



INTERNATIONAL STANDARD ISO/IEC 9075-11:2016
TECHNICAL CORRIGENDUM 2

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**Information technology — Database languages — SQL — Part 11:
Information and definition schemas (SQL/Schemata)**

TECHNICAL CORRIGENDUM 2

Technologies de l'information — Langages de base de données — SQL — Partie 11: Schémas des informations et des définitions (SQL/Schemata)

RECTIFICATIF TECHNIQUE 2

Technical Corrigendum 2 to ISO/IEC 9075-11:2016 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 32, *Data management and interchange*.

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5 Information Schema

5.2 INFORMATION_SCHEMA_CATALOG_NAME view

1. *Rationale: Correct the syntax.*

Replace the view definition with:

```
CREATE VIEW INFORMATION_SCHEMA_CATALOG_NAME AS
  SELECT CATALOG_NAME
  FROM DEFINITION_SCHEMA.CATALOG_NAME
  WHERE CATALOG_NAME = 'CN';
```

5.34 KEY_PERIOD_USAGE view

1. *Rationale: Correct a Conformance Rule.*

Replace Conformance Rule 2) with:

- 2) Without Feature T181, "Application-time period tables", conforming SQL language shall not reference the view INFORMATION_SCHEMA.KEY_PERIOD_USAGE.

5.37 PARAMETERS view

This Subclause is modified by Subclause 19.5, "PARAMETERS view", in ISO/IEC 9075-4.

This Subclause is modified by Subclause 21.10, "PARAMETERS view", in ISO/IEC 9075-14.

1. *Rationale: Identify the correct column.*

Replace Conformance Rule 4) with:

- 4) Without Feature B200, "Polymorphic table functions", conforming SQL language shall not reference INFORMATION_SCHEMA.PARAMETERS.TABLE_SEMANTICS, INFORMATION_SCHEMA.PARAMETERS.IS_PRUNABLE, or INFORMATION_SCHEMA.PARAMETERS.HAS_PASS_THROUGH_COLUMNS.

2. *Rationale: Remove incorrect and misleading Conformance Rules.*

Delete Conformance Rules 5) and 6).

5.39 PRIVATE_PARAMETERS view

1. *Rationale: Remove incorrect and inappropriate column references.*

In the Definition, delete "P.FROM_SQL_SPECIFIC_CATALOG, P.FROM_SQL_SPECIFIC_SCHEMA, P.FROM_SQL_SPECIFIC_NAME, P.TO_SQL_SPECIFIC_CATALOG, P.TO_SQL_SPECIFIC_SCHEMA, P.TO_SQL_SPECIFIC_NAME," and "DTD.TABLE_SEMANTICS, DTD.IS_PRUNABLE, DTD.HAS_PASS_THROUGH_COLUMNS" from the select list.

2. *Rationale: Private parameters of a polymorphic table function cannot be generic tables.*

Delete Conformance Rules 5), 6) and 7).

5.51 ROUTINE_ROUTINE_USAGE view

1. *Rationale: Clarify the contents of columns.*

Replace the Definition with:

Definition

```
CREATE VIEW ROUTINE_ROUTINE_USAGE AS
  SELECT RRU.SPECIFIC_CATALOG, RRU.SPECIFIC_SCHEMA, RRU.SPECIFIC_NAME,
         RRU.SUBJECT_ROUTINE_CATALOG AS ROUTINE_CATALOG,
         RRU.SUBJECT_ROUTINE_SCHEMA AS ROUTINE_SCHEMA,
         RRU.SUBJECT_ROUTINE_NAME AS ROUTINE_NAME
  FROM DEFINITION_SCHEMA.ROUTINE_ROUTINE_USAGE AS RRU
  JOIN
    DEFINITION_SCHEMA.SCHEMATA AS S
  ON ( ( RRU.SUBJECT_ROUTINE_CATALOG, RRU.SUBJECT_ROUTINE_SCHEMA )
      = ( S.CATALOG_NAME, S.SCHEMA_NAME ) )
  WHERE ( S.SCHEMA_OWNER = CURRENT_USER
        OR
          S.SCHEMA_OWNER IN
            ( SELECT ER.ROLE_NAME
              FROM ENABLED_ROLES AS ER ) )
  AND
    RRU.SPECIFIC_CATALOG
    = ( SELECT ISCN.CATALOG_NAME
        FROM INFORMATION_SCHEMA.CATALOG_NAME AS ISCN );

GRANT SELECT ON TABLE ROUTINE_ROUTINE_USAGE
  TO PUBLIC WITH GRANT OPTION;
```

NOTE 1 — The columns ROUTINE_CATALOG, ROUTINE_SCHEMA, and ROUTINE_NAME of the view identify the subject routine of either a <routine invocation>, a <method reference>, a <method invocation>, or a <static method invocation> contained in the <SQL routine body> or in the <parameter default> of an SQL parameter of an SQL-invoked routine.

5.52 ROUTINE_SEQUENCE_USAGE view

1. *Rationale: Make the definition of the view match its description.*

Replace the Definition with:

```
CREATE VIEW ROUTINE_SEQUENCE_USAGE AS
  SELECT SPECIFIC_CATALOG, SPECIFIC_SCHEMA, SPECIFIC_NAME,
         R.ROUTINE_CATALOG, R.ROUTINE_SCHEMA, R.ROUTINE_NAME,
         RSU.SEQUENCE_CATALOG, RSU.SEQUENCE_SCHEMA, RSU.SEQUENCE_NAME
  FROM ( DEFINITION_SCHEMA.SEQUENCE_SEQUENCE_USAGE AS RSU
```

```

JOIN
    DEFINITION_SCHEMA.ROUTINES AS R
    USING ( SPECIFIC_CATALOG, SPECIFIC_SCHEMA, SPECIFIC_NAME ) )
JOIN
    DEFINITION_SCHEMA.SCHEMATA AS S
    ON ( ( RSU.SEQUENCE_CATALOG, RSU.SEQUENCE_SCHEMA )
        = ( S.CATALOG_NAME, S.SCHEMA_NAME ) )
WHERE ( S.SCHEMA_OWNER = CURRENT_USER
    OR
        S.SCHEMA_OWNER IN
        ( SELECT ER.ROLE_NAME
          FROM ENABLED_ROLES AS ER ) )
AND
    SPECIFIC_CATALOG
    = ( SELECT ISCN.CATALOG_NAME
        FROM INFORMATION_SCHEMA_CATALOG_NAME AS ISCN );

GRANT SELECT ON TABLE ROUTINE_SEQUENCE_USAGE
TO PUBLIC WITH GRANT OPTION;

```

5.69 TRIGGER_PERIOD_USAGE view

1. *Rationale: Add missing Conformance Rule.*

Add the following Conformance Rule:

- 5) Without Feature T211, "Basic trigger capability", conforming SQL language shall not reference the view INFORMATION_SCHEMA.TRIGGER_PERIOD_USAGE.

