

续表 D. 14. 2

类型	EXPRESS 描述
展示层分配 (IfcPresentationLayerAssignment)	ENTITY IfcPresentationLayerAssignment SUPERTYPE OF (IfcPresentationLayerWithStyle); Name : IfcLabel; Description : OPTIONAL IfcText; AssignedItems : SET [1:?] OF IfcLayeredItem; Identifier : OPTIONAL IfcIdentifier; WHERE ApplicableItems : SIZEOF(QUERY(temp < * AssignedItems (SIZEOF(TYPEOF(temp) * ['IFCREPRESENTATIONRESOURCE. IFCSHAPEREPRESENTATION', 'IFCGEOMETRYRESOURCE. IFCGEOMETRICREPRESENTATIONITEM', 'IFCGEOMETRYRESOURCE. IFCMAPPEDITEM']) = 1))) = SIZEOF(AssignedItems); END_ENTITY
带样式展示层 (IfcPresentationLayerWithStyle)	ENTITY IfcPresentationLayerWithStyle SUBTYPE OF IfcPresentationLayerAssignment; LayerOn : LOGICAL; LayerFrozen : LOGICAL; LayerBlocked : LOGICAL; LayerStyles : SET OF IfcPresentationStyle; WHERE ApplicableOnlyToItems : SIZEOF(QUERY(temp < * AssignedItems (SIZEOF(TYPEOF(temp) * ['IFCGEOMETRYRESOURCE. IFCGEOMETRICREPRESENTATIONITEM', 'IFCGEOMETRYRESOURCE. IFCMAPPEDITEM']) = 1))) = SIZEOF(AssignedItems); END_ENTITY

D. 15 截面资源

D. 15. 1 截面资源类型的 EXPRESS 描述应按表 D. 15. 1 的规定采用。

表 D. 15. 1 截面资源类型的 EXPRESS 描述

类型	EXPRESS 描述
截面类型枚举 (IfcProfileTypeEnum)	TYPE IfcProfileTypeEnum = ENUMERATION OF (CURVE, AREA); END_TYPE
钢筋角色枚举 (IfcReinforcingBarRoleEnum)	TYPE IfcReinforcingBarRoleEnum = ENUMERATION OF (MAIN, SHEAR, LIGATURE, STUD, PUNCHING, EDGE, RING, ANCHORING, USERDEFINED, NOTDEFINED); END_TYPE
钢筋表面枚举 (IfcReinforcingBarSurfaceEnum)	TYPE IfcReinforcingBarSurfaceEnum = ENUMERATION OF (PLAIN, TEXTURED); END_TYPE
截面类型枚举 (IfcSectionTypeEnum)	TYPE IfcSectionTypeEnum = ENUMERATION OF (UNIFORM, TAPERED); END_TYPE

