ISO 10303-232:2002(E)

EXAMPLE 1 The following represent different types of Technical Data Packages through a product's life cycle:

- Conceptual Design Drawings and Associated Lists;
- Developmental Design Drawings and Associated Lists;
- Product Drawings and Associated Lists;
- Commercial Drawings and Associated Lists;
- Special Inspection Equipment Drawings and Associated Lists;
- Special Tooling Drawings and Associated Lists.

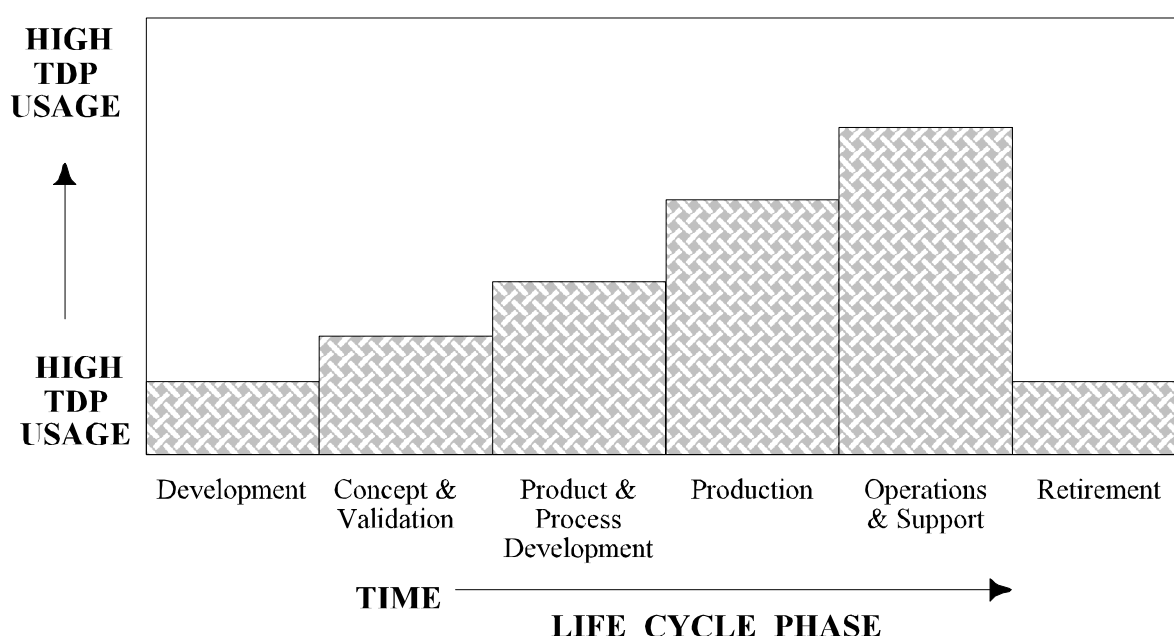


**Figure 3 — Functional usage of technical data**

NOTE 4 Definitions for the preceding types of TDPs are given in Clause 3.5.

The content, form, and format of the data are critical to the core information content for exchange or access of the TDP. The following are within the scope of this part of ISO 10303:

- All products and their commodity types;

NOTE 5 This part of ISO 10303 is defined independently of product or commodity.

- Product definition data and product configuration control data pertaining to the concept development, concept and validation, product and process development, production, operations and support, and retirement phases of a product (herein called the product life cycle);

NOTE 6 ISO 10303 standards are referenced throughout the documentation of the requirements of this part of ISO 10303. This part utilizes ISO 10303 standards through the use of application interpreted constructs.

- Relationship of the product to a technical data package element (see 3.5.27);
- Identification of drawings related to the product that require configuration control, exchange, or access;
- The data content requirements for parts lists, data lists, index lists, indented data lists, and other associated lists that are associated to a drawing or a product data set (see 3.5 for definitions);
- The data content requirements for product data set that represent geometric product shape;
- Identification of files containing shape information and the positioning information needed to place components in an assembly;
- Identification of alternate geometric representations of the product definition data by different disciplines during the product life cycle;
- Identification of any group of technical data related to the product that needs configuration control exchange or access;

EXAMPLE 2 A finite element analysis (models, controls, and results) and testing reports are each a group of technical data.

- Identification of specifications and standards that define or describe the product or product unique processes;
- Identification of documentation that define or describe change activity to the product or product related documentation;

EXAMPLE 3 Change activity is documented in the form of Drawing Revision Notices, Engineering Change Notices, and Drawing Change Notices.

- The Identification of standard parts (see 3.5.26) for the purpose of their inclusion in a product's design;
- The visual presentation for human understanding of the associated list data and the product data set;
- The data requirements for configuration control exchange of Technical Data Packages;

NOTE 7 Identification of document version will be defined by this part of ISO 10303.

- The identification and relationship of Technical Data Package elements within a TDP exchange;
- The identification of file and file format for Technical Data Package elements;

NOTE 8 File and file format information may be defined by this part of ISO 10303, another part of ISO 10303, National Standards or through mutual agreement between the sending and receiving parties of the TDP elements.

## ISO 10303-232:2002(E)

- The identification of digital and non-digital media for specific technical data package elements.

EXAMPLE 4 Digital media could include floppy disk, diskette, compact disk, and 9-track tape.

EXAMPLE 5 Non-digital media could include paper, mylar, aperture card, and vellum.

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

- Data content requirements for technological data used in, or resulting from, the analysis or test of a design that is used as evidence for consideration of a change to a design;

NOTE 9 A product data set may contain analysis or test data in a format other than this part of ISO 10303.

- Data content requirements for technological data that results in changes to the design during the initial design evolution prior to release;

NOTE 10 Changes prior to release are considered informal change activity.

NOTE 11 ISO 10303-209 [4] defines requirements for informal change activity prior to engineering release.

- Data content requirements for business management data for a design project;

EXAMPLE 6 Business data could include schedule, cost, time standards, risk, and related management information.

- Data content requirements for alternate representations of the data by different disciplines outside of that required to define, manufacture, or procure the product;
- Data content requirements for definition of digital or non-digital media for a TDP exchange;
- Data content requirements for definition of procedures to record the digital TDP files to digital media.