5.78 VIEW_PERIOD_USAGE view

1. *Rationale: Delete incorrect Conformance Rule.*

Delete Conformance Rule 2).

5.82 Short name views

This Subclause is modified by Subclause 19.8, "Short name views", in ISO/IEC 9075-4.

This Subclause is modified by Subclause 24.14, "Short name views", in ISO/IEC 9075-9.

This Subclause is modified by Subclause 14.7, "Short name views", in ISO/IEC 9075-13.

This Subclause is modified by Subclause 21.15, "Short name views", in ISO/IEC 9075-14.

1. *Rationale: Remove incorrect column references.*

In the Definition, delete "FROM_SQL_SPEC_CAT, FROM_SQL_SPEC_SCH, FROM_SQL_SPEC_NAME, TO_SQL_SPEC_CAT, TO_SQL_SPEC_SCHEMA, TO_SQL_SPEC_NAME," and ", TABLE_SEMANTICS, IS_PRUNABLE, HAS_PASS_THRU_COLS" from the view column list of PRIVATE_PARAMS_S, and delete "FROM_SQL_SPECIFIC_CATALOG, FROM_SQL_SPECIFIC_SCHEMA, FROM_SQL_SPECIFIC_NAME, TO_SQL_SPECIFIC_CATALOG, TO_SQL_SPECIFIC_SCHEMA, TO_SQL_SPECIFIC_NAME," and ", TABLE_SEMANTICS, IS_PRUNABLE, HAS_PASS_THROUGH_COLUMNS" from the select list of PRIVATE_PARAMS_S.

2. *Rationale: Make the definition of the view match its description.*

Replace the Definition of the ROUT_SEQ_USAGE_S view with:

```
CREATE VIEW ROUT_SEQ_USAGE_S
( SPECIFIC_CATALOG, SPECIFIC_SCHEMA, SPECIFIC_NAME,
  ROUTINE_CATALOG, ROUTINE_SCHEMA, ROUTINE_NAME,
  SEQUENCE_CATALOG, SEQUENCE_SCHEMA, SEQUENCE_NAME ) AS
SELECT SPECIFIC_CATALOG, SPECIFIC_SCHEMA, SPECIFIC_NAME,
       ROUTINE_CATALOG, ROUTINE_SCHEMA, ROUTINE_NAME,
       SEQUENCE_CATALOG, SEQUENCE_SCHEMA, SEQUENCE_NAME
FROM INFORMATION_SCHEMA.ROUTINE_SEQUENCE_USAGE;
```

3. *Rationale: Remove incorrect and misleading Conformance Rules:*

Delete Conformance Rules 69), 70), and 73).

4. *Rationale: Add missing Conformance Rules:*

Insert the following Conformance Rules:

- 74) Without Feature T522, "Default values for IN parameters of SQL-invoked procedures", Feature T523, "Default values for INOUT parameters of SQL-invoked procedures", or Feature T525, "Default values for parameters of SQL-invoked functions", conforming SQL language shall not reference INFORMATION_SCHEMA.PRIVATE_PARAMS_S.PARAMETER_DEFAULT.
- 75) Without Feature F651, "Catalog name qualifiers", conforming SQL language shall not reference the view INFORMATION_SCHEMA.CATALOG_NAME.
- 76) Without Feature F690, "Collation support", conforming SQL language shall not reference the view INFORMATION_SCHEMA.COLLATION_APPLIC_S.
- 77) Without Feature F341, "Usage tables", conforming SQL language shall not reference the view INFORMATION_SCHEMA.CONSTR_PER_USAGE.
- 78) Without Feature T181, "Application-time period tables", conforming SQL language shall not reference the view INFORMATION_SCHEMA.CONSTR_PER_USAGE.
- 79) Without Feature F341, "Usage tables", conforming SQL language shall not reference the view INFORMATION_SCHEMA.ROUTINE_PERIOD_USAGE.
- 80) Without Feature T180, "System-versioned tables", conforming SQL language shall not reference the view INFORMATION_SCHEMA.ROUTINE_PER_USAGE.
- 81) Without Feature T181, "Application-time period tables", conforming SQL language shall not reference the view INFORMATION_SCHEMA.ROUTINE_PER_USAGE.
- 82) Without Feature F341, "Usage tables", conforming SQL language shall not reference the view INFORMATION_SCHEMA.TRIG_PER_USAGE.
- 83) Without Feature T180, "System-versioned tables", conforming SQL language shall not reference the view INFORMATION_SCHEMA.TRIG_PER_USAGE.

- 84) Without Feature T181, “Application-time period tables”, conforming SQL language shall not reference the view INFORMATION_SCHEMA.TRIG_PER_USAGE.

6 Definition Schema

6.10 CHARACTER_REPERTOIRES base table

1. *Rationale: Correct the definition of the Table Population.*

Replace Table Population rule 4) b) iv) with:

- 4) ...
 b) ...
 iv) UCS: 'UCS' and an implementation-defined choice of either 'UCS_BASIC' or 'UNICODE'.

2. *Rationale: Correct the definition of the Table Population.*

Delete Table Population rules 4) b) v) and 4) b) vi).