D. 15. 2 截面资源实体的 EXPRESS 描述应按表 D. 15. 2 的规定采用。

表 D. 15.2 截面资源实体的 EXPRESS 描述

实体	EXPRESS 描述
任意封闭截面定义 (IfcArbitraryClosedProfileDef)	ENTITY IfcArbitraryClosedProfileDef SUPERTYPE OF (IfcArbitraryProfileDefWithVoids) SUBTYPE OF IfcProfileDef; OuterCurve : IfcCurve; WHERE WR1 : OuterCurve.Dim = 2; WR2 : NOT('IFCGEOMETRYRESOURCE.IFCLINE' IN TYPEOF(OuterCurve)); WR3 : NOT('IFCGEOMETRYRESOURCE.IFCOFFSETCURVE2D' IN TYPEOF(OuterCurve)); END_ENTITY
任意开放截面定义 (IfcArbitraryOpenProfileDef)	ENTITY IfcArbitraryOpenProfileDef SUPERTYPE OF (IfcCenterLineProfileDef) SUBTYPE OF IfcProfileDef; Curve : IfcBoundedCurve; WHERE WR11 : ('IFCPROFILERESOURCE.IFCCENTERLINEPROFILEDEF' IN TYPEOF(SELF)) OR (SELF\IfcProfileDef.ProfileType = IfcProfileTypeEnum.CURVE); WR12 : Curve.Dim = 2; END_ENTITY
任意带洞截面定义 (IfcArbitraryProfileDefWithVoids)	ENTITY IfcArbitraryProfileDefWithVoids SUBTYPE OF IfcArbitraryClosedProfileDef; InnerCurves : SET [1:?] OF IfcCurve; WHERE WR1 : SELF\IfcProfileDef.ProfileType = AREA; WR2 : SIZEOF(QUERY(temp < * InnerCurves temp.Dim <> 2)) = 0; WR3 : SIZEOF(QUERY(temp < * InnerCurves 'IFCGEOMETRYRESOURCE.IFCLINE' IN TYPEOF(temp))) = 0; END_ENTITY
非对称工形截面定义 (IfcAsymmetricIShapeProfileDef)	ENTITY IfcAsymmetricIShapeProfileDef SUBTYPE OF IfcParameterizedProfileDef; BottomFlangeWidth : IfcPositiveLengthMeasure; OverallDepth : IfcPositiveLengthMeasure; WebThickness : IfcPositiveLengthMeasure; BottomFlangeThickness : IfcPositiveLengthMeasure; BottomFlangeFilletRadius : OPTIONAL IfcNonNegativeLengthMeasure; TopFlangeWidth : IfcPositiveLengthMeasure; TopFlangeThickness : OPTIONAL IfcPositiveLengthMeasure; TopFlangeFilletRadius : OPTIONAL IfcNonNegativeLengthMeasure; BottomFlangeEdgeRadius : OPTIONAL IfcNonNegativeLengthMeasure; BottomFlangeSlope : OPTIONAL IfcPlaneAngleMeasure; TopFlangeEdgeRadius : OPTIONAL IfcNonNegativeLengthMeasure; TopFlangeSlope : OPTIONAL IfcPlaneAngleMeasure; WHERE ValidFlangeThickness : NOT(EXISTS(TopFlangeThickness)) OR ((BottomFlangeThickness + TopFlangeThickness) < OverallDepth); ValidWebThickness : (WebThickness < BottomFlangeWidth) AND (WebThickness < TopFlangeWidth); ValidBottomFilletRadius : (NOT(EXISTS(BottomFlangeFilletRadius))) OR (BottomFlangeFilletRadius <= (BottomFlangeWidth - WebThickness)/2.); ValidTopFilletRadius : (NOT(EXISTS(TopFlangeFilletRadius))) OR (TopFlangeFilletRadius <= (TopFlangeWidth - WebThickness)/2.); END_ENTITY
中心线截面定义 (IfcCenterLineProfileDef)	ENTITY IfcCenterLineProfileDef SUBTYPE OF IfcArbitraryOpenProfileDef; Thickness : IfcPositiveLengthMeasure; END_ENTITY
中空圆形截面定义 (IfcCircleHollowProfileDef)	ENTITY IfcCircleHollowProfileDef SUBTYPE OF IfcCircleProfileDef; WallThickness : IfcPositiveLengthMeasure; WHERE WR1 : WallThickness < SELF\IfcCircleProfileDef.Radius; END_ENTITY

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实体	EXPRESS 描述
圆截面定义 (IfcCircleProfileDef)	ENTITY IfcCircleProfileDef SUPERTYPE OF (IfcCircleHollowProfileDef) SUBTYPE OF IfcParameterizedProfileDef; Radius : IfcPositiveLengthMeasure; END_ENTITY
组合截面定义 (IfcCompositeProfileDef)	ENTITY IfcCompositeProfileDef SUBTYPE OF IfcProfileDef; Profiles : SET [2;?] OF IfcProfileDef; Label : OPTIONAL IfcLabel; WHERE InvariantProfileType : SIZEOF (QUERY (temp < * Profiles temp.ProfileType <> Profiles [1] . ProfileType)) = 0; NoRecursion : SIZEOF(QUERY(temp < * Profiles 'IFCProfiler.ESOURCE.IFCCOMPOSITEPROFILEDEF' IN TYPEOF(temp))) = 0; END_ENTITY
C形截面定义 (IfcCShapeProfileDef)	ENTITY IfcCShapeProfileDef SUBTYPE OF IfcParameterizedProfileDef; Depth : IfcPositiveLengthMeasure; Width : IfcPositiveLengthMeasure; WallThickness : IfcPositiveLengthMeasure; Girth : IfcPositiveLengthMeasure; InternalFilletRadius : OPTIONAL IfcNonNegativeLengthMeasure; WHERE ValidGirth : Girth < (Depth / 2.); ValidInternalFilletRadius : NOT(EXISTS(InternalFilletRadius)) OR ((InternalFilletRadius <= Width/2 - WallThickness) AND (InternalFilletRadius <= Depth/2 - WallThickness)); ValidWallThickness : (WallThickness < Width/2.) AND (WallThickness < Depth/2.); END_ENTITY
导出截面定义 (IfcDerivedProfileDef)	ENTITY IfcDerivedProfileDef SUPERTYPE OF (IfcMirroredProfileDef) SUBTYPE OF IfcProfileDef; ParentProfile : IfcProfileDef; Operator : IfcCartesianTransformationOperator2D; Label : OPTIONAL IfcLabel; WHERE InvariantProfileType, SELF\IfcProfileDef.ProfileType = ParentProfile.ProfileType; END_ENTITY
椭圆截面定义 (IfcEllipseProfileDef)	ENTITY IfcEllipseProfileDef SUBTYPE OF IfcParameterizedProfileDef; SemiAxis1 : IfcPositiveLengthMeasure; SemiAxis2 : IfcPositiveLengthMeasure; END_ENTITY
工形截面定义 (IfcIShapeProfileDef)	ENTITY IfcIShapeProfileDef SUBTYPE OF IfcParameterizedProfileDef; OverallWidth : IfcPositiveLengthMeasure; OverallDepth : IfcPositiveLengthMeasure; WebThickness : IfcPositiveLengthMeasure; FlangeThickness : IfcPositiveLengthMeasure; FilletRadius : OPTIONAL IfcNonNegativeLengthMeasure; FlangeEdgeRadius : OPTIONAL IfcNonNegativeLengthMeasure; FlangeSlope : OPTIONAL IfcPlaneAngleMeasure; WHERE ValidFlangeThickness : (2 * FlangeThickness) < OverallDepth; ValidWebThickness : WebThickness < OverallWidth; ValidFilletRadius : NOT(EXISTS(FilletRadius)) OR ((FilletRadius <= (OverallWidth - WebThickness)/2.) AND (FilletRadius <= (OverallDepth - (2 * FlangeThickness))/2.)); END_ENTITY

