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Technical Corrigendum 3
ISO/IEC 9075-3:1995
Technical Corrigendum 1
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Technical Corrigendum 1

TECHNICAL CORRIGENDUM

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Information technology — Database languages — SQL

TECHNICAL CORRIGENDUM

Technologies de l'information — Langues de base de données — SQL

RECTIFICATIF TECHNIQUE

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Technical Corrigendum 3 to International Standard ISO/IEC 9075:1992, Technical Corrigendum 1 to International Standard ISO/IEC 9075-3:1995 and Technical Corrigendum 1 to International Standard ISO/IEC 9075-4:1996 were prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 32, *Data management services*.

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Relation to previous technical corrigenda:

This Corrigendum contains the cumulative set of corrections to ISO/IEC 9075:1992, ISO/IEC 9075-3:1995 and ISO/IEC 9075-4:1996.

It completely subsumes and replaces all previous corrigenda for ISO/IEC 9075.

Statement of purpose for rationale:

A statement indicating the rationale for each change to ISO/IEC 9075 is included. This is to inform the users of that standard as to the reason why it was judged necessary to change the original wording. In many cases the reason is editorial or to clarify the wording; in some cases it is to correct an error or an omission in the original wording.

Notes on rule numbering:

This Corrigendum introduces some new Syntax, Access, General and Leveling Rules. The new Rules in this Corrigendum have been numbered as follows:

Rules inserted between, for example, Rules 7) and 8) (in ISO/IEC 9075:1992) are numbered 7.1), 7.2), etc. [or 7) a.1), 7) a.2), etc.]. Those inserted before Rule 1) are numbered 0.1), 0.2), etc.

Contents

Page

ISO/IEC 9075:1992

Database Languages - SQL

.....	7
Introduction	7
2 Normative references	7
3.3.4.3 Terms denoting rule requirements	8
4.2 Character strings	8
4.2.1 Character strings and collating sequences	8
4.2.3 Rules determining collating sequence usage	9
4.3.1 Bit string comparison and assignment	9
4.4 Numbers	9
4.4.1 Characteristics of numbers	9
4.5 Datetimes and intervals	10
4.5.1 Datetimes	10
4.5.2 Intervals	11
4.5.3 Operations involving datetimes and intervals	11
4.6 Type conversion and mixing of data types	12
4.8 Columns	12
4.9 Tables	12
4.10.2 Table constraints	13
4.18.1 Status parameters	13
4.21 Cursors	13
4.22.6 SQL-statements and transaction states	14
4.24 SQL dynamic statements	14
4.26 Privileges	14
4.28 SQL-transactions	14
4.29 SQL-connections	14
4.31 Client-server operation	15
5.2 <token> and <separator>	15
5.3 <literal>	16
5.4 Names and identifiers	17
6.1 <data type>	17
6.2 <value specification> and <target specification>	18
6.3 <table reference>	18
6.4 <column reference>	19
6.5 <set function specification>	20
6.6 <numeric value function>	20
6.7 <string value function>	21
6.8 <datetime value function>	21
6.10 <cast specification>	22
6.11 <value expression>	25
6.12 <numeric value expression>	25
6.14 <datetime value expression>	25
6.15 <interval value expression>	27
7.1 <row value constructor>	28
7.4 <from clause>	29
7.5 <joined table>	30
7.6 <where clause>	31
7.7 <group by clause>	31
7.8 <having clause>	32
7.9 <query specification>	33
7.10 <query expression>	35
7.11 <scalar subquery>, <row subquery>, and <table subquery>	36