## 2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 10303-232. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 10303-232 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 31 (all parts), *Quantities and units*

ISO 1000:1992, *SI units and recommendations for the use of their multiples and of certain other units*

ISO/IEC 8824-1:1998, *Information technology — Abstract Syntax Notation One (ASN.1): Specification of basic notation*

ISO 10303-1:1994, *Industrial automation systems and integration — Product data representation and exchange — Part 1: Overview and fundamental principles*

ISO 10303-11:1994, *Industrial automation systems and integration — Product data representation and exchange — Part 11: Description methods: The EXPRESS language reference manual*

ISO 10303-21:2002, *Industrial automation systems and integration — Product data representation and exchange — Part 21: Implementation methods: Clear text encoding of the exchange structure*

ISO 10303-31:1994, *Industrial automation systems and integration — Product data representation and exchange — Part 31: Conformance testing methodology and framework: General concepts*

ISO 10303-41:2000, *Industrial automation systems and integration — Product data representation and exchange — Part 41: Integrated generic resource: Fundamentals of product description and support*

ISO 10303-42:2000, *Industrial automation systems and integration — Product data representation and exchange — Part 42: Integrated generic resource: Geometric and topological representation*

ISO 10303-43:2000, *Industrial automation systems and integration — Product data representation and exchange — Part 43: Integrated generic resource: Representation structures*

ISO 10303-44:2000, *Industrial automation systems and integration — Product data representation and exchange — Part 44: Integrated generic resource: Product structure configuration*

ISO 10303-45:1998, *Industrial automation systems and integration — Product data representation and exchange — Part 45: Integrated generic resource: Materials*

ISO 10303-46:1994, *Industrial automation systems and integration — Product data representation and exchange — Part 46: Integrated generic resources: Visual presentation*

ISO 10303-49:1998, *Industrial automation systems and integration — Product data representation and exchange — Part 49: Integrated generic resources: Process structure and properties*

ISO 10303-101:1994, *Industrial automation systems and integration — Product data representation and exchange — Part 101: Integrated application resources: Draughting*

ISO 10303-201:1994, *Industrial automation systems and integration — Product data representation and exchange — Part 201: Application protocol: Explicit draughting*

ISO 10303-202:1996, *Industrial automation systems and integration — Product data representation and exchange — Part 202: Application protocol: Associative draughting*

ISO 10303-203:1994, *Industrial automation systems and integration — Product data representation and exchange — Part 203: Application protocol: Configuration controlled design*

## **ISO 10303-232:2002(E)**

ISO 10303-501:2000, *Industrial automation systems and integration — Product data representation and exchange — Part 501: Application interpreted construct: Edge-based wireframe*

ISO 10303-502:2000, *Industrial automation systems and integration — Product data representation and exchange — Part 502: Application interpreted construct: Shell-based wireframe*

ISO 10303-503:2000, *Industrial automation systems and integration — Product data representation and exchange — Part 503: Application interpreted construct: Geometrically bounded 2D wireframe*

ISO 10303-505:2000, *Industrial automation systems and integration — Product data representation and exchange — Part 505: Application interpreted construct: Drawing structure and administration*

ISO 10303-507:2001, *Industrial automation systems and integration — Product data representation and exchange — Part 507: Application interpreted construct: Geometrically bounded surface*

ISO 10303-508:2001, *Industrial automation systems and integration — Product data representation and exchange — Part 508: Application interpreted construct: Non-manifold surface*

ISO 10303-509:2001, *Industrial automation systems and integration — Product data representation and exchange — Part 509: Application interpreted construct: Manifold surface*

ISO 10303-510:2000, *Industrial automation systems and integration — Product data representation and exchange — Part 510: Application interpreted construct: Geometrically bounded wireframe*

ISO 10303-511:2001, *Industrial automation systems and integration — Product data representation and exchange — Part 511: Application interpreted construct: Topologically bounded surface*

ISO 10303-512:1999, *Industrial automation systems and integration — Product data representation and exchange — Part 512: Application interpreted construct: Faceted boundary representation*

ISO 10303-513:2000, *Industrial automation systems and integration — Product data representation and exchange — Part 513: Application interpreted construct: Elementary boundary representation*

ISO 10303-514:1999, *Industrial automation systems and integration — Product data representation and exchange — Part 514: Application interpreted construct: Advanced boundary representation*

ISO 10303-515:2000, *Industrial automation systems and integration — Product data representation and exchange — Part 515: Application interpreted construct: Constructive solid geometry*

ISO 10303-517:2000, *Industrial automation systems and integration — Product data representation and exchange — Part 517: Application interpreted construct: Mechanical design geometric presentation*

ISO 10303-518—<sup>1)</sup>, *Industrial automation systems and integration — Product data representation and exchange — Part 518: Application interpreted construct: Mechanical design shaded presentation*

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<sup>1)</sup> To be published.

### 3 Terms, definitions, and abbreviations

#### 3.1 Terms defined in ISO 10303-1

For the purposes of this part of ISO 10303, the following terms defined in ISO 10303-1 apply:

- abstract test suite;
- application;
- application activity model;
- application context;
- application interpreted model;
- application object;
- application protocol;
- application reference model;
- assembly;
- component;
- conformance class;
- conformance requirement;
- data;
- data exchange;
- implementation method;
- information;
- integrated resource;
- interpretation;
- PICS proforma;
- product;
- product data;

## **ISO 10303-232:2002(E)**

- protocol implementation conformance statement;
- structure;
- unit of functionality.

### **3.2 Terms defined in ISO 10303-31**

For the purposes of this part of ISO 10303, the following terms defined in ISO 10303-31 apply:

- conformance testing;
- preprocessor;
- postprocessor.

### **3.3 Terms defined in ISO 10303-42**

For the purposes of this part of ISO 10303, the following terms defined in ISO 10303-42 apply:

- arcwise connected;
- axi-symmetric;
- bounds;
- boundary;
- boundary representation solid model;
- closed curve;
- closed surface;
- connected;
- connected component;
- curve;
- cycle;
- dimensionality;
- $d$ -manifold with boundary;
- domain;

- extent;
- finite;
- geometric coordinate system;
- graph;
- handle;
- homomorphic;
- list;
- open curve;
- open surface;
- orientable;
- overlap;
- parameter range;
- parameter space;
- placement coordinate system;
- self-intersect;
- self-loop;
- set;
- space dimensionality;
- surface;
- topological sense.

### 3.4 Terms defined in ISO 10303-203

For the purposes of this part of ISO 10303, the following terms defined in ISO 10303-203 apply:

- boundary representation model;
- design phase;

## ISO 10303-232:2002(E)

- mechanical part;
- solid model;
- sub-assembly;
- wireframe model.