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实体	EXPRESS 描述
L 形截面定义 (IfcLShapeProfileDef)	ENTITY IfcLShapeProfileDef SUBTYPE OF IfcParameterizedProfileDef; Depth ; IfcPositiveLengthMeasure; Width ; OPTIONAL IfcPositiveLengthMeasure; Thickness ; IfcPositiveLengthMeasure; FilletRadius ; OPTIONAL IfcNonNegativeLengthMeasure; EdgeRadius ; OPTIONAL IfcNonNegativeLengthMeasure; LegSlope ; OPTIONAL IfcPlaneAngleMeasure; WHERE ValidThickness : (Thickness < Depth) AND (NOT(EXISTS(Width)) OR (Thickness < Width)); END_ENTITY
镜像截面定义 (IfcMirroredProfileDef)	ENTITY IfcMirroredProfileDef SUBTYPE OF IfcDerivedProfileDef; DERIVE SELF\IfcDerivedProfileDef. Operator ; IfcCartesianTransformationOperator2D ; = IfcRepresentationItem() IfcGeometricRepresentationItem() IfcCartesianTransformationOperator(- Axis1 IfcRepresentationItem () IfcGeometricRepresentationItem() IfcDirection([-1. , 0.]), - Axis2 IfcRepresentationItem() Ifc GeometricRepresentationItem() IfcDirection([0. , 1.]), - LocalOrigin IfcRepresentationItem() IfcGe ometricRepresentationItem() IfcPoint() IfcCartesianPoint([0. , 0.]), - Scale 1.) IfcCartesianTran sformationOperator2D(); END_ENTITY
参数化截面定义 (IfcParameterized ProfileDef)	ENTITY IfcParameterizedProfileDef ABSTRACT SUPERTYPE OF (ONEOF(IfcAsymmetricShapeProfileDef, IfcCShapeProfileDef, IfcCircleProf ileDef, IfcEllipseProfileDef, IfcIShapeProfileDef, IfcLShapeProfileDef, IfcRectangleProfileDef, IfcTShapePro fileDef, IfcTrapeziumProfileDef, IfcUShapeProfileDef, IfcZShapeProfileDef)) SUBTYPE OF IfcProfileDef; Position ; OPTIONAL IfcAxis2Placement2D; END_ENTITY
截面定义 (IfcProfileDef)	ENTITY IfcProfileDef SUPERTYPE OF (ONEOF(IfcArbitraryClosedProfileDef, IfcArbitraryOpenProfileDef, IfcCompositeProfileDef, IfcDerivedProfileDef, IfcParameterizedProfileDef)); ProfileType ; IfcProfileTypeEnum; ProfileName ; OPTIONAL IfcLabel; INVERSE HasExternalReference ; SET OF IfcExternalReferenceRelationship FOR RelatedResourceObjects; HasProperties ; SET OF IfcProfileProperties FOR ProfileDefinition; END_ENTITY
截面属性 (IfcProfileProperties)	ENTITY IfcProfileProperties SUBTYPE OF IfcExtendedProperties; ProfileDefinition ; IfcProfileDef; END_ENTITY
中空矩形截面 定义 (IfcRectangleHollow ProfileDef)	ENTITY IfcRectangleHollowProfileDef SUBTYPE OF IfcRectangleProfileDef; WallThickness ; IfcPositiveLengthMeasure; InnerFilletRadius ; OPTIONAL IfcNonNegativeLengthMeasure; OuterFilletRadius ; OPTIONAL IfcNonNegativeLengthMeasure; WHERE ValidWallThickness : (WallThickness < (SELF\IfcRectangleProfileDef. XDim/2.)) AND (WallThickness < (SELF\IfcRectangleProfileDef. YDim/2.)); ValidInnerRadius : NOT(EXISTS(InnerFilletRadius)) OR ((InnerFilletRadius <= (SELF\IfcRectanglePro fileDef. XDim/2 - WallThickness)) AND (InnerFilletRadius <= (SELF\IfcRectangleProfileDef. YDim/2 -W allThickness))); ValidOuterRadius : NOT(EXISTS(OuterFilletRadius)) OR ((OuterFilletRadius <= (SELF\IfcRectangleP rofileDef. XDim/2.)) AND (OuterFilletRadius <= (SELF\IfcRectangleProfileDef. YDim/2.))); END_ENTITY