6.22 DATA_TYPE_DESCRIPTOR base table

*This Subclause is modified by Subclause 25.2, “DATA_TYPE_DESCRIPTOR base table”, in ISO/IEC 9075-9.
 This Subclause is modified by Subclause 22.1, “DATA_TYPE_DESCRIPTOR base table”, in ISO/IEC 9075-14.
 This Subclause is modified by Subclause 20.1, “DATA_TYPE_DESCRIPTOR base table”, in ISO/IEC 9075-15.*

1. *Rationale: Correct the syntax.*

Replace the view definition with:

```
CREATE TABLE DATA_TYPE_DESCRIPTOR (
    OBJECT_CATALOG          INFORMATION_SCHEMA.SQL_IDENTIFIER,
    OBJECT_SCHEMA           INFORMATION_SCHEMA.SQL_IDENTIFIER,
    OBJECT_NAME             INFORMATION_SCHEMA.SQL_IDENTIFIER,
    OBJECT_TYPE             INFORMATION_SCHEMA.CHARACTER_DATA
    CONSTRAINT DATA_TYPE_DESCRIPTOR_CHECK_OBJECT_TYPE
    CHECK ( OBJECT_TYPE IN
        ( 'TABLE', 'DOMAIN', 'USER-DEFINED TYPE',
          'ROUTINE', 'SEQUENCE' ) ),
    DTD_IDENTIFIER          INFORMATION_SCHEMA.SQL_IDENTIFIER,
    DATA_TYPE              INFORMATION_SCHEMA.CHARACTER_DATA
    CONSTRAINT DATA_TYPE_DESCRIPTOR_OBJECT_DATA_TYPE_NOT_NULL
    NOT NULL,
    CHARACTER_SET_CATALOG  INFORMATION_SCHEMA.SQL_IDENTIFIER,
    CHARACTER_SET_SCHEMA   INFORMATION_SCHEMA.SQL_IDENTIFIER,
    CHARACTER_SET_NAME     INFORMATION_SCHEMA.SQL_IDENTIFIER,
    CHARACTER_MAXIMUM_LENGTH INFORMATION_SCHEMA.CARDINAL_NUMBER,
    CHARACTER_OCTET_LENGTH INFORMATION_SCHEMA.CARDINAL_NUMBER,
    COLLATION_CATALOG      INFORMATION_SCHEMA.SQL_IDENTIFIER,
    COLLATION_SCHEMA       INFORMATION_SCHEMA.SQL_IDENTIFIER,
```

COLLATION_NAME INFORMATION_SCHEMA.SQL_IDENTIFIER,
 NUMERIC_PRECISION INFORMATION_SCHEMA.CARDINAL_NUMBER,
 NUMERIC_PRECISION_RADIX INFORMATION_SCHEMA.CARDINAL_NUMBER,
 NUMERIC_SCALE INFORMATION_SCHEMA.CARDINAL_NUMBER,
 DECLARED_DATA_TYPE INFORMATION_SCHEMA.CHARACTER_DATA,
 DECLARED_NUMERIC_PRECISION INFORMATION_SCHEMA.CARDINAL_NUMBER,
 DECLARED_NUMERIC_SCALE INFORMATION_SCHEMA.CARDINAL_NUMBER,
 DATETIME_PRECISION INFORMATION_SCHEMA.CARDINAL_NUMBER,
 INTERVAL_TYPE INFORMATION_SCHEMA.CHARACTER_DATA,
 INTERVAL_PRECISION INFORMATION_SCHEMA.CARDINAL_NUMBER,
 USER_DEFINED_TYPE_CATALOG INFORMATION_SCHEMA.SQL_IDENTIFIER,
 USER_DEFINED_TYPE_SCHEMA INFORMATION_SCHEMA.SQL_IDENTIFIER,
 USER_DEFINED_TYPE_NAME INFORMATION_SCHEMA.SQL_IDENTIFIER,
 SCOPE_CATALOG INFORMATION_SCHEMA.SQL_IDENTIFIER,
 SCOPE_SCHEMA INFORMATION_SCHEMA.SQL_IDENTIFIER,
 SCOPE_NAME INFORMATION_SCHEMA.SQL_IDENTIFIER,
 MAXIMUM_CARDINALITY INFORMATION_SCHEMA.CARDINAL_NUMBER,
 TABLE_SEMANTICS INFORMATION_SCHEMA.CHARACTER_DATA
 CONSTRAINT DATA_TYPE_DESCRIPTOR_TABLE_SEMANTICS_CHECK
 CHECK (TABLE_SEMANTICS IN ('ROW', 'SET')),
 IS_PRUNABLE INFORMATION_SCHEMA.YES_OR_NO,
 HAS_PASS_THROUGH_COLUMNS INFORMATION_SCHEMA.YES_OR_NO,
 CONSTRAINT DATA_TYPE_DESCRIPTOR_DATA_TYPE_CHECK COMBINATIONS
 CHECK ((DATA_TYPE IN
 ('CHARACTER', 'CHARACTER VARYING', 'CHARACTER LARGE OBJECT')
 AND
 (CHARACTER_SET_CATALOG, CHARACTER_SET_SCHEMA,
 CHARACTER_SET_NAME) IS NOT NULL
 AND
 (CHARACTER_MAXIMUM_LENGTH, CHARACTER_OCTET_LENGTH) IS NOT NULL
 AND
 (NUMERIC_PRECISION, NUMERIC_PRECISION_RADIX, NUMERIC_SCALE,
 DECLARED_DATA_TYPE, DECLARED_NUMERIC_PRECISION,
 DECLARED_NUMERIC_SCALE) IS NULL
 AND
 DATETIME_PRECISION IS NULL
 AND
 (INTERVAL_TYPE, INTERVAL_PRECISION) IS NULL
 AND
 (USER_DEFINED_TYPE_CATALOG, USER_DEFINED_TYPE_SCHEMA,
 USER_DEFINED_TYPE_NAME) IS NULL
 AND
 (SCOPE_CATALOG, SCOPE_SCHEMA, SCOPE_NAME) IS NULL
 AND
 MAXIMUM_CARDINALITY IS NULL
 AND
 (TABLE_SEMANTICS, IS_PRUNABLE, HAS_PASS_THROUGH_COLUMNS) IS NULL)
 OR
 (DATA_TYPE IN
 ('BINARY', 'BINARY VARYING', 'BINARY LARGE OBJECT')
 AND
 (CHARACTER_MAXIMUM_LENGTH, CHARACTER_OCTET_LENGTH) IS NOT NULL
 AND
 (CHARACTER_SET_CATALOG, CHARACTER_SET_SCHEMA,
 CHARACTER_SET_NAME, COLLATION_CATALOG,
 COLLATION_SCHEMA, COLLATION_NAME) IS NULL

```

AND
    ( NUMERIC_PRECISION, NUMERIC_PRECISION_RADIX, NUMERIC_SCALE,
      DECLARED_DATA_TYPE, DECLARED_NUMERIC_PRECISION,
      DECLARED_NUMERIC_SCALE ) IS NULL
AND
    DATETIME_PRECISION IS NULL
AND
    ( INTERVAL_TYPE, INTERVAL_PRECISION ) IS NULL
AND
    ( USER_DEFINED_TYPE_CATALOG, USER_DEFINED_TYPE_SCHEMA,
      USER_DEFINED_TYPE_NAME ) IS NULL
AND
    ( SCOPE_CATALOG, SCOPE_SCHEMA, SCOPE_NAME ) IS NULL
AND
    MAXIMUM_CARDINALITY IS NULL
AND
    ( TABLE_SEMANTICS, IS_PRUNABLE, HAS_PASS_THROUGH_COLUMNS ) IS NULL )
OR
    ( DATA_TYPE IN
      ( 'SMALLINT', 'INTEGER', 'BIGINT' )
    AND
      DECLARED_DATA_TYPE IN
      ( 'SMALLINT', 'INTEGER', 'BIGINT', 'NUMERIC', 'DECIMAL' )
    AND
      ( CHARACTER_SET_CATALOG, CHARACTER_SET_SCHEMA,
        CHARACTER_SET_NAME, CHARACTER_MAXIMUM_LENGTH, CHARACTER_OCTET_LENGTH,

        COLLATION_CATALOG, COLLATION_SCHEMA, COLLATION_NAME ) IS NULL
    AND
      NUMERIC_PRECISION_RADIX IN ( 2, 10 )
    AND
      NUMERIC_PRECISION IS NOT NULL
    AND
      NUMERIC_SCALE = 0
    AND
      ( DECLARED_NUMERIC_SCALE IS NULL OR DECLARED_NUMERIC_SCALE = 0 )
    AND
      DATETIME_PRECISION IS NULL
    AND
      ( INTERVAL_TYPE, INTERVAL_PRECISION ) IS NULL
    AND
      ( USER_DEFINED_TYPE_CATALOG, USER_DEFINED_TYPE_SCHEMA,
        USER_DEFINED_TYPE_NAME ) IS NULL
    AND
      ( SCOPE_CATALOG, SCOPE_SCHEMA, SCOPE_NAME ) IS NULL
    AND
      MAXIMUM_CARDINALITY IS NULL
    AND
      ( TABLE_SEMANTICS, IS_PRUNABLE, HAS_PASS_THROUGH_COLUMNS ) IS NULL )
OR
    ( DATA_TYPE IN
      ( 'NUMERIC', 'DECIMAL' )
    AND
      DECLARED_DATA_TYPE IN
      ( 'SMALLINT', 'INTEGER', 'BIGINT', 'NUMERIC', 'DECIMAL' )
    AND
      ( CHARACTER_SET_CATALOG, CHARACTER_SET_SCHEMA,