8.2 <comparison predicate>	36
8.3 <between predicate>	36
8.7 <quantified comparison predicate>	37
8.11 <overlaps predicate>	37
9.1 Retrieval assignment	37
9.2 Store assignment	38
9.3 Set operation result data types	39
10.1 <interval qualifier>	40
10.2 <language clause>, Table 16	41
10.4 <character set specification>	41
10.5 <collate clause>	41
10.6 <constraint name definition> and <constraint attributes>	41
11.1 <schema definition>	42
11.2 <drop schema statement>	42
11.4 <column definition>	42
11.5 <default clause>	42
11.6 <table constraint definition>	44
11.8 <referential constraint definition>	45
11.9 <check constraint definition>	45
11.11 <add column definition>	45
11.15 <drop column definition>	46
11.16 <add table constraint definition>	47
11.17 <drop table constraint definition>	47
11.18 <drop table statement>	48
11.19 <view definition>	48
11.21 <domain definition>	49
11.25 <add domain constraint definition>	49
11.26 <drop domain constraint definition>	50
11.27 <drop domain statement>	50
11.28 <character set definition>	50
11.29 <drop character set statement>	51
11.30 <collation definition>	51
11.31 <drop collation statement>	51
11.32 <translation definition>	52
11.34 <assertion definition>	53
11.36 <grant statement>	53
11.37 <revoke statement>	55
12.3 <procedure>	60
12.4 Calls to a <procedure>	61
12.5 <SQL procedure statement>	71
13.1 <declare cursor>	72
13.2 <open statement>	72
13.3 <fetch statement>	72
13.4 <close statement>	73
13.5 <select statement: single row>	73
13.6 <delete statement: positioned>	74
13.7 <delete statement: searched>	74
13.8 <insert statement>	74
13.9 <update statement: positioned>	75
13.10 <update statement: searched>	75
13.11 <temporary table declaration>	76
14.1 <set transaction statement>	76
14.2 <set constraints mode statement>	76
14.3 <commit statement>	76

15.1 <connect statement>	76
15.2 <set connection statement>	77
15.3 <disconnect statement>	77
16.5 <set local time zone statement>	77
17.1 Description of SQL item descriptor areas	77
17.2 <allocate descriptor statement>	77
17.3 <deallocate descriptor statement>	78
17.4 <get descriptor statement>	78
17.5 <set descriptor statement>	78
17.6 <prepare statement>	78
17.9 <using clause>	82
17.10 <execute statement>	82
17.11 <execute immediate statement>	82
17.15 <dynamic fetch statement>	83
17.18 <dynamic update statement: positioned>	83
17.19 <preparable dynamic delete statement: positioned>	83
17.20 <preparable dynamic update statement: positioned>	84
18.1 <get diagnostics statement>	84
19.1 <embedded SQL host program>	86
19.3 <embedded SQL Ada program>	86
19.5 <embedded SQL COBOL program>	86
20.1 <direct SQL statement>	86
21.1 Introduction	87
21.2.2 INFORMATION_SCHEMA_CATALOG_NAME base table	87
21.2.3 INFORMATION_SCHEMA_CATALOG_NAME_CARDINALITY assertion	88
21.2.4 SCHEMATA view	88
21.2.5 DOMAINS view	88
21.2.6 DOMAIN_CONSTRAINTS view	88
21.2.9 COLUMNS view	89
21.2.17 ASSERTIONS view	89
21.2.23 CONSTRAINT_TABLE_USAGE view	89
21.2.24 CONSTRAINT_COLUMN_USAGE view	90
21.2.27 SQL_IDENTIFIER domain	91
21.3.5 DATA_TYPE_DESCRIPTOR base table	91
21.3.6 DOMAINS base table	94
21.3.8 TABLES base table	94
21.3.10 COLUMNS base table	95
21.3.11 VIEW_TABLE_USAGE base table	96
21.3.12 VIEW_COLUMN_USAGE base table	96
21.3.13 TABLE_CONSTRAINTS base table	97
21.3.15 REFERENTIAL_CONSTRAINTS base table	97
21.3.17 CHECK_TABLE_USAGE base table	97
21.3.18 CHECK_COLUMN_USAGE base table	98
21.3.21 COLUMN_PRIVILEGES base table	98
21.3.22 USAGE_PRIVILEGES base table	99
21.3.23 CHARACTER_SETS base table	99
21.3.24 COLLATIONS base table	99
21.3.25 TRANSLATIONS base table	99
21.3.26 SQL_LANGUAGES base table	100
22.1 SQLSTATE	100
22.2 SQLCODE	102
22.3 Remote Database Access SQLSTATE Subclasses	102
23.2 Claims of Conformance	104
23.3 Extensions and options	105
A.1 Intermediate SQL Specifications	105