### 3.5 Other terms and definitions

For the purposes of this part of ISO 10303, the following terms and definitions apply:

#### 3.5.1

##### **associated list**

a tabulation of pertinent engineering information pertaining to an item depicted on an engineering drawing, on a set of engineering drawings, a product data set, in a product data set, or a combination thereof

EXAMPLE Examples of an associated list are Parts List, Data List, Indentured Data List, and Index List.

#### 3.5.2

##### **commercial drawings**

engineering and design disclosure information in support of end items that are commercially developed items, or off-the-shelf items

#### 3.5.3

##### **computer interpretable data**

data that is in a specific context and format and can be read and stored in a computer system such that action may be taken based on the content of the data

EXAMPLE A properly formatted floppy disk contains a file in a standard file format. One of the parameters of the data in the file is release information, which is one of the following: "released", "not released", or "unknown". If the release information for this file is "not released". The software application reading this file places this information in a working area, rather than the release area.

#### 3.5.4

##### **computer processable data**

data that is in a format that can be read and stored by a computer

EXAMPLE A personal note written in a commercial word processor format on a properly formatted floppy disk can be read by a personal computer (PC) with the appropriate software. The data can also be displayed and stored on that PC according to the formatting instructions, regardless of the note content. However, a hand written note is not computer processable.

#### 3.5.5

##### **conceptual design drawings**

design concepts in defined graphic form, and including appropriate textual information required for analysis and evaluation of those concepts

**3.5.6****data definition exchange (DDE)**

a listing that identifies and records the total number of TDP elements required to support the given product data for an item, assembly, or detail being exchanged or available for access

**3.5.7****data list**

a tabulation of all engineering drawings, associated lists, specifications, standards, product data sets and subordinate data lists pertaining to the item that applies to the data list

**3.5.8****design activity standard**

a document containing a set of rules, criteria, and requirements established by an enterprise, organization, or department used to measure the accuracy and control completeness of a design

NOTE 1 A standard may be developed by the organization that is doing the design.

NOTE 2 A standard may be developed by an industrial organization (for example, ISO) that is concerned with standards development. A design activity may adopt the standard without modification or the organization may modify the standard for their purpose.

**3.5.9****design disclosure**

engineering definition sufficiently complete to enable a competent manufacturer to produce and maintain quality control of item(s) to the degree that physical and performance characteristics interchangeable with those of the original design are obtained without resorting to additional product design effort, additional design data, or recourse to the original design activity

**3.5.10****developmental design drawings**

data provided to support the analysis of a specific design approach and the fabrication of product prototype for test or experimentation

**3.5.11****drawing types**

one of two types: industry standard and government peculiar, and can be typed according to the format of the data.

**3.5.12****government peculiar drawings**

drawings whose specific data content is defined by a specific Government program or Government entity

EXAMPLE Different government peculiar drawing types: inseparable assembly drawing, envelope drawing, and package content drawing.

**3.5.13****in-house documents**

documents that are owned and controlled within an enterprise

## ISO 10303-232:2002(E)

### 3.5.14

#### **indentured data list**

a structured tabulation of all engineering drawings, associated lists, specifications, standards, product data sets, and subordinate data lists pertaining to the item to which the data list applies and essential in-house documents (see 3.5.13) necessary to meet the technical design disclosure requirements of a project

NOTE The indentured data list can be viewed as a tabulation listed in a top-down breakdown (generation tree) order using parts or documents as its top-down breakdown order.

### 3.5.15

#### **index list**

a tabulation of data lists and possible subordinate index lists pertaining to a business requirement

### 3.5.16

#### **industry standard drawing**

drawing types that are recognized by a standards body such as ISO

EXAMPLE Different industry standard drawing types are detailed drawing, assembly drawing, and installation drawing.

### 3.5.17

#### **intelligent data format**

a format that captures product data in more than a presentation perspective

EXAMPLE Standard exchange for product model data.

### 3.5.18

#### **parts list**

a tabulation of identified parts, bulk materials, and possible reference documents used in an Item

NOTE Other terms used to describe a parts list are the following:

- list of materials;
- bill of materials;
- stock list;
- item list.

### 3.5.19

#### **path information**

a computer interpretable or human interpretable string of text that allows a software application or person enough knowledge to follow a trail over a computer network

### 3.5.20

#### **product data set**

a computer interpretable file of Product model data

EXAMPLE 3D models, and configuration data such as release, security, and/or contract information.

### 3.5.21

#### **product drawings and associated lists**

the necessary design, engineering, manufacturing, and quality assurance requirements information necessary to enable the procurement or manufacture of an interchangeable item that duplicates the physical and performance characteristics of the original product, without additional design engineering effort or recourse to the original design activity

### 3.5.22

#### **product information**

recorded facts, concepts, or instructions about a product

### 3.5.23

#### **reference document**

any design activity standard (see 3.5.8), drawing, or other document that is specified on a drawing or a list.

### 3.5.24

#### **special inspection equipment drawings and associated lists**

the data required to permit the limited production of special inspection equipment that duplicates the physical and performance characteristics of any previously built special inspection equipment

### 3.5.25

#### **special tooling drawings and associated lists**

the data necessary to enable a manufacturer to produce an item that duplicates the physical and performance characteristics identical to those of the original tooling

### 3.5.26

#### **standard parts**

parts that an enterprise identifies as being utilized multiple times within the enterprise's business domain

### 3.5.27

#### **TDP element**

a piece of product information that would be exchanged or shared between two parties

EXAMPLE Such as engineering drawings, associated lists, referenced documents, or other data.

### 3.5.28

#### **Technical Data Package**

a collection of related information about a product being exchanged among PDM systems

EXAMPLE The following examples of TDP types identify requirements for TDP elements:

- Conceptual design drawings and associated lists;
- Developmental design drawings and associated lists;
- Product drawings and associated lists;
- Commercial drawings and associated lists;

## ISO 10303-232:2002(E)

- Specifications;
- Special inspection equipment and associated lists;
- Special tooling drawings and associated lists;
- Software and software documentation.