```

```

CHARACTER_SET_NAME, CHARACTER_MAXIMUM_LENGTH, CHARACTER_OCTET_LENGTH,

    COLLATION_CATALOG, COLLATION_SCHEMA, COLLATION_NAME ) IS NULL
AND
    NUMERIC_PRECISION_RADIX = 10
AND
    ( NUMERIC_PRECISION, NUMERIC_SCALE ) IS NOT NULL
AND
    DATETIME_PRECISION IS NULL
AND
    ( INTERVAL_TYPE, INTERVAL_PRECISION ) IS NULL
AND
    ( USER_DEFINED_TYPE_CATALOG, USER_DEFINED_TYPE_SCHEMA,
      USER_DEFINED_TYPE_NAME ) IS NULL
AND
    ( SCOPE_CATALOG, SCOPE_SCHEMA, SCOPE_NAME ) IS NULL
AND
    MAXIMUM_CARDINALITY IS NULL
AND
    ( TABLE_SEMANTICS, IS_PRUNABLE, HAS_PASS_THROUGH_COLUMNS ) IS NULL )
OR
    ( DATA_TYPE IN
      ( 'REAL', 'DOUBLE PRECISION', 'FLOAT' )
    AND
      DECLARED_DATA_TYPE IN
      ( 'REAL', 'DOUBLE PRECISION', 'FLOAT' )
    AND
      ( CHARACTER_SET_CATALOG, CHARACTER_SET_SCHEMA,
        CHARACTER_SET_NAME, CHARACTER_MAXIMUM_LENGTH, CHARACTER_OCTET_LENGTH,

          COLLATION_CATALOG, COLLATION_SCHEMA, COLLATION_NAME ) IS NULL
    AND
      NUMERIC_PRECISION IS NOT NULL
    AND
      NUMERIC_PRECISION_RADIX = 2
    AND
      NUMERIC_SCALE IS NULL
    AND
      DATETIME_PRECISION IS NULL
    AND
      ( INTERVAL_TYPE, INTERVAL_PRECISION ) IS NULL
    AND
      ( USER_DEFINED_TYPE_CATALOG, USER_DEFINED_TYPE_SCHEMA,
        USER_DEFINED_TYPE_NAME ) IS NULL
    AND
      ( SCOPE_CATALOG, SCOPE_SCHEMA, SCOPE_NAME ) IS NULL
    AND
      MAXIMUM_CARDINALITY IS NULL
    AND
      ( TABLE_SEMANTICS, IS_PRUNABLE, HAS_PASS_THROUGH_COLUMNS ) IS NULL )
OR
    ( DATA_TYPE = 'DECFLOAT'
    AND
      DECLARED_DATA_TYPE = 'DECFLOAT'
    AND
      ( CHARACTER_SET_CATALOG, CHARACTER_SET_SCHEMA,
        CHARACTER_SET_NAME, CHARACTER_MAXIMUM_LENGTH, CHARACTER_OCTET_LENGTH,