A.2 Entry SQL Specifications	107
Annex B: Implementation-defined elements	110
Annex C Implementation-dependent elements	111
Annex E Incompatibilities with ISO/IEC 9075:1989	112
Annex F Maintenance and interpretation of SQL	113
ISO/IEC 9075-3:1995	
Database Languages - SQL-Part 3:Call-Level Interface (SQL/CLI)	115
Contents	115
4.1 Introduction	116
4.3 Diagnostics areas	116
4.4.7 CLI descriptor areas	116
5.1 <CLI routine>	116
5.2 <CLI routine> invocation	117
5.3 SQL/CLI common elements	117
5.3.3 Implicit using clause	118
5.3.4 Character string retrieval	122
5.3.7 CLI-specific status codes	122
5.3.8 Description of CLI item descriptor areas	122
5.3.9 <CLI routine>	124
5.4 Data type correspondences	125
6.4 AllocStmt	125
6.5 BindCol	126
6.6 BindParam	126
6.9 ColAttribute	128
6.13 DescribeCol	128
6.17 ExecDirect	128
6.18 Execute	128
6.24 FreeStmt	129
6.27 GetData	129
6.30 GetDiagField	129
6.31 GetDiagRec	131
6.34 GetInfo	132
6.34.1 GetParamData	133
6.36 GetTypeInfo	137
6.38 ParamData	138
6.39 Prepare	139
6.40 PutData	139
6.41 RowCount	139
6.38 ParamData	140
6.42 SetConnectAttr	140
6.43 SetCursorName	140
6.44 SetDescField	141
6.45 SetDescRec	143
A.1 C Header File SQLCLI.H	143
A.2 COBOL Library Item SQLCLI	148
B.1 Create table, insert, select	150
B.2 Interactive Query	152
B.3 Providing long dynamic arguments at Execute() time	153
Annex C	154
Annex D Implementation-dependent elements	154
Index	154

ISO/IEC 9075-4:1996

Database Languages - SQL-Part 4:Persistent Stored Modules
(SQL/PSM)

.....	155
2 Normative references	155
3.3 Conventions	155
6.2 <column reference>	155
6.3 <item reference>	155
6.6 <value expression>	156
7.3 <query specification>	156
9.1 <routine invocation>	157
10.3 <default clause>	157
10.7 <drop table statement>	158
10.4 <check constraint definition>	158
10.8 <view definition>	158
10.9 <drop view statement>	158
10.13 <drop translation statement>	159
10.16 <SQL-server module definition>	159
10.18 <SQL-invoked routine>	159
10.20 <grant statement>	159
10.21 <revoke statement>	160
11.4 <SQL procedure statement>	162
12.2 <open statement>	162
13.2 <return statement>	163
13.3 <compound statement>	163
13.9 <if statement>	163
13.14 <for statement>	163
17.3 <resignal statement>	164
19.1.5 ROUTINES view	164
19.2.4 ROUTINES base table	165
Annex A	165
Annex B	167

ISO/IEC 9075:1992 **Database Languages - SQL**

Introduction

1. *Rationale: In the list of significant new features, the wording incorrectly implies that all the examples listed in item 10) are referential integrity facilities.*

On page xiv, in Significant new feature 10), replace "referential integrity" with "integrity".