### 3.6 Abbreviations

For the purposes of this part of ISO 10303, the following abbreviations apply:

|       |                                         |
|-------|-----------------------------------------|
| AAM   | application activity model              |
| AIC   | application interpreted construct       |
| AIM   | application interpreted model           |
| AP    | application protocol                    |
| ARM   | application reference model             |
| BOM   | bill-of-material                        |
| CAD   | computer aided design                   |
| CDRL  | contract data requirements list         |
| CID   | commercial item description             |
| CM    | configuration management                |
| DAG   | directed acyclic graph                  |
| DDE   | Data Definition Exchange                |
| DID   | data item description                   |
| DL    | Data List                               |
| DWG   | drawing                                 |
| ICAM  | integrated computer-aided manufacturing |
| ID    | identification                          |
| IDEF0 | ICAM definition language 0              |

|      |                                                |
|------|------------------------------------------------|
| IDL  | Indentured Data List                           |
| IGES | Initial Graphics Exchange Specification        |
| IL   | Index List                                     |
| OL   | Other List                                     |
| PDM  | Product Data Management                        |
| PDS  | Product Data Set                               |
| PICS | Protocol information and conformance statement |
| PL   | Parts List                                     |
| PRES | Presentation                                   |
| RD   | Reference Document                             |
| TDP  | Technical Data Package                         |
| UoF  | Units of Functionality                         |

## 4 Information requirements

This clause specifies the information required for technical data packaging core information and exchange.

The information requirements are specified as a set of units of functionality, application objects, and application assertions. These assertions pertain to individual application objects and to relationships between application objects. The information requirements are defined using the terminology of the subject area of this application protocol.

NOTE 1 A graphical representation of the information requirements is given in annex G.

NOTE 2 The information requirements correspond to those of the activities identified as being in the scope of this application protocol are in annex F.

NOTE 3 The mapping table is specified in 5.1 that shows how the information requirements are met using the integrated resources of this International Standard. The use of the integrated resources introduces additional requirements that are common to application protocols.

NOTE 4 The information requirements were captured using the EXPRESS language defined in ISO 10303-11. The EXPRESS language constructs of entity, type, select, and enumeration are used to define an application object. A unit of functionality consists of a subset of application objects.

## ISO 10303-232:2002(E)

The following are high-level information requirements:

- any exchange requiring exchange document accountability shall contain at least one Data Definition Exchange (DDE) element;
- the DDE shall reference TDP elements for the information of interest;
- the TDP elements are drawings, product data sets, reference documents, associated lists, and any other piece of product information that would be exchanged or shared between two parties.

### 4.1 Units of functionality

This subclause specifies the units of functionality for the technical data packaging core information and exchange application protocol. This part of ISO 10303 specifies the following units of functionality:

- data\_definition\_exchange;
- data\_list;
- drawing;
- indentured\_data\_list;
- index\_list;
- other\_list;
- parts\_list;
- presentation;
- product\_data\_set;
- reference\_document.

NOTE 1 The following ISO 10303-203 UoFs are considered to be a portion of this part of ISO 10303: authorization, bill\_of\_material, design\_information, effectivity, end\_item\_identification, part\_identification, and source\_control

The units of functionality and a description of the functions that each UoF supports are given in 4.1.1 through 4.1.11. Table 1 and Table 2 provide the applicability of the EXPRESS constructs, selects, enumerations, types, and entities, to the units of functionality. The application objects included in the UoFs are defined in 4.2. The application objects that are used by each UoF are given in Table 2.

NOTE 2 The objects in Table 1 reflect the selects and enumerations from the ARM EXPRESS-G diagram in annex G. The objects in Table 2 reflect entities and types from the ARM EXPRESS-G. Clauses 4.1.1 thru 4.1.11 reflect the same object list as in Table 2 with the same order. Clause 4.2 incorporates all types, selects, and enumerations into the using entity's definition resulting in more robust objects.

NOTE 3 Abbreviations used in the column headings for Table 1 and Table 2 are found in 3.6.

**Table 1 — Applicability of selects and enumerations to units of functionality**

| Objects                                  | Units of functionality |    |    |     |     |     |     |    |      |    |
|------------------------------------------|------------------------|----|----|-----|-----|-----|-----|----|------|----|
| Select, Enumeration                      | PL                     | DL | IL | IDL | DDE | PDS | DWG | RD | PRES | OL |
| alternate_identification_element_-select | X                      | X  | X  | X   | X   | X   | X   | X  |      | X  |
| alternate_identification_item_-select    | X                      | X  | X  | X   | X   | X   | X   | X  |      | X  |
| change_type                              | X                      | X  | X  | X   | X   | X   | X   | X  |      | X  |
| component_list_type_enumeration          | X                      |    |    |     |     |     |     |    |      |    |
| component_list_type_select               | X                      |    |    |     |     |     |     |    |      |    |
| data_definition_entry_and_file_-select   |                        |    |    |     | X   |     |     |    |      |    |
| data_definition_entry_select             |                        |    |    |     | X   |     |     |    |      |    |
| data_definition_exchange_list_-method    |                        |    |    |     | X   |     |     |    |      |    |
| data_definition_file_entry               |                        |    |    |     | X   |     |     |    |      |    |
| date_or_event                            | X                      |    |    | X   | X   |     |     |    |      |    |
| drawing_or_product_data_set              | X                      | X  | X  | X   |     | X   |     |    |      | X  |
| entry_format_select                      |                        |    |    |     | X   |     |     |    |      |    |
| exchange_reason                          |                        |    |    |     | X   |     |     |    |      |    |
| geometry_select                          | X                      |    |    |     |     |     |     |    |      |    |
| graphics_parameters                      |                        |    |    |     |     |     |     |    | X    |    |
| identification_select                    |                        |    |    | X   | X   |     |     |    |      |    |
| indentured_list_method                   |                        |    |    | X   | X   |     |     |    |      |    |
| item_identifying_number_select           | X                      | X  |    | X   | X   | X   | X   |    |      |    |
| item_list_applies_to_select              | X                      |    |    |     |     |     |     |    |      |    |
| item_or_element                          |                        |    |    | X   | X   |     |     |    |      |    |
| list_entry_select                        |                        |    |    | X   | X   |     |     |    |      |    |
| quantity_accuracy_enumeration            | X                      |    |    | X   | X   |     |     | X  |      |    |

**Table 1 — Applicability of selects and enumerations to units of functionality (concluded)**

| Objects                          | Units of functionality |    |    |     |     |     |     |    |      |    |
|----------------------------------|------------------------|----|----|-----|-----|-----|-----|----|------|----|
| Select, Enumeration              | PL                     | DL | IL | IDL | DDE | PDS | DWG | RD | PRES | OL |
| quantity_accuracy_select         | X                      |    |    | X   | X   |     |     | X  |      |    |
| quantity_type_select             | X                      |    |    | X   | X   |     |     |    |      |    |
| retrofit_state                   | X                      |    |    |     |     |     |     |    |      |    |
| revision_authorization_select    | X                      | X  | X  | X   | X   | X   | X   | X  |      | X  |
| shape_select                     | X                      |    |    | X   | X   | X   | X   |    |      |    |
| source_identification            |                        | X  |    | X   | X   |     |     |    |      |    |
| stock_size_classification        | X                      |    |    |     |     |     |     |    |      |    |
| stock_size_cross_section         | X                      |    |    |     |     |     |     |    |      |    |
| usage_condition                  | X                      |    |    |     |     |     |     |    |      |    |
| usage_context                    | X                      |    |    | X   | X   |     |     |    |      |    |
| valid_tdp_elements_for_data_list |                        | X  |    |     |     |     |     |    |      |    |
| weight_derivation                | X                      |    |    |     |     |     |     |    |      |    |