```

```

        COLLATION_CATALOG, COLLATION_SCHEMA, COLLATION_NAME ) IS NULL
    AND
        NUMERIC_PRECISION IS NOT NULL
    AND
        NUMERIC_PRECISION_RADIX = 10
    AND
        NUMERIC_SCALE IS NULL
    AND
        DATETIME_PRECISION IS NULL
    AND
        ( INTERVAL_TYPE, INTERVAL_PRECISION ) IS NULL
    AND
        ( USER_DEFINED_TYPE_CATALOG, USER_DEFINED_TYPE_SCHEMA,
          USER_DEFINED_TYPE_NAME ) IS NULL
    AND
        ( SCOPE_CATALOG, SCOPE_SCHEMA, SCOPE_NAME ) IS NULL
    AND
        MAXIMUM_CARDINALITY IS NULL
    AND
        ( TABLE_SEMANTICS, IS_PRUNABLE, HAS_PASS_THROUGH_COLUMNS ) IS NULL )
OR
    ( DATA_TYPE IN
      ( 'DATE', 'TIME', 'TIMESTAMP',
        'TIME WITH TIME ZONE', 'TIMESTAMP WITH TIME ZONE' )
    AND
      ( CHARACTER_SET_CATALOG, CHARACTER_SET_SCHEMA,
        CHARACTER_SET_NAME, CHARACTER_MAXIMUM_LENGTH, CHARACTER_OCTET_LENGTH,

        COLLATION_CATALOG, COLLATION_SCHEMA, COLLATION_NAME ) IS NULL
    AND
      ( NUMERIC_PRECISION, NUMERIC_PRECISION_RADIX, NUMERIC_SCALE,
        DECLARED_DATA_TYPE, DECLARED_NUMERIC_PRECISION,
        DECLARED_NUMERIC_SCALE ) IS NULL
    AND
      DATETIME_PRECISION IS NOT NULL
    AND
      ( INTERVAL_TYPE, INTERVAL_PRECISION ) IS NULL
    AND
      ( USER_DEFINED_TYPE_CATALOG, USER_DEFINED_TYPE_SCHEMA,
        USER_DEFINED_TYPE_NAME ) IS NULL
    AND
      ( SCOPE_CATALOG, SCOPE_SCHEMA, SCOPE_NAME ) IS NULL
    AND
      MAXIMUM_CARDINALITY IS NULL
    AND
      ( TABLE_SEMANTICS, IS_PRUNABLE, HAS_PASS_THROUGH_COLUMNS ) IS NULL )
OR
    ( DATA_TYPE = 'INTERVAL'
    AND
      ( CHARACTER_SET_CATALOG, CHARACTER_SET_SCHEMA,
        CHARACTER_SET_NAME, CHARACTER_MAXIMUM_LENGTH, CHARACTER_OCTET_LENGTH,

        COLLATION_CATALOG, COLLATION_SCHEMA, COLLATION_NAME ) IS NULL
    AND
      ( NUMERIC_PRECISION, NUMERIC_PRECISION_RADIX, NUMERIC_SCALE,
        DECLARED_DATA_TYPE, DECLARED_NUMERIC_PRECISION,

```

```

        DECLARED_NUMERIC_SCALE ) IS NULL
    AND
        DATETIME_PRECISION IS NOT NULL
    AND
        INTERVAL_TYPE IN
            ( 'YEAR', 'MONTH', 'DAY', 'HOUR', 'MINUTE', 'SECOND',
              'YEAR TO MONTH', 'DAY TO HOUR', 'DAY TO MINUTE',
              'DAY TO SECOND', 'HOUR TO MINUTE',
              'HOUR TO SECOND', 'MINUTE TO SECOND' )
    AND
        INTERVAL_PRECISION IS NOT NULL
    AND
        ( USER_DEFINED_TYPE_CATALOG, USER_DEFINED_TYPE_SCHEMA,
          USER_DEFINED_TYPE_NAME ) IS NULL
    AND
        ( SCOPE_CATALOG, SCOPE_SCHEMA, SCOPE_NAME ) IS NULL
    AND
        MAXIMUM_CARDINALITY IS NULL
    AND
        ( TABLE_SEMANTICS, IS_PRUNABLE, HAS_PASS_THROUGH_COLUMNS ) IS NULL )
OR
    ( DATA_TYPE = 'BOOLEAN'
    AND
        ( CHARACTER_SET_CATALOG, CHARACTER_SET_SCHEMA,
          CHARACTER_SET_NAME, CHARACTER_MAXIMUM_LENGTH, CHARACTER_OCTET_LENGTH,

          COLLATION_CATALOG, COLLATION_SCHEMA, COLLATION_NAME ) IS NULL
    AND
        ( NUMERIC_PRECISION, NUMERIC_PRECISION_RADIX, NUMERIC_SCALE,
          DECLARED_DATA_TYPE, DECLARED_NUMERIC_PRECISION,
          DECLARED_NUMERIC_SCALE ) IS NULL
    AND
        DATETIME_PRECISION IS NULL
    AND
        ( INTERVAL_TYPE, INTERVAL_PRECISION ) IS NULL
    AND
        ( USER_DEFINED_TYPE_CATALOG, USER_DEFINED_TYPE_SCHEMA,
          USER_DEFINED_TYPE_NAME ) IS NULL
    AND
        ( SCOPE_CATALOG, SCOPE_SCHEMA, SCOPE_NAME ) IS NULL
    AND
        MAXIMUM_CARDINALITY IS NULL
    AND
        ( TABLE_SEMANTICS, IS_PRUNABLE, HAS_PASS_THROUGH_COLUMNS ) IS NULL )
OR
    ( DATA_TYPE = 'USER-DEFINED'
    AND
        ( CHARACTER_SET_CATALOG, CHARACTER_SET_SCHEMA,
          CHARACTER_SET_NAME, CHARACTER_OCTET_LENGTH,
          CHARACTER_MAXIMUM_LENGTH, COLLATION_CATALOG,
          COLLATION_SCHEMA, COLLATION_NAME ) IS NULL
    AND
        ( NUMERIC_PRECISION, NUMERIC_PRECISION_RADIX, NUMERIC_SCALE,
          DECLARED_DATA_TYPE, DECLARED_NUMERIC_PRECISION,
          DECLARED_NUMERIC_SCALE ) IS NULL
    AND
        DATETIME_PRECISION IS NULL