2 Normative references

1. *Rationale: Editorial. The (non-extended) Pascal standard should be identified as ISO/IEC 7185 rather than ISO 7185. The designation was changed in 1990 when the standard was revised.*

Change "ISO 7185:1990" to "ISO/IEC 7185:1990"

2. *Rationale: Editorial.*

Add the following reference after the reference to "ISO 8601:1988":

- ISO 8649:1988, *Information Processing Systems — Open Systems Interconnection — Service Definition for the Association Control Service Element.*
3. *Rationale: The newly revised Ada language standard (ISO/IEC-8652:1995, Information technology — Programming languages — Ada) contains support for decimal-encoded numeric data and variable length character strings. The revised interface allows newly written applications in the revised Ada language access to these features of SQL; previously written Ada applications, conformant with the earlier Ada interface, are conformant with the revised interface.*

Replace the reference to ISO/IEC 8652:1987) with:

- ISO/IEC 8652:1995, *Information technology — Programming languages — Ada.*
4. *Rationale: Editorial.*

Add the following reference after the reference to ISO/IEC 8824:1990:

- ISO/IEC 9579-1:1993, *Information technology — Open Systems Interconnection — Remote Database Access, Part 1: Generic Model, Service, and Protocol.*

Add the following reference after the reference to ISO/IEC 9899:

- ISO/IEC 10026-21, *Information technology — Open Systems Interconnection — Distributed Transaction Processing — Part 2: Service Definition.*

3.3.4.3 Terms denoting rule requirements

1. *Rationale: The following unifies the SQLSTATE returned for the different ways of invoking an SQL statement.*

In the first and second paragraphs, replace "syntax error or access rule violation (if this situation occurs during dynamic execution of an SQL-statement, then the exception that is raised is *syntax error or access rule violation in dynamic SQL statement*; if the situation occurs during direct invocation of an SQL-statement, then the exception that is raised is *syntax or access rule violation in direct SQL statement*)" with "syntax error or access rule violation".

4.2 Character strings

1. *Rationale: Editorial.*

In the second paragraph, replace the last sentence with:

Character sets defined by standards or by implementations reside in the Information Schema (named INFORMATION_SCHEMA) in each catalog, as do collations and translations defined by standards and collations, translations, and form-of-use conversions defined by implementations.

4.2.1 Character strings and collating sequences

1. *Rationale: The following changes make the definitions of character set and collation descriptors more precise.*

Replace the text on page 17 that occurs after the first paragraph with:

A character set is described by a character set descriptor. A character set descriptor includes:

- the name of the character set or character repertoire,
- if the character set is a character repertoire, then the name of the form-of-use,
- an indication of what characters are in the character set, and
- whether or not the character set uses the DEFAULT collation for its character repertoire, and,
- if the character set does not utilize the DEFAULT collation for its character repertoire, then the <translation name> contained in the character set's <translation collation>, if any, the <collation name> contained in the character set's <collate clause> or <limited collation definition>, if any, and, whether or not DESC was specified in the reference to the collation

For every character set, there is at least one collation. A collation is described by a collation descriptor. A collation descriptor includes:

- the name of the collation,
- the name of the character repertoire on which the collation operates,
- whether the collation has the NO PAD or the PAD SPACE attribute, and
- whether or not this collation utilizes the DEFAULT collation for its character repertoire,

- if the collation does not utilize the DEFAULT collation for its character repertoire, then the <translation name> contained in the collation's <translation collation>, if any, the <collation name> contained in the collation's <collation source>, if any, and whether or not DESC was specified in the definition of the collation.

4.2.3 Rules determining collating sequence usage

1. *Rationale: Editorial. The second bullet of the first paragraph (When columns are involved (e.g., comparing ...)) predicates the possibility of just one column being involved, but the sentence ends with words that imply at least two columns. In addition, it is not clear whether the intent is that default collating sequence of a column overrides the collating sequence (necessarily the default for the relevant repertoire) for a literal.*

Replace the second bullet with:

- When one or more columns are involved (e.g., comparing two columns, or comparing a column to a literal), then provided that all columns involved have the same default collating sequence and there is no explicit specification of a collating sequence, that default collating sequence is used.

4.3.1 Bit string comparison and assignment

1. *Rationale: The second paragraph can be read to mean that all source bits are assigned successively to the most significant bit position of the receiving (target) string. Note that there does not appear to be a corresponding rule for character string assignment in the relevant subclause of "Concepts". Relevant rules do exist in clause 9, but do not address the order in which bits (or characters) are assigned.*

Delete the second paragraph of the subclause.