**Table 2 — Applicability of types and entities to the units of functionality**

| Objects                          | Units of functionality |    |    |     |     |     |     |    |      |    |
|----------------------------------|------------------------|----|----|-----|-----|-----|-----|----|------|----|
| Entity                           | PL                     | DL | IL | IDL | DDE | PDS | DWG | RD | PRES | OL |
| a_number                         | X                      | X  | X  | X   | X   | X   | X   | X  | X    | X  |
| a_real                           | X                      | X  | X  | X   | X   | X   | X   | X  | X    | X  |
| accessed_file                    |                        |    |    |     | X   |     |     |    |      |    |
| alternate_element_identification | X                      | X  | X  | X   | X   | X   | X   | X  |      | X  |
| alternate_identification_of_item | X                      | X  |    | X   | X   | X   | X   |    |      |    |
| alternate_item                   | X                      |    |    | X   | X   |     |     |    |      |    |
| an_integer                       | X                      | X  | X  | X   | X   | X   | X   | X  | X    | X  |

**Table 2 — Applicability of types and entities to the units of functionality  
(continued)**

| Objects                                | Units of functionality |    |    |     |     |     |     |    |      |    |
|----------------------------------------|------------------------|----|----|-----|-----|-----|-----|----|------|----|
| Entity                                 | PL                     | DL | IL | IDL | DDE | PDS | DWG | RD | PRES | OL |
| annotation                             |                        |    |    |     |     | X   | X   |    |      |    |
| approval                               | X                      | X  | X  | X   | X   | X   | X   |    |      | X  |
| assembly_relationship                  | X                      |    |    |     |     |     |     |    |      |    |
| associated_list                        | X                      | X  | X  | X   |     |     |     |    |      | X  |
| body_presentation                      |                        |    |    |     |     |     |     |    | X    |    |
| certification                          | X                      | X  | X  | X   | X   | X   | X   | X  |      | X  |
| change_identification                  | X                      | X  | X  | X   | X   | X   | X   | X  |      | X  |
| column_header                          |                        |    |    |     |     |     |     |    | X    |    |
| columnar_data_content_holder           |                        |    |    |     |     |     |     |    | X    |    |
| company                                | X                      | X  | X  | X   | X   | X   | X   | X  |      | X  |
| company_code                           | X                      | X  | X  | X   | X   | X   | X   | X  |      | X  |
| configuration                          | X                      | X  | X  | X   | X   | X   | X   |    |      | X  |
| content_property                       |                        |    |    | X   | X   | X   |     |    |      |    |
| contract                               | X                      | X  | X  | X   | X   | X   | X   |    |      | X  |
| contract_submission                    |                        | X  |    | X   | X   |     |     |    |      |    |
| data_definition_entry_item             |                        |    |    |     | X   |     |     |    |      |    |
| data_definition_entry_tdp_element      |                        |    |    |     | X   |     |     |    |      |    |
| data_definition_exchange               |                        |    |    |     | X   |     |     |    |      |    |
| data_definition_exchange_body          |                        |    |    |     | X   |     |     |    |      |    |
| data_definition_exchange_header        |                        |    |    |     | X   |     |     |    |      |    |
| data_definition_exchange_simple_entry  |                        |    |    |     | X   |     |     |    |      |    |
| data_definition_indentured_entry       |                        |    |    |     | X   |     |     |    |      |    |
| data_definition_indentured_list_method |                        |    |    |     | X   |     |     |    |      |    |

**Table 2 — Applicability of types and entities to the units of functionality  
(continued)**

| Objects                                | Units of functionality |    |    |     |     |     |     |    |      |    |
|----------------------------------------|------------------------|----|----|-----|-----|-----|-----|----|------|----|
| Entity                                 | PL                     | DL | IL | IDL | DDE | PDS | DWG | RD | PRES | OL |
| data_list                              |                        | X  | X  |     |     |     |     |    |      |    |
| data_list_body                         |                        | X  |    |     |     |     |     |    |      |    |
| data_list_entry                        |                        | X  |    |     |     |     |     |    |      |    |
| data_list_header                       |                        | X  | X  |     |     |     |     |    |      |    |
| data_list_tabulation                   |                        | X  |    |     |     |     |     |    |      |    |
| date                                   | X                      | X  | X  | X   | X   | X   | X   | X  | X    | X  |
| date_effectivity                       | X                      |    |    | X   | X   |     |     |    |      |    |
| delivery_accounting                    |                        |    |    |     | X   |     |     |    |      |    |
| design_authority                       | X                      | X  | X  | X   | X   | X   | X   | X  |      | X  |
| distribution_notice                    | X                      | X  | X  | X   | X   | X   | X   |    |      | X  |
| document_list                          |                        | X  | X  | X   |     |     |     |    |      |    |
| document_usage_parameter               | X                      | X  | X  | X   | X   | X   | X   | X  |      | X  |
| drawing                                | X                      | X  | X  | X   |     | X   | X   |    |      | X  |
| drawing_suffix_number_-<br>combination | X                      | X  |    | X   | X   | X   | X   |    |      |    |
| effectivity                            | X                      |    |    | X   | X   |     |     |    |      |    |
| element_identification                 | X                      | X  | X  | X   | X   | X   | X   | X  |      | X  |
| element_type                           | X                      | X  | X  | X   | X   | X   | X   | X  |      | X  |
| event                                  | X                      |    |    | X   | X   |     |     |    |      |    |
| exchange_file                          |                        |    |    |     | X   |     |     |    |      |    |
| explicit_graphics                      |                        |    |    |     |     |     |     |    | X    |    |
| external_graphics_file                 |                        |    |    |     |     |     |     |    | X    |    |
| external_library_reference             | X                      |    |    | X   | X   | X   |     |    |      |    |
| field_content_holder                   |                        |    |    |     |     |     |     |    | X    |    |
| field_content_holder_singular          |                        |    |    |     |     |     |     |    | X    |    |

**Table 2 — Applicability of types and entities to the units of functionality  
(continued)**

| Objects                                               | Units of functionality |    |    |     |     |     |     |    |      |    |
|-------------------------------------------------------|------------------------|----|----|-----|-----|-----|-----|----|------|----|
| Entity                                                | PL                     | DL | IL | IDL | DDE | PDS | DWG | RD | PRES | OL |
| field_content_holder_tabulation                       |                        |    |    |     |     |     |     |    | X    |    |
| field_location                                        |                        |    |    |     |     |     |     |    | X    |    |
| field_location_definition                             |                        |    |    |     |     |     |     |    | X    |    |
| field_title                                           |                        |    |    |     |     |     |     |    | X    |    |
| file                                                  | X                      |    |    |     | X   | X   |     |    | X    |    |
| file_format                                           | X                      |    |    |     | X   | X   |     |    | X    |    |
| file_relationship                                     | X                      |    |    |     | X   | X   |     |    | X    |    |
| foreign_defined_item                                  | X                      |    |    |     |     |     |     |    |      |    |
| geometric_validation_property                         |                        |    |    |     |     | X   |     |    |      |    |
| geometry                                              |                        |    |    |     |     | X   | X   |    | X    |    |
| general_item_definition_-<br>relationship             | X                      |    |    |     |     |     |     |    |      |    |
| group_parent_column_header                            |                        |    |    |     |     |     |     |    | X    |    |
| group_parent_content_holder                           |                        |    |    |     |     |     |     |    | X    |    |
| group_parent_header                                   |                        |    |    |     |     |     |     |    | X    |    |
| header                                                | X                      | X  | X  | X   | X   | X   | X   |    |      | X  |
| header_block                                          |                        |    |    |     |     |     |     |    | X    |    |
| header_configuration_with_-<br>element_identification | X                      | X  | X  | X   | X   | X   | X   |    |      | X  |
| header_presentation                                   |                        |    |    |     |     |     |     |    | X    |    |
| identifier                                            | X                      | X  | X  | X   | X   | X   | X   | X  | X    | X  |
| indentured_data_list                                  |                        |    | X  | X   |     |     |     |    |      |    |
| indentured_data_list_body                             |                        |    |    | X   |     |     |     |    |      |    |
| indentured_data_list_entry                            |                        |    |    | X   |     |     |     |    |      |    |
| indentured_data_list_header                           |                        |    | X  | X   |     |     |     |    |      |    |

**Table 2 — Applicability of types and entities to the units of functionality  
(continued)**

| Objects                                                        | Units of functionality |    |    |     |     |     |     |    |      |    |
|----------------------------------------------------------------|------------------------|----|----|-----|-----|-----|-----|----|------|----|
| Entity                                                         | PL                     | DL | IL | IDL | DDE | PDS | DWG | RD | PRES | OL |
| indentured_data_list_tabulation                                |                        |    |    | X   |     |     |     |    |      |    |
| indentured_list_by_document                                    |                        |    |    | X   | X   |     |     |    |      |    |
| indentured_list_by_part                                        |                        |    |    | X   | X   |     |     |    |      |    |
| indentured_list_by_part_with_-<br>document_references_to_parts |                        |    |    | X   | X   |     |     |    |      |    |
| independent_property                                           | X                      |    |    | X   | X   | X   |     |    |      |    |
| independent_property_relationship                              | X                      |    |    | X   | X   | X   |     |    |      |    |
| independent_property_usage                                     | X                      |    |    | X   | X   | X   |     |    |      |    |
| index_list                                                     |                        |    | X  |     |     |     |     |    |      |    |
| index_list_body                                                |                        |    | X  |     |     |     |     |    |      |    |
| index_list_entry                                               |                        |    | X  |     |     |     |     |    |      |    |
| index_list_header                                              |                        |    | X  |     |     |     |     |    |      |    |
| item                                                           | X                      | X  | X  | X   | X   | X   | X   | X  |      | X  |
| item_identification                                            | X                      | X  | X  | X   | X   | X   | X   | X  |      | X  |
| item_list                                                      | X                      |    |    |     |     |     |     |    |      |    |
| item_list_drawing                                              | X                      |    |    |     |     |     |     |    |      |    |
| item_parent_to_item_child_-<br>relationship                    |                        |    |    | X   | X   |     |     |    |      |    |
| item_parent_to_tdp_element_-<br>child_relationship             |                        |    |    | X   | X   |     |     |    |      |    |
| item_type                                                      | X                      | X  |    | X   | X   | X   | X   |    |      |    |
| item_usage                                                     | X                      |    |    |     |     |     |     |    |      |    |
| label                                                          | X                      | X  | X  | X   | X   | X   | X   | X  | X    | X  |
| list_item_usage                                                | X                      |    |    |     |     |     |     |    |      |    |
| list_presentation                                              |                        |    |    |     |     |     |     |    | X    |    |
| load_point                                                     |                        |    |    |     |     |     |     |    | X    |    |

**Table 2 — Applicability of types and entities to the units of functionality  
(continued)**

| Objects                       | Units of functionality |    |    |     |     |     |     |    |      |    |
|-------------------------------|------------------------|----|----|-----|-----|-----|-----|----|------|----|
| Entity                        | PL                     | DL | IL | IDL | DDE | PDS | DWG | RD | PRES | OL |
| locally_defined_item          | X                      |    |    |     |     |     |     |    |      |    |
| location_instance             | X                      |    |    |     |     |     |     |    |      |    |
| lot_effectivity               | X                      |    |    | X   | X   |     |     |    |      |    |
| made_from_stock_material      | X                      |    |    |     |     |     |     |    |      |    |
| make_from_relationship        | X                      |    |    |     |     |     |     |    |      |    |
| measure                       | X                      |    |    | X   | X   |     |     |    | X    |    |
| notation                      | X                      | X  | X  | X   | X   |     |     |    |      | X  |
| number_with_units             | X                      |    |    | X   | X   |     |     |    |      |    |
| other_list                    |                        | X  |    |     |     |     |     |    |      | X  |
| other_list_body               |                        |    |    |     |     |     |     |    |      | X  |
| other_list_body_table         |                        |    |    |     |     |     |     |    |      | X  |
| other_list_header             |                        | X  |    |     |     |     |     |    |      | X  |
| other_reference_document      | X                      | X  | X  | X   | X   | X   | X   | X  |      | X  |
| page_parameters               |                        |    |    |     |     |     |     |    | X    |    |
| page_presentation             |                        |    |    |     |     |     |     |    | X    |    |
| part_occurrence_in_assembly   | X                      |    |    |     |     |     |     |    |      |    |
| parts_list                    | X                      | X  |    |     |     |     |     |    |      |    |
| parts_list_body               | X                      |    |    |     |     |     |     |    |      |    |
| parts_list_header             | X                      | X  |    |     |     |     |     |    |      |    |
| person                        | X                      | X  | X  | X   | X   | X   | X   | X  |      | X  |
| person_and_organization       | X                      | X  | X  | X   | X   | X   | X   |    |      | X  |
| product_configuration         | X                      | X  | X  | X   | X   | X   | X   | X  |      | X  |
| product_data_set              | X                      | X  |    | X   |     | X   |     |    |      | X  |
| product_data_set_with_format  | X                      | X  |    | X   |     | X   |     |    |      | X  |
| product_data_set_with_shading | X                      | X  |    | X   |     | X   |     |    |      | X  |

**Table 2 — Applicability of types and entities to the units of functionality  
(continued)**

| Objects                                | Units of functionality |    |    |     |     |     |     |    |      |    |
|----------------------------------------|------------------------|----|----|-----|-----|-----|-----|----|------|----|
| Entity                                 | PL                     | DL | IL | IDL | DDE | PDS | DWG | RD | PRES | OL |
| product_data_set_without_format        | X                      | X  |    | X   |     | X   |     |    |      | X  |
| product_model                          | X                      | X  | X  | X   | X   | X   | X   |    |      | X  |
| product_presentation                   |                        |    |    |     |     | X   | X   |    |      |    |
| project                                | X                      |    |    | X   | X   |     |     |    |      |    |
| promissory_usage                       | X                      |    |    |     |     |     |     |    |      |    |
| property_assignment                    | X                      |    |    | X   | X   | X   |     |    |      |    |
| quantified_part_usage_in_-<br>assembly | X                      |    |    |     |     |     |     |    |      |    |
| quantity                               | X                      |    |    | X   | X   |     |     |    |      |    |
| reason                                 |                        |    |    |     | X   |     |     |    |      |    |
| reference_document                     | X                      | X  | X  | X   | X   | X   | X   | X  |      | X  |
| reference_document_usage               | X                      | X  | X  | X   | X   | X   | X   | X  |      | X  |
| relative_event                         | X                      |    |    | X   | X   |     |     |    |      |    |
| release_authentication                 | X                      | X  | X  | X   | X   | X   | X   |    |      | X  |
| retrofit_usage                         | X                      |    |    | X   |     |     |     |    |      |    |
| revision                               | X                      | X  | X  | X   | X   |     |     |    |      | X  |
| security_classification                | X                      | X  | X  | X   | X   | X   | X   |    |      | X  |
| sequence_effectivity                   | X                      |    |    | X   | X   |     |     |    |      |    |
| shaded_shape_model                     |                        |    |    |     |     | X   |     |    |      |    |
| shape_model                            |                        |    |    |     |     | X   | X   |    |      |    |
| sheet                                  | X                      | X  |    | X   | X   | X   | X   |    |      | X  |
| simple_list_of_elements                |                        |    |    |     | X   |     |     |    |      |    |
| simple_list_of_files                   |                        |    |    |     | X   |     |     |    |      |    |
| single_document_list                   |                        | X  | X  |     |     |     |     |    |      |    |
| size_characteristics                   | X                      | X  | X  | X   | X   | X   | X   |    |      | X  |

**Table 2 — Applicability of types and entities to the units of functionality  
(continued)**

| Objects                                     | Units of functionality |    |    |     |     |     |     |    |      |    |
|---------------------------------------------|------------------------|----|----|-----|-----|-----|-----|----|------|----|
| Entity                                      | PL                     | DL | IL | IDL | DDE | PDS | DWG | RD | PRES | OL |
| size_characteristics_full_size              | X                      | X  | X  | X   | X   | X   | X   |    |      | X  |
| size_characteristics_internal_<br>divisions |                        |    |    |     | X   | X   |     |    |      |    |
| size_characteristics_sheet_<br>across_file  |                        |    |    |     | X   | X   |     |    |      |    |
| source_file                                 |                        |    |    |     |     | X   |     |    |      |    |
| source_information_type                     | X                      |    |    | X   | X   |     |     |    |      |    |
| source_location                             |                        | X  |    | X   | X   |     |     |    |      |    |
| special_condition                           | X                      | X  |    | X   | X   | X   |     |    |      |    |
| specification_document                      | X                      | X  |    | X   | X   |     |     | X  |      |    |
| specified_part_in_assembly_tree             | X                      |    |    |     |     |     |     |    |      |    |
| standard_document                           | X                      | X  |    | X   | X   |     |     | X  |      |    |
| status                                      | X                      | X  | X  | X   | X   | X   | X   | X  |      | X  |
| stock_material                              | X                      |    |    |     |     |     |     |    |      |    |
| stock_size                                  | X                      |    |    |     |     |     |     |    |      |    |
| stock_size_parameters                       | X                      |    |    |     |     |     |     |    |      |    |
| string_location_definition                  |                        |    |    |     |     |     |     |    | X    |    |
| system_declaration                          |                        |    |    |     | X   | X   |     |    |      |    |
| system_destination                          |                        |    |    |     | X   |     |     |    |      |    |
| tabulation                                  |                        |    |    |     |     |     |     |    | X    |    |
| tabulation_entry                            |                        |    |    |     |     |     |     |    |      | X  |
| tabulation_header                           |                        |    |    |     |     |     |     |    | X    |    |
| tdp_element                                 | X                      | X  | X  | X   | X   | X   | X   | X  |      | X  |
| tdp_element_and_item_association            | X                      | X  | X  | X   | X   | X   | X   | X  |      | X  |
| tdp_element_list_item                       | X                      |    |    |     |     |     |     |    |      |    |

**Table 2 — Applicability of types and entities to the units of functionality  
(concluded)**

| Objects                                              | Units of functionality |    |    |     |     |     |     |    |      |    |
|------------------------------------------------------|------------------------|----|----|-----|-----|-----|-----|----|------|----|
| Entity                                               | PL                     | DL | IL | IDL | DDE | PDS | DWG | RD | PRES | OL |
| tdp_element_parent_to_item_child_relationship        |                        |    |    | X   | X   |     |     |    |      |    |
| tdp_element_parent_to_tdp_element_child_relationship |                        |    |    | X   | X   |     |     |    |      |    |
| tdp_indentured_item                                  |                        |    |    | X   | X   |     |     |    |      |    |
| tdp_indentured_tdp_element                           |                        |    |    | X   | X   |     |     |    |      |    |
| text                                                 | X                      | X  | X  | X   | X   | X   | X   | X  | X    | X  |
| time                                                 | X                      | X  | X  | X   | X   | X   | X   | X  | X    | X  |
| time_interval_effectivity                            | X                      |    |    | X   | X   |     |     |    |      |    |
| transformation                                       | X                      |    |    |     |     |     |     |    |      |    |
| volume                                               | X                      |    |    | X   | X   |     |     |    |      |    |
| weight                                               | X                      |    |    | X   | X   |     |     |    |      |    |

NOTE 4 Table 1 and Table 2 are a cross reference of the UoFs of this part of ISO 10303 and the application objects defined in 4.2.

#### 4.1.1 data\_definition\_exchange

The data\_definition\_exchange UoF captures the shipping and packaging information required to identify and relate the product data and documentation being exchanged, in whole or in part, between two enterprises or between two systems.

The following application objects are used by the data\_definition\_exchange UoF:

- A\_number;
- A\_real;
- Accessed\_file;
- Alternate\_element\_identification;
- Alternate\_identification\_of\_item;
- Alternate\_item;

- An\_integer;
- Approval;
- Certification;
- Change\_identification;
- Company;
- Company\_code;
- Configuration;
- Content\_property;
- Contract;
- Contract\_submission;
- Data\_definition\_entry\_item;
- Data\_definition\_entry\_tdp\_element;
- Data\_definition\_exchange;
- Data\_definition\_exchange\_body;
- Data\_definition\_exchange\_header;
- Data\_definition\_exchange\_simple\_entry;
- Data\_definition\_indentured\_entry;
- Data\_definition\_indentured\_list\_method;
- Date;
- Date\_effectivity;
- Delivery\_accounting;
- Design\_authority;
- Distribution\_notice;
- Document\_usage\_parameter;

## ISO 10303-232:2002(E)

- Drawing\_suffix\_number\_combination;
- Effectivity;
- Element\_identification;
- Element\_type;
- Event;
- Exchange\_file;
- External\_library\_reference;
- File;
- File\_format;
- File\_relationship;
- Header;
- Header\_configuration\_with\_element\_identification;
- Identifier;
- Indentured\_list\_by\_document;
- Indentured\_list\_by\_part;
- Indentured\_list\_by\_part\_with\_document\_references\_to\_parts;
- Independent\_property;
- Independent\_property\_relationship;
- Independent\_property\_usage;
- Item;
- Item\_identification;
- Item\_parent\_to\_item\_child\_relationship;
- Item\_parent\_to\_tdp\_element\_child\_relationship;
- Item\_type;

- Label;
- Lot\_effectivity;
- Measure;
- Notation;
- Number\_with\_units;
- Other\_reference\_document;
- Person;
- Person\_and\_organization;
- Product\_configuration;
- Product\_model;
- Project;
- Property\_assignment;
- Quantity;
- Reason;
- Reference\_document;
- Reference\_document\_usage;
- Relative\_event;
- Release\_authentication;
- Revision;
- Security\_classification;
- Sequence\_effectivity;
- Sheet;
- Simple\_list\_of\_elements;
- Simple\_list\_of\_files;

## ISO 10303-232:2002(E)

- Size\_characteristics;
- Size\_characteristics\_full\_size;
- Size\_characteristics\_internal\_divisions;
- Size\_characteristics\_sheet\_across\_file;
- Source\_information\_type;
- Source\_location;
- Special\_condition;
- Specification\_document;
- Standard\_document;
- Status;
- System\_declaration;
- System\_destination;
- Tdp\_element;
- Tdp\_element\_and\_item\_association;
- Tdp\_element\_parent\_to\_item\_child\_relationship;
- Tdp\_element\_parent\_to\_tdp\_element\_child\_relationship;
- Tdp\_indentured\_item;
- Tdp\_indentured\_tdp\_element;
- Text;
- Time;
- Time\_interval\_effectivity;
- Volume;
- Weight.

### 4.1.2 data\_list

The data\_list UoF contains the information that is formulated into a tabulation of drawings, reference documents, subordinate data list, associated parts list, and other lists pertaining to some Item.

The following application objects are used by the data\_list UoF:

- A\_number;
- A\_real;
- Alternate\_element\_identification;
- Alternate\_identification\_of\_item;
- An\_integer;
- Approval;
- Associated list;
- Certification;
- Change\_identification;
- Company;
- Company\_code;
- Configuration;
- Contract;
- Contract\_submission;
- Data\_list;
- Data\_list\_body;
- Data\_list\_entry;
- Data\_list\_header;
- Data\_list\_tabulation;
- Date;
- Design\_authority;

## ISO 10303-232:2002(E)

- Distribution\_notice;
- Document\_list;
- Document\_usage\_parameter;
- Drawing;
- Drawing\_suffix\_number\_combination;
- Element\_identification;
- Element\_type;
- Header;
- Header\_configuration\_with\_element\_identification;
- Identifier;
- Item;
- Item\_identification;
- Item\_type;
- Label;
- Notation;
- Other\_list;
- Other\_list\_header;
- Other\_reference\_document;
- Parts\_list;
- Parts\_list\_header;
- Person;
- Person\_and\_organization;
- Product\_configuration;
- Product\_data\_set;

- Product\_data\_set\_with\_format;
- Product\_data\_set\_with\_shading;
- Product\_data\_set\_without\_format;
- Product\_model;
- Reference\_document;
- Reference\_document\_usage;
- Release\_authentication;
- Revision;
- Security\_classification;
- Sheet;
- Single\_document\_list;
- Size\_characteristics;
- Size\_characteristics\_full\_size;
- Source\_location;
- Special\_condition;
- Specification\_document;
- Standard\_document;
- Status;
- Tdp\_element;
- Tdp\_element\_and\_item\_association;
- Text;
- Time.

### 4.1.3 drawing

The drawing UoF contains the information that describes the presentation of product data in a human interpretable form wherein the physical or functional requirements for that product are presented pictorially, textually, or both.

The following application objects are used by the drawing UoF:

- A\_number;
- A\_real;
- Alternate\_element\_identification;
- Alternate\_identification\_of\_item;
- An\_integer;
- Annotation;
- Approval;
- Certification;
- Change\_identification;
- Company;
- Company\_code;
- Configuration;
- Contract;
- Date;
- Design\_authority;
- Distribution\_notice;
- Document\_usage\_parameter;
- Drawing;
- Drawing\_suffix\_number\_combination;
- Element\_identification;