```

```

AND
  ( INTERVAL_TYPE, INTERVAL_PRECISION ) IS NULL
AND
  ( USER_DEFINED_TYPE_CATALOG, USER_DEFINED_TYPE_SCHEMA,
    USER_DEFINED_TYPE_NAME ) IS NOT NULL
AND
  ( SCOPE_CATALOG, SCOPE_SCHEMA, SCOPE_NAME ) IS NULL
AND
  MAXIMUM_CARDINALITY IS NULL
AND
  ( TABLE_SEMANTICS, IS_PRUNABLE, HAS_PASS_THROUGH_COLUMNS ) IS NULL )
OR
  ( DATA_TYPE = 'REF'
  AND
    ( CHARACTER_MAXIMUM_LENGTH, CHARACTER_OCTET_LENGTH ) IS NOT NULL
  AND
    ( CHARACTER_SET_CATALOG, CHARACTER_SET_SCHEMA,
      CHARACTER_SET_NAME, COLLATION_CATALOG,
      COLLATION_SCHEMA, COLLATION_NAME ) IS NULL
  AND
    ( NUMERIC_PRECISION, NUMERIC_PRECISION_RADIX, NUMERIC_SCALE,
      DECLARED_DATA_TYPE, DECLARED_NUMERIC_PRECISION,
      DECLARED_NUMERIC_SCALE ) IS NULL
  AND
    DATETIME_PRECISION IS NULL
  AND
    ( INTERVAL_TYPE, INTERVAL_PRECISION ) IS NULL
  AND
    ( USER_DEFINED_TYPE_CATALOG, USER_DEFINED_TYPE_SCHEMA,
      USER_DEFINED_TYPE_NAME ) IS NOT NULL
  AND
    MAXIMUM_CARDINALITY IS NULL
  AND
    ( TABLE_SEMANTICS, IS_PRUNABLE, HAS_PASS_THROUGH_COLUMNS ) IS NULL )
OR
  ( DATA_TYPE = 'ARRAY'
  AND
    ( CHARACTER_SET_CATALOG, CHARACTER_SET_SCHEMA,
      CHARACTER_SET_NAME, CHARACTER_OCTET_LENGTH,
      CHARACTER_MAXIMUM_LENGTH, COLLATION_CATALOG,
      COLLATION_SCHEMA, COLLATION_NAME ) IS NULL
  AND
    ( NUMERIC_PRECISION, NUMERIC_PRECISION_RADIX, NUMERIC_SCALE,
      DECLARED_DATA_TYPE, DECLARED_NUMERIC_PRECISION,
      DECLARED_NUMERIC_SCALE ) IS NULL
  AND
    DATETIME_PRECISION IS NULL
  AND
    ( INTERVAL_TYPE, INTERVAL_PRECISION ) IS NULL
  AND
    ( USER_DEFINED_TYPE_CATALOG, USER_DEFINED_TYPE_SCHEMA,
      USER_DEFINED_TYPE_NAME ) IS NULL
  AND
    ( SCOPE_CATALOG, SCOPE_SCHEMA, SCOPE_NAME ) IS NULL
  AND
    MAXIMUM_CARDINALITY IS NOT NULL
  AND

```

```

        ( TABLE_SEMANTICS, IS_PRUNABLE, HAS_PASS_THROUGH_COLUMNS ) IS NULL )
OR
    ( DATA_TYPE = 'MULTISET'
    AND
        ( CHARACTER_SET_CATALOG, CHARACTER_SET_SCHEMA,
          CHARACTER_SET_NAME, CHARACTER_OCTET_LENGTH,
          CHARACTER_MAXIMUM_LENGTH, COLLATION_CATALOG,
          COLLATION_SCHEMA, COLLATION_NAME ) IS NULL
    AND
        ( NUMERIC_PRECISION, NUMERIC_PRECISION_RADIX, NUMERIC_SCALE,
          DECLARED_DATA_TYPE, DECLARED_NUMERIC_PRECISION,
          DECLARED_NUMERIC_SCALE ) IS NULL
    AND
        DATETIME_PRECISION IS NULL
    AND
        ( INTERVAL_TYPE, INTERVAL_PRECISION ) IS NULL
    AND
        ( USER_DEFINED_TYPE_CATALOG, USER_DEFINED_TYPE_SCHEMA,
          USER_DEFINED_TYPE_NAME ) IS NULL
    AND
        ( SCOPE_CATALOG, SCOPE_SCHEMA, SCOPE_NAME ) IS NULL
    AND
        MAXIMUM_CARDINALITY IS NULL
    AND
        ( TABLE_SEMANTICS, IS_PRUNABLE, HAS_PASS_THROUGH_COLUMNS ) IS NULL )
OR
    ( DATA_TYPE = 'ROW'
    AND
        ( CHARACTER_SET_CATALOG, CHARACTER_SET_SCHEMA,
          CHARACTER_SET_NAME, CHARACTER_OCTET_LENGTH,
          CHARACTER_MAXIMUM_LENGTH, COLLATION_CATALOG,
          COLLATION_SCHEMA, COLLATION_NAME ) IS NULL
    AND
        ( NUMERIC_PRECISION, NUMERIC_PRECISION_RADIX, NUMERIC_SCALE,
          DECLARED_DATA_TYPE, DECLARED_NUMERIC_PRECISION,
          DECLARED_NUMERIC_SCALE ) IS NULL
    AND
        DATETIME_PRECISION IS NULL
    AND
        ( INTERVAL_TYPE, INTERVAL_PRECISION ) IS NULL
    AND
        ( USER_DEFINED_TYPE_CATALOG, USER_DEFINED_TYPE_SCHEMA,
          USER_DEFINED_TYPE_NAME ) IS NULL
    AND
        ( SCOPE_CATALOG, SCOPE_SCHEMA, SCOPE_NAME ) IS NULL
    AND
        MAXIMUM_CARDINALITY IS NULL
    AND
        ( TABLE_SEMANTICS, IS_PRUNABLE, HAS_PASS_THROUGH_COLUMNS ) IS NULL )
OR
    ( DATA_TYPE = 'TABLE'
    AND
        ( CHARACTER_SET_CATALOG, CHARACTER_SET_SCHEMA,
          CHARACTER_SET_NAME, CHARACTER_OCTET_LENGTH,
          CHARACTER_MAXIMUM_LENGTH, COLLATION_CATALOG,
          COLLATION_SCHEMA, COLLATION_NAME ) IS NULL
    AND

```

```

        ( NUMERIC_PRECISION, NUMERIC_PRECISION_RADIX, NUMERIC_SCALE,
          DECLARED_DATA_TYPE, DECLARED_NUMERIC_PRECISION,
          DECLARED_NUMERIC_SCALE ) IS NULL
      AND
        DATETIME_PRECISION IS NULL
      AND
        ( INTERVAL_TYPE, INTERVAL_PRECISION ) IS NULL
      AND
        ( USER_DEFINED_TYPE_CATALOG, USER_DEFINED_TYPE_SCHEMA,
          USER_DEFINED_TYPE_NAME ) IS NULL
      AND
        ( SCOPE_CATALOG, SCOPE_SCHEMA, SCOPE_NAME ) IS NULL
      AND
        MAXIMUM_CARDINALITY IS NULL )
    OR
      ( DATA_TYPE = 'DESCRIPTOR'
      AND
        ( CHARACTER_SET_CATALOG, CHARACTER_SET_SCHEMA,
          CHARACTER_SET_NAME, CHARACTER_OCTET_LENGTH,
          CHARACTER_MAXIMUM_LENGTH, COLLATION_CATALOG,
          COLLATION_SCHEMA, COLLATION_NAME ) IS NULL
      AND
        ( NUMERIC_PRECISION, NUMERIC_PRECISION_RADIX, NUMERIC_SCALE,
          DECLARED_DATA_TYPE, DECLARED_NUMERIC_PRECISION,
          DECLARED_NUMERIC_SCALE ) IS NULL
      AND
        DATETIME_PRECISION IS NULL
      AND
        ( INTERVAL_TYPE, INTERVAL_PRECISION ) IS NULL
      AND
        ( USER_DEFINED_TYPE_CATALOG, USER_DEFINED_TYPE_SCHEMA,
          USER_DEFINED_TYPE_NAME ) IS NULL
      AND
        ( SCOPE_CATALOG, SCOPE_SCHEMA, SCOPE_NAME ) IS NULL
      AND
        MAXIMUM_CARDINALITY IS NULL
      AND
        ( TABLE_SEMANTICS, IS_PRUNABLE, HAS_PASS_THROUGH_COLUMNS ) IS NULL )
    OR
      ( DATA_TYPE NOT IN
        ( 'CHARACTER', 'CHARACTER VARYING',
          'CHARACTER LARGE OBJECT', 'BINARY',
          'BINARY VARYING', 'BINARY LARGE OBJECT',
          'NUMERIC', 'DECIMAL', 'SMALLINT', 'INTEGER', 'BIGINT',
          'FLOAT', 'REAL', 'DOUBLE PRECISION', 'DECFLOAT',
          'DATE', 'TIME', 'TIMESTAMP',
          'INTERVAL', 'BOOLEAN', 'USER-DEFINED',
          'REF', 'ROW', 'ARRAY', 'MULTISET',
          'TABLE', 'DESCRIPTOR' ) ) ),
CONSTRAINT DATA_TYPE_DESCRIPTOR_CHECK_REFERENCES_UDT
CHECK ( USER_DEFINED_TYPE_CATALOG <>
      ANY ( SELECT CATALOG_NAME
            FROM SCHEMATA )
      OR
      ( USER_DEFINED_TYPE_CATALOG, USER_DEFINED_TYPE_SCHEMA,
        USER_DEFINED_TYPE_NAME ) IN

```

```

        ( SELECT USER_DEFINED_TYPE_CATALOG, USER_DEFINED_TYPE_SCHEMA,
            USER_DEFINED_TYPE_NAME
          FROM USER_DEFINED_TYPES ) ),

CONSTRAINT DATA_TYPE_DESCRIPTOR_PRIMARY_KEY
  PRIMARY KEY ( OBJECT_CATALOG, OBJECT_SCHEMA, OBJECT_NAME,
               OBJECT_TYPE, DTD_IDENTIFIER ),

CONSTRAINT
DATA_TYPE_DESCRIPTOR_CHECK_REFERENCES_COLLATION_CHARACTER_SET_APPLICABILITY
  CHECK ( CHARACTER_SET_CATALOG NOT IN
        ( SELECT CATALOG_NAME FROM SCHEMATA )
        OR
        COLLATION_CATALOG NOT IN
        ( SELECT CATALOG_NAME FROM SCHEMATA )
        OR
        ( CHARACTER_SET_CATALOG, CHARACTER_SET_SCHEMA, CHARACTER_SET_NAME,
          COLLATION_CATALOG, COLLATION_SCHEMA, COLLATION_NAME ) IN
        ( SELECT CHARACTER_SET_CATALOG, CHARACTER_SET_SCHEMA, CHARACTER_SET_NAME,
          COLLATION_CATALOG, COLLATION_SCHEMA, COLLATION_NAME
          FROM COLLATION_CHARACTER_SET_APPLICABILITY ) ),

CONSTRAINT DATA_TYPE_DESCRIPTOR_FOREIGN_KEY_SCHEMATA
  FOREIGN KEY ( USER_DEFINED_TYPE_CATALOG, USER_DEFINED_TYPE_SCHEMA )
    REFERENCES SCHEMATA
)

```

2. *Rationale: Remove redundant and incomplete Description.*

Delete Description 10).

6.45 ROUTINES base table

This Subclause is modified by Subclause 20.5, "ROUTINES base table", in ISO/IEC 9075-4.

This Subclause is modified by Subclause 15.5, "ROUTINES base table", in ISO/IEC 9075-13.

This Subclause is modified by Subclause 22.3, "ROUTINES base table", in ISO/IEC 9075-14.

1. *Rationale: Correct the syntax and add missing foreign key constraint.*

Replace the table definition with:

```

CREATE TABLE ROUTINES (
  SPECIFIC_CATALOG          INFORMATION_SCHEMA.SQL_IDENTIFIER,
  SPECIFIC_SCHEMA          INFORMATION_SCHEMA.SQL_IDENTIFIER,
  SPECIFIC_NAME            INFORMATION_SCHEMA.SQL_IDENTIFIER,
  ROUTINE_CATALOG          INFORMATION_SCHEMA.SQL_IDENTIFIER,
  ROUTINE_SCHEMA           INFORMATION_SCHEMA.SQL_IDENTIFIER,
  ROUTINE_NAME             INFORMATION_SCHEMA.SQL_IDENTIFIER,
  MODULE_CATALOG           INFORMATION_SCHEMA.SQL_IDENTIFIER,
  MODULE_SCHEMA            INFORMATION_SCHEMA.SQL_IDENTIFIER,
  MODULE_NAME              INFORMATION_SCHEMA.SQL_IDENTIFIER,
  USER_DEFINED_TYPE_CATALOG INFORMATION_SCHEMA.SQL_IDENTIFIER,
  USER_DEFINED_TYPE_SCHEMA INFORMATION_SCHEMA.SQL_IDENTIFIER,

```

USER_DEFINED_TYPE_NAME INFORMATION_SCHEMA.SQL_IDENTIFIER,
 ROUTINE_TYPE INFORMATION_SCHEMA.CHARACTER_DATA
 CONSTRAINT ROUTINE_TYPE_NOT_NULL
 NOT NULL
 CONSTRAINT ROUTINE_TYPE_CHECK
 CHECK (ROUTINE_TYPE IN
 ('PROCEDURE', 'FUNCTION', 'PTF',
 'INSTANCE METHOD', 'STATIC METHOD', 'CONSTRUCTOR METHOD')),
 DTD_IDENTIFIER INFORMATION_SCHEMA.SQL_IDENTIFIER,
 ROUTINE_BODY INFORMATION_SCHEMA.CHARACTER_DATA
 CONSTRAINT ROUTINE_BODY_NOT_NULL
 NOT NULL
 CONSTRAINT ROUTINE_BODY_CHECK
 CHECK (ROUTINE_BODY IN
 ('SQL', 'EXTERNAL', 'PTF')),
 ROUTINE_DEFINITION INFORMATION_SCHEMA.CHARACTER_DATA,
 EXTERNAL_NAME INFORMATION_SCHEMA.SQL_IDENTIFIER,
 EXTERNAL_LANGUAGE INFORMATION_SCHEMA.CHARACTER_DATA
 CONSTRAINT EXTERNAL_LANGUAGE_CHECK
 CHECK (EXTERNAL_LANGUAGE IN
 ('ADA', 'C', 'COBOL',
 'FORTRAN', 'MUMPS', 'PASCAL', 'PLI')),
 PARAMETER_STYLE INFORMATION_SCHEMA.CHARACTER_DATA
 CONSTRAINT PARAMETER_STYLE_CHECK
 CHECK (PARAMETER_STYLE IN
 ('SQL', 'GENERAL')),
 IS_DETERMINISTIC INFORMATION_SCHEMA.YES_OR_NO
 CONSTRAINT ROUTINES_IS_DETERMINISTIC_NOT_NULL
 NOT NULL,
 SQL_DATA_ACCESS INFORMATION_SCHEMA.CHARACTER_DATA
 CONSTRAINT ROUTINES_SQL_DATA_ACCESS_NOT_NULL
 NOT NULL
 CONSTRAINT ROUTINES_SQL_DATA_ACCESS_CHECK
 CHECK (SQL_DATA_ACCESS IN
 ('NO SQL', 'CONTAINS SQL',
 'READS SQL DATA', 'MODIFIES SQL DATA')),
 IS_NULL_CALL INFORMATION_SCHEMA.YES_OR_NO,
 SQL_PATH INFORMATION_SCHEMA.CHARACTER_DATA,
 SCHEMA_LEVEL_ROUTINE INFORMATION_SCHEMA.YES_OR_NO
 CONSTRAINT ROUTINES_SCHEMA_LEVEL_ROUTINE_NOT_NULL
 NOT NULL,
 MAX_DYNAMIC_RESULT_SETS INFORMATION_SCHEMA.CARDINAL_NUMBER,
 IS_USER_DEFINED_CAST INFORMATION_SCHEMA.YES_OR_NO,
 IS_IMPLICITLY_INVOCABLE INFORMATION_SCHEMA.YES_OR_NO,
 SECURITY_TYPE INFORMATION_SCHEMA.CHARACTER_DATA
 CONSTRAINT ROUTINES_SECURITY_TYPE_CHECK
 CHECK (SECURITY_TYPE IN
 ('DEFINER', 'INVOKER', 'IMPLEMENTATION DEFINED')),
 TO_SQL_SPECIFIC_CATALOG INFORMATION_SCHEMA.SQL_IDENTIFIER,
 TO_SQL_SPECIFIC_SCHEMA INFORMATION_SCHEMA.SQL_IDENTIFIER,
 TO_SQL_SPECIFIC_NAME INFORMATION_SCHEMA.SQL_IDENTIFIER,
 AS_LOCATOR INFORMATION_SCHEMA.YES_OR_NO,
 CREATED INFORMATION_SCHEMA.TIME_STAMP,
 LAST_ALTERED INFORMATION_SCHEMA.TIME_STAMP,
 NEW_SAVEPOINT_LEVEL INFORMATION_SCHEMA.YES_OR_NO,
 IS_UDT_DEPENDENT INFORMATION_SCHEMA.YES_OR_NO
 CONSTRAINT ROUTINES_IS_UDT_DEPENDENT_NOT_NULL