4.4 Numbers

1. *Rationale: Clarification.*

Add the following sentence immediately before the heading of Subclause 4.4.1 Characteristics of Numbers:

A value described by a numeric data type descriptor is always signed.

4.4.1 Characteristics of numbers

1. *Rationale: In several paragraphs in this subclause, phrases similar to "values representable in the data type" are used when the meaning is "members of the data type". A data type is defined as a set of values, so the term is unnecessarily complicated. Since there are rules defining mappings from all numbers within the range of a data type onto that data type, the meaning of "representable" is anyway somewhat ambiguous. Simplify the convoluted wording used to specify that rounding is always towards zero. Use numeric instead of numerical for consistency.*

Replace the fourth, fifth, sixth, seventh and eighth paragraphs with:

An approximation obtained by truncation of a numeric value N for an <exact numeric type> T is a value V in T such that N is not closer to zero than is V and there is no value in T between V and N .

An approximation obtained by rounding of a numeric value N for an <exact numeric type> T is a value V in T such that the absolute value of the difference between N and the numeric value of V is not greater than half

the absolute value of the difference between two successive numeric values in T. If there are more than one such values V, then it is implementation-defined which one is taken.

All numeric values between the smallest and the largest value, inclusive, in a given exact numeric type have an approximation obtained by rounding or truncation for that type; it is implementation-defined which other numeric values have such approximations.

An approximation obtained by truncation or rounding of a numeric value N for an <approximate numeric type> T is a value V in T such that there is no value in T that lies between the V and N.

If there are more than one such values V then it is implementation-defined which one is taken. It is implementation-defined which numeric values have approximations obtained by rounding or truncation for a given approximate numeric type.

4.5 Datetimes and intervals

1. *Rationale: Clarification.*

Add the following sentence before the paragraph starting "Every datetime ...":

A value described by an interval data type descriptor is always signed.

4.5.1 Datetimes

1. *Rationale: Editorial.*

Replace the first paragraph with:

Table 4, "Fields in datetime items", specifies the fields that can make up a datetime value; a datetime value is made up of a subset of those fields. Not all of the fields shown are required to be in the subset, but every field that appears in the table between the first included primary field and the last included primary field shall also be included. If either timezone field is in the subset, then both of them shall be included.

2. *Rationale: Clarify the treatment of time zones.*

Replace the sixth, seventh, eighth and ninth paragraphs with:

A datetime data type that specifies WITH TIME ZONE is a data type that is *datetime with time zone*.

The surface of the earth is divided into zones, called time zones, in which every correct clock tells the same time, known as *local time*. Local time is equal to UTC (Coordinated Universal Time) plus the *time zone displacement*, which is a value of INTERVAL HOUR TO MINUTE, between '-12:59' and '+13:00'. The time zone displacement is constant throughout a time zone, changing at the beginning and end of Daylight Saving Time, where applicable.

A datetime value, of data type TIME or TIMESTAMP, may represent a local time or UTC. A data item may be defined to contain either a datetime value only, or a datetime value together with a time zone displacement.

For the convenience of users, whenever a datetime value with time zone is to be implicitly derived from one without (for example, in a simple assignment operation), SQL assumes the value without time zone to be local, subtracts the default session time zone displacement from it to give UTC, and associates that time zone displacement with the result.

Conversely, whenever a datetime value without time zone is to be implicitly derived from one with, SQL assumes the value with time zone to be UTC, adds the time zone displacement to it to give local, and the result, without any time zone displacement, is local.

4.5.2 Intervals

1. *Rationale: Editorial*

Replace the fifth paragraph with:

Within an item of type interval, the first field is constrained only by the <interval leading field precision> of the associated <interval qualifier>. Table 7, "Valid values for fields in INTERVAL items", specifies the constraints on subsequent field values.

2. *Rationale: Editorial.*

In Table 7, replace "<interval leading field precision" with "<interval leading field precision>" (two occurrences).

3. *Rationale: Clarify the precision of interval fields.*

Replace the sixth paragraph (that following Table 7) with:

Values in interval fields other than SECOND are integers, and have precision 2 when not the first field. SECOND, however, can be defined to have an <interval fractional seconds precision> that indicates the number of decimal digits maintained following the decimal point in the seconds value. When not the first field, SECOND has a precision of 2 places before the decimal point.