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实体	EXPRESS 描述
矩形截面定义 (IfcRectangleProfileDef)	ENTITY IfcRectangleProfileDef SUPERTYPE OF(ONEOF(IfcRectangleHollowProfileDef, IfcRoundedRectangleProfileDef)) SUBTYPE OF IfcParameterizedProfileDef; XDim : IfcPositiveLengthMeasure; YDim : IfcPositiveLengthMeasure; END_ENTITY
钢筋属性 (IfcReinforcementBarProperties)	ENTITY IfcReinforcementBarProperties SUBTYPE OF IfcPreDefinedProperties; TotalCrossSectionArea : IfcAreaMeasure; SteelGrade : IfcLabel; BarSurface : OPTIONAL IfcReinforcingBarSurfaceEnum; EffectiveDepth : OPTIONAL IfcLengthMeasure; NominalBarDiameter : OPTIONAL IfcPositiveLengthMeasure; BarCount : OPTIONAL IfcCountMeasure; END_ENTITY
圆角矩形截面定义 (IfcRoundedRectangleProfileDef)	ENTITY IfcRoundedRectangleProfileDef SUBTYPE OF IfcRectangleProfileDef; RoundingRadius : IfcPositiveLengthMeasure; WHERE ValidRadius : ((RoundingRadius <= (SELF.IfcRectangleProfileDef.XDim/2.)) AND (RoundingRadius <= (SELF.IfcRectangleProfileDef.YDim/2.))); END_ENTITY
横截面属性 (IfcSectionProperties)	ENTITY IfcSectionProperties SUBTYPE OF IfcPreDefinedProperties; SectionType : IfcSectionTypeEnum; StartProfile : IfcProfileDef; EndProfile : OPTIONAL IfcProfileDef; END_ENTITY
横截面钢筋属性 (IfcSectionReinforcementProperties)	ENTITY IfcSectionReinforcementProperties SUBTYPE OF IfcPreDefinedProperties; LongitudinalStartPosition : IfcLengthMeasure; LongitudinalEndPosition : IfcLengthMeasure; TransversePosition : OPTIONAL IfcLengthMeasure; ReinforcementRole : IfcReinforcingBarRoleEnum; SectionDefinition : IfcSectionProperties; CrossSectionReinforcementDefinitions : SET [1:?] OF IfcReinforcementBarProperties; END_ENTITY
梯形截面定义 (IfcTrapeziumProfileDef)	ENTITY IfcTrapeziumProfileDef SUBTYPE OF IfcParameterizedProfileDef; BottomXDim : IfcPositiveLengthMeasure; TopXDim : IfcPositiveLengthMeasure; YDim : IfcPositiveLengthMeasure; TopXOffset : IfcLengthMeasure; END_ENTITY
T形截面定义 (IfcTShapeProfileDef)	ENTITY IfcTShapeProfileDef SUBTYPE OF IfcParameterizedProfileDef; Depth : IfcPositiveLengthMeasure; FlangeWidth : IfcPositiveLengthMeasure; WebThickness : IfcPositiveLengthMeasure; FlangeThickness : IfcPositiveLengthMeasure; FilletRadius : OPTIONAL IfcNonNegativeLengthMeasure; FlangeEdgeRadius : OPTIONAL IfcNonNegativeLengthMeasure; WebEdgeRadius : OPTIONAL IfcNonNegativeLengthMeasure; WebSlope : OPTIONAL IfcPlaneAngleMeasure; FlangeSlope : OPTIONAL IfcPlaneAngleMeasure; WHERE ValidFlangeThickness : FlangeThickness < Depth; ValidWebThickness : WebThickness < FlangeWidth; END_ENTITY

续表 D. 15. 2

实体	EXPRESS 描述
U 形截面定义 (IfcUShapeProfileDef)	<pre> ENTITY IfcUShapeProfileDef SUBTYPE OF IfcParameterizedProfileDef; Depth : IfcPositiveLengthMeasure; FlangeWidth : IfcPositiveLengthMeasure; WebThickness : IfcPositiveLengthMeasure; FlangeThickness : IfcPositiveLengthMeasure; FilletRadius : OPTIONAL IfcNonNegativeLengthMeasure; EdgeRadius : OPTIONAL IfcNonNegativeLengthMeasure; FlangeSlope : OPTIONAL IfcPlaneAngleMeasure; WHERE ValidFlangeThickness : FlangeThickness < (Depth / 2.); ValidWebThickness : WebThickness < FlangeWidth; END_ENTITY </pre>
Z 形截面定义 (IfcZShapeProfileDef)	<pre> ENTITY IfcZShapeProfileDef SUBTYPE OF IfcParameterizedProfileDef; Depth : IfcPositiveLengthMeasure; FlangeWidth : IfcPositiveLengthMeasure; WebThickness : IfcPositiveLengthMeasure; FlangeThickness : IfcPositiveLengthMeasure; FilletRadius : OPTIONAL IfcNonNegativeLengthMeasure; EdgeRadius : OPTIONAL IfcNonNegativeLengthMeasure; WHERE ValidFlangeThickness : FlangeThickness < (Depth / 2.); END_ENTITY </pre>

D. 16 属性资源

D. 16. 1 属性资源类型的 EXPRESS 描述应按表 D. 16. 1 的规定采用。

表 D. 16. 1 属性资源类型的 EXPRESS 描述

类型	EXPRESS 描述
插值曲线枚举 (IfcCurveInterpolationEnum)	<pre> TYPE IfcCurveInterpolationEnum = ENUMERATION OF (LINEAR, LOG_LINEAR, LOG_LOG, NOTDEFINED); END_TYPE </pre>
对象引用选择 (IfcObjectReferenceSelect)	<pre> TYPE IfcObjectReferenceSelect = SELECT (IfcMaterialDefinition, IfcPerson, IfcOrganization, IfcPersonAndOrganization, IfcExternalReference, IfcTimeSeries, IfcAddress, IfcAppliedValue, IfcTable); END_TYPE </pre>

D. 16. 2 属性资源实体的 EXPRESS 描述应按表 D. 16. 2 的规定采用。

表 D. 16. 2 属性资源实体的 EXPRESS 描述

实体	EXPRESS 描述
复杂属性 (IfcComplexProperty)	<pre> ENTITY IfcComplexProperty SUBTYPE OF IfcProperty; UsageName : IfcIdentifier; HasProperties : SET [1:?] OF IfcProperty; WHERE WR21 : SIZEOF(QUERY(temp < * HasProperties SELF := temp)) = 0; WR22 : IfcUniquePropertyName(HasProperties); END_ENTITY </pre>

续表 D.16.2

实体	EXPRESS 描述
扩展属性 (IfcExtendedProperties)	ENTITY IfcExtendedProperties ABSTRACT SUPERTYPE OF(ONEOF(IfcMaterialProperties, IfcProfileProperties)) SUBTYPE OF IfcPropertyAbstraction; Name ; OPTIONAL IfcIdentifier; Description ; OPTIONAL IfcText; Properties ; SET [1:?] OF IfcProperty; END_ENTITY
预定义属性 (IfcPreDefinedProperties)	ENTITY IfcPreDefinedProperties ABSTRACT SUPERTYPE OF(ONEOF(IfcReinforcementBarProperties, IfcSectionProperties, IfcSectionReinforcementProperties)) SUBTYPE OF IfcPropertyAbstraction; END_ENTITY
属性(IfcProperty)	ENTITY IfcProperty ABSTRACT SUPERTYPE OF(ONEOF(IfcComplexProperty, IfcSimpleProperty)) SUBTYPE OF IfcPropertyAbstraction; Name ; IfcIdentifier; Description ; OPTIONAL IfcText; INVERSE PartOfSet ; SET OF IfcPropertySet FOR HasProperties; PropertyForDependance ; SET OF IfcPropertyDependencyRelationship FOR DependingProperty; PropertyDependsOn ; SET OF IfcPropertyDependencyRelationship FOR DependantProperty; PartOfComplex ; SET OF IfcComplexProperty FOR HasProperties; END_ENTITY
抽象属性 (IfcPropertyAbstraction)	ENTITY IfcPropertyAbstraction ABSTRACT SUPERTYPE OF(ONEOF(IfcExtendedProperties, IfcPreDefinedProperties, IfcProperty, IfcPropertyEnumeration)); INVERSE HasExternalReferences ; SET OF IfcExternalReferenceRelationship FOR RelatedResourceObjects; END_ENTITY
有界值属性 (IfcPropertyBoundedValue)	ENTITY IfcPropertyBoundedValue SUBTYPE OF IfcSimpleProperty; UpperBoundValue ; OPTIONAL IfcValue; LowerBoundValue ; OPTIONAL IfcValue; Unit ; OPTIONAL IfcUnit; SetPointValue ; OPTIONAL IfcValue; WHERE SameUnitUpperLower ; NOT (EXISTS(UpperBoundValue)) OR NOT (EXISTS(LowerBoundValue)) OR (TYPEOF(UpperBoundValue) = TYPEOF(LowerBoundValue)); SameUnitUpperSet ; NOT (EXISTS(UpperBoundValue)) OR NOT (EXISTS(SetPointValue)) OR (TYPEOF(UpperBoundValue) = TYPEOF(SetPointValue)); SameUnitLowerSet ; NOT (EXISTS(LowerBoundValue)) OR NOT (EXISTS(SetPointValue)) OR (TYPEOF(LowerBoundValue) = TYPEOF(SetPointValue)); END_ENTITY
关系依赖属性 (IfcPropertyDependencyRelationship)	ENTITY IfcPropertyDependencyRelationship SUBTYPE OF IfcResourceLevelRelationship; DependingProperty ; IfcProperty; DependantProperty ; IfcProperty; EXPRESSION ; OPTIONAL IfcText; WHERE NoSelfReference ; DependingProperty ; <> ; DependantProperty; END_ENTITY
枚举属性值 (IfcPropertyEnumeratedValue)	ENTITY IfcPropertyEnumeratedValue SUBTYPE OF IfcSimpleProperty; EnumerationValues ; OPTIONAL LIST [1:?] OF IfcValue; EnumerationReference ; OPTIONAL IfcPropertyEnumeration; WHERE WR21 ; NOT (EXISTS(EnumerationReference)) OR NOT (EXISTS(EnumerationValues)) OR (SIZEOF(QUERY(temp < * EnumerationValues temp IN EnumerationReference. EnumerationValues)) = SIZEOF(EnumerationValues)); END_ENTITY

续表 D. 16. 2

实体	EXPRESS 描述
属性枚举 (IfcProperty Enumeration)	<pre> ENTITY IfcPropertyEnumeration SUBTYPE OF IfcPropertyAbstraction; Name : IfcLabel; EnumerationValues : LIST [1:?] OF UNIQUE IfcValue; Unit : OPTIONAL IfcUnit; UNIQUE UR1 : Name; WHERE WR01 ; SIZEOF(QUERY(temp < * SELF. EnumerationValues NOT(TYPEOF(SELF. EnumerationVal ues[1]) = TYPEOF(temp)))) = 0; END_ENTITY </pre>
属性列表值 (IfcPropertyList Value)	<pre> ENTITY IfcPropertyListValue SUBTYPE OF IfcSimpleProperty; ListValues ; OPTIONAL LIST [1:?] OF IfcValue; Unit : OPTIONAL IfcUnit; WHERE WR31 ; SIZEOF(QUERY(temp < * SELF. ListValues NOT(TYPEOF(SELF. ListValues[1]) = TYP EOF(temp)))) = 0; END_ENTITY </pre>
引用值属性 (IfcPropertyReference Value)	<pre> ENTITY IfcPropertyReferenceValue SUBTYPE OF IfcSimpleProperty; UsageName : OPTIONAL IfcText; PropertyReference ; OPTIONAL IfcObjectReferenceSelect; END_ENTITY </pre>
单值属性 (IfcPropertySingle Value)	<pre> ENTITY IfcPropertySingleValue SUBTYPE OF IfcSimpleProperty; NominalValue ; OPTIONAL IfcValue; Unit : OPTIONAL IfcUnit; END_ENTITY </pre>
表值属性 (IfcPropertyTable Value)	<pre> ENTITY IfcPropertyTableValue SUBTYPE OF IfcSimpleProperty; DefiningValues ; OPTIONAL LIST [1:?] OF UNIQUE IfcValue; DefinedValues ; OPTIONAL LIST [1:?] OF IfcValue; EXPRESSIon ; OPTIONAL IfcText; DefiningUnit ; OPTIONAL IfcUnit; DefinedUnit ; OPTIONAL IfcUnit; CurveInterpolation ; OPTIONAL IfcCurveInterpolationEnum; WHERE WR21 ; (NOT(EXISTS(DefiningValues)) AND NOT(EXISTS(DefinedValues))) OR (SIZEOF(DefiningVa lues) = SIZEOF(DefinedValues)); WR22 ; NOT(EXISTS(DefiningValues)) OR (SIZEOF(QUERY(temp < * SELF. DefiningValues TYPE OF(temp) <> TYPEOF(SELF. DefiningValues[1]))) = 0); WR23 ; NOT(EXISTS(DefinedValues)) OR (SIZEOF(QUERY(temp < * SELF. DefinedValues TYPE OF(temp) <> TYPEOF(SELF. DefinedValues[1]))) = 0); END_ENTITY </pre>
简单属性 (IfcSimpleProperty)	<pre> ENTITY IfcSimpleProperty ABSTRACT SUPERTYPE OF(ONEOF(IfcPropertyBoundedValue, IfcPropertyEnumeratedValue, IfcProp ertyListValue, IfcPropertyReferenceValue, IfcPropertySingleValue, IfcPropertyTableValue)) SUBTYPE OF IfcProperty; END_ENTITY </pre>

D. 16. 3 属性资源应采用属性名称唯一性函数，函数的 EXPRESS 描述应符合下列规定：

```

FUNCTION IfcUniquePropertyName
(Properties : SET [1:?] OF IfcProperty)
;BOOLEAN; LOCAL tmp : GENERIC; END_LOCAL; RETURN(tmp);
END_FUNCTION
                    
```


D.17 数量资源

D.17.1 数量资源实体的 EXPRESS 描述应按表 D.17.1 的规定采用。

表 D.17.1 数量资源实体的 EXPRESS 描述

实体	EXPRESS 描述
复杂物理量 (IfcPhysicalComplexQuantity)	ENTITY IfcPhysicalComplexQuantity SUBTYPE OF IfcPhysicalQuantity; HasQuantities : SET [1;?] OF IfcPhysicalQuantity; Discrimination : IfcLabel; Quality : OPTIONAL IfcLabel; Usage : OPTIONAL IfcLabel; WHERE NoSelfReference : SIZEOF(QUERY(temp < * HasQuantities SELF, =, temp)) = 0; UniqueQuantityNames : IfcUniqueQuantityNames(HasQuantities); END_ENTITY
物理量 (IfcPhysicalQuantity)	ENTITY IfcPhysicalQuantity ABSTRACT SUPERTYPE OF(ONEOF(IfcPhysicalComplexQuantity, IfcPhysicalSimpleQuantity)); Name : IfcLabel; Description : OPTIONAL IfcText; INVERSE HasExternalReferences : SET OF IfcExternalReferenceRelationship FOR RelatedResourceObjects; PartOfComplex : SET [0;1] OF IfcPhysicalComplexQuantity FOR HasQuantities; END_ENTITY
简单物理量 (IfcPhysicalSimpleQuantity)	ENTITY IfcPhysicalSimpleQuantity ABSTRACT SUPERTYPE OF(ONEOF(IfcQuantityArea, IfcQuantityCount, IfcQuantityLength, IfcQuantityTime, IfcQuantityVolume, IfcQuantityWeight)); SUBTYPE OF IfcPhysicalQuantity; Unit : OPTIONAL IfcNamedUnit; END_ENTITY
面积数量 (IfcQuantityArea)	ENTITY IfcQuantityArea SUBTYPE OF IfcPhysicalSimpleQuantity; AreaValue : IfcAreaMeasure; Formula : OPTIONAL IfcLabel; WHERE WR21 : NOT(EXISTS(SELF\IfcPhysicalSimpleQuantity. Unit)) OR (SELF\IfcPhysicalSimpleQuantity. Unit. UnitType = IfcUnitEnum. AREAUNIT); WR22 : AreaValue >= 0. ; END_ENTITY
计数 (IfcQuantityCount)	ENTITY IfcQuantityCount SUBTYPE OF IfcPhysicalSimpleQuantity; CountValue : IfcCountMeasure; Formula : OPTIONAL IfcLabel; WHERE WR21 : CountValue >= 0. ; END_ENTITY
长度数量 (IfcQuantityLength)	ENTITY IfcQuantityLength SUBTYPE OF IfcPhysicalSimpleQuantity; LengthValue : IfcLengthMeasure; Formula : OPTIONAL IfcLabel; WHERE WR21 : NOT(EXISTS(SELF\IfcPhysicalSimpleQuantity. Unit)) OR (SELF\IfcPhysicalSimpleQuantity. Unit. UnitType = IfcUnitEnum. LENGTHUNIT); WR22 : LengthValue >= 0. ; END_ENTITY

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实体	EXPRESS 描述
时间数量 (IfcQuantityTime)	ENTITY IfcQuantityTime SUBTYPE OF IfcPhysicalSimpleQuantity; TimeValue : IfcTimeMeasure; Formula : OPTIONAL IfcLabel; WHERE WR21 : NOT(EXISTS(SELF\IfcPhysicalSimpleQuantity. Unit)) OR (SELF\IfcPhysicalSimpleQuantity. Unit. UnitType = IfcUnitEnum. TIMEUNIT); WR22 : TimeValue >= 0. ; END_ENTITY
体积数量 (IfcQuantityVolume)	ENTITY IfcQuantityVolume SUBTYPE OF IfcPhysicalSimpleQuantity; VolumeValue : IfcVolumeMeasure; Formula : OPTIONAL IfcLabel; WHERE WR21 : NOT(EXISTS(SELF\IfcPhysicalSimpleQuantity. Unit)) OR (SELF\IfcPhysicalSimpleQuantity. Unit. UnitType = IfcUnitEnum. VOLUMEUNIT); WR22 : VolumeValue >= 0. ; END_ENTITY
重量数量 (IfcQuantityWeight)	ENTITY IfcQuantityWeight SUBTYPE OF IfcPhysicalSimpleQuantity; WeightValue : IfcMassMeasure; Formula : OPTIONAL IfcLabel; WHERE WR21 : NOT(EXISTS(SELF\IfcPhysicalSimpleQuantity. Unit)) OR (SELF\IfcPhysicalSimpleQuantity. Unit. UnitType = IfcUnitEnum. MASSUNIT); WR22 : WeightValue >= 0. ; END_ENTITY

D. 17. 2 数量资源应采用数量名称唯一性函数，函数的 EXPRESS 描述应符合下列规定：

```

FUNCTION IfcUniqueQuantityNames
  (Properties : SET [1: ?] OF IfcPhysicalQuantity)
  ; LOGICAL; LOCAL tmp : GENERIC; END_LOCAL; RETURN (tmp);
END_FUNCTION
    
```

D. 18 表 达 资 源

D. 18. 1 表达资源类型的 EXPRESS 描述应按表 D. 18. 1 的规定采用。

表 D. 18. 1 表达资源类型的 EXPRESS 描述

类型	EXPRESS 描述
几何投影枚举 (IfcGeometric ProjectionEnum)	TYPE IfcGeometricProjectionEnum = ENUMERATION OF (GRAPH_VIEW, SKETCH_VIEW, MODEL_VIEW, PLAN_VIEW, REFLECTED_PLAN_VIEW, SECTION_VIEW, ELEVATION_VIEW, USERDEFINED, NOTDEFINED); END_TYPE

续表 D. 18. 1

类型	EXPRESS 描述
全局局部枚举 (IfcGlobalOrLocalEnum)	TYPE IfcGlobalOrLocalEnum = ENUMERATION OF (GLOBAL_COORDS, LOCAL_COORDS); END_TYPE
坐标系引用选择 (IfcCoordinateReferenceSystemSelect)	TYPE IfcCoordinateReferenceSystemSelect = SELECT (IfcCoordinateReferenceSystem, IfcGeometricRepresentationContext); END_TYPE
产品表达选择 (IfcProductRepresentationSelect)	TYPE IfcProductRepresentationSelect = SELECT (IfcProductDefinitionShape, IfcRