INTERNATIONAL STANDARD ISO/IEC 9075-11:2016

TECHNICAL CORRIGENDUM 2

Published 2022-06

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*.

ICS 35.060

Ref. No. ISO/IEC 9075-11:2016/Cor.2:2022(E)

Published in Switzerland

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.SEQENCE_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
```