4. *Rationale: The wording seemed to imply that extra fields effectively added to a day-time interval for the purposes of operations between two fields are all added at the same end. However, comparison of an HOUR interval with a DAY-MINUTE interval would require extension of the HOUR interval at both ends.*

In the ninth paragraph, change "either the most significant end or the least significant end of one or both day-time intervals" to "either the most significant end of one interval, or the least significant end of one interval, or both".

4.5.3 Operations involving datetimes and intervals

1. *Rationale: Editorial. Table 8, Valid operators involving datetimes and intervals, specifies not the results of arithmetic operations involving datetime and interval operands, but the result types of operations between operands of those types.*

Replace the first paragraph with:

Table 8, "Valid operators involving datetimes and intervals", specifies the data types of the results of arithmetic operations involving datetime and interval operands.

4.6 Type conversion and mixing of data types

1. *Rationale: Correct an inconsistency in style between the third sentence of the third paragraph and similar statements elsewhere in the standard. Also correct the grammar of the last sentence.*

Replace the third paragraph with:

Values corresponding to the data types BIT and BIT VARYING are always mutually comparable and are mutually assignable. If a store assignment would result in the loss of bits due to truncation, then an exception condition is raised. When values of unequal length are compared, if the shorter is a prefix of the longer, then the shorter is less than the longer; otherwise, the longer is effectively truncated to the length of the shorter for the purposes of comparison. When values of equal length are to be compared, then a bit-by-bit comparison is made. A 0-bit is less than a 1-bit.

4.8 Columns

1. *Rationale: Editorial.*

Replace the third paragraph and the lead-in to the bullet list of the fourth paragraph with:

Every column has a nullability characteristic that indicates whether any attempt to store a null value into that column will inevitably cause an exception condition to be raised, and whether any attempt to retrieve a value from that column can ever result in a null value. The possible values of the nullability characteristic are known not nullable and possibly nullable.

A column *C* with <column name> *CN* of a base table *T* has a nullability characteristic that is known not nullable if and only if either:

2. *Rationale: Editorial.*

In the penultimate paragraph on page 28, replace "<row value constructor expression>" with "<row value constructor element>".

4.9 Tables

1. *Rationale: Editorial.*

Replace the first sentence of the third paragraph with:

A table is either a base table or a derived table.

2. *Rationale: There is no named derived table other than a viewed table.*

After the paragraph that begins with "A derived table descriptor describes a derived table.", delete the first item ("— if the table is named, then the name of the table;").

3. *Rationale: There is no named derived table other than a viewed table.*

After the paragraph that begins with "A view descriptor describes a view.", insert "— the name of the view, and" before the existing item.

4.10.2 Table constraints

1. *Rationale: Editorial.*

In the **Note**, replace "<match option>" with "<match type>".

2. *Rationale: Editorial.*

In the paragraph that begins with "A referential constraint is satisfied", replace "<match option>" with "<match type>".

4.18.1 Status parameters

1. *Rationale: To insure that the value returned to the user in SQLSTATE is representative of the actual state of the transaction or SQL-statement.*

Add the following as the last paragraph:

For the purpose of choosing status parameter values to be returned, *exceptions* for transaction rollback have precedence over *exceptions* for statement failure. Similarly, completion condition *no data* has precedence over *warning*, which has precedence over *successful completion*. All *exceptions* have precedence over all completion conditions. The values assigned to SQLSTATE shall obey these precedence rules.

4.21 Cursors

1. *Rationale: Define "dynamic cursor" and "extended dynamic cursor".*

Add the following after the first sentence of the first paragraph:

A cursor specified by a <dynamic declare cursor> is a *declared dynamic cursor*. A cursor specified by an <allocate cursor statement> is an *extended dynamic cursor*. A *dynamic cursor* is either a declared dynamic cursor or an extended dynamic cursor.

2. *Rationale: Correct concepts section regarding when cursors are destroyed.*

Replace the second paragraph with:

For every <declare cursor> or <dynamic declare cursor> in a <module>, a cursor is effectively created when an SQL-transaction (see Subclause 4.28, "SQL-transactions") referencing the <module> is initiated, and destroyed when that SQL-transaction is terminated. An extended dynamic cursor is effectively created when an <allocate cursor statement> is executed within an SQL-transaction and destroyed when that SQL-transaction is terminated. In addition, a dynamic cursor is destroyed when a <deallocate prepared statement> is executed that deallocates the prepared statement on which the cursor is based.

4.22.6 SQL-statements and transaction states

1. *Rationale: No statement can be both transaction-initiating and not transaction-initiating.*

In the first dashed list (of transaction-initiating SQL-statements), in the bulleted sublist of SQL-data statements, delete the entry for <dynamic select statement>.

4.24 SQL dynamic statements

1. *Rationale: Editorial.*

In the fourth paragraph, replace "<target specification>s" with "<simple value specification>s".

2. *Rationale: Editorial.*

In the eighth paragraph, replace the first occurrence of "<SQL statement>s" with "<SQL procedure statement>s", and replace the second occurrence of "<SQL statement>s" with "<embedded SQL statement>s".

4.26 Privileges

1. *Rationale: Editorial.*

In the fourth paragraph on page 52, replace "<module authorization identifier> is" with "<schema authorization identifier> is".

2. *Rationale: Provide missing rules that cover the acquisition of the necessary privileges to acquire the WITH GRANT OPTION on views through a grant to PUBLIC.*

Add the following before the antepenultimate paragraph of this Subclause:

The phrase *user privileges* refers to the set of privileges defined by the privilege descriptors whose grantee is either the identified <authorization identifier> or PUBLIC.

4.28 SQL-transactions

1. *Rationale: Clarification.*

In the paragraph that begins "In some environments (e.g., remote database access)", replace all occurrences of "SQL-environment" with "SQL-implementation".

4.29 SQL-connections

1. *Rationale: Editorial.*

Replace the second paragraph with :

An SQL-connection is an *active SQL-connection* if any SQL-statement that initiates or requires an SQL-transaction has been executed at its SQL-server via that SQL-connection during the current SQL-transaction.

2. *Rationale: Clarification.*

In the last sentence of the penultimate paragraph, replace "SQL-environment" with "SQL-implementation".

4.31 Client-server operation

1. *Rationale: Clarification.*

Replace the first sentence with :

As perceived by an SQL-agent, an SQL-implementation consists of one or more SQL-servers and one SQL-client through which SQL-connections can be made to them.

5.2 <token> and <separator>

1. *Rationale: The maximum length of an <identifier> is intended to be 128 characters.*

Replace Syntax Rule 8) with :

- 8) In a <regular identifier>, the number of <underscore>s plus the number of <identifier part>s shall be less than 128.
2. *Rationale: A <regular identifier> shall not contain any <quote> or <double quote>. Thus, a <delimited identifier> with a <delimited identifier body> containing a <quote> or <double quote> is not equivalent to any <regular identifier>.*

In Syntax Rule 13), delete the expression "(with all occurrences of <quote> replaced by <quote symbol> and all occurrences of <doublequote symbol> replaced by <double quote>)".

3. *Rationale: Correct the incorrect references to "<quote>" and "<quote symbol>" and delete the redundant references to "<double quote>"s and "<double quote symbol>"s in Syntax Rule 14.*

In Syntax Rule 14), delete "(with all occurrences of <quote> replaced by <quote symbol> and all occurrences of <doublequote symbol> replaced by <doublequote>)".

4. *Rationale: A <character representation> does not appear in a <regular identifier> or in a <delimited identifier body>.*

Replace Leveling Rule 2) a) with :

- a) The number of <underscore>s plus the number of <identifier part>s contained in a <regular identifier> shall be less than 18.

Insert the following Leveling Rule 2) a.1):

- a.1) The <delimited identifier body> of a <delimited identifier> shall not comprise more than 18 <delimited identifier part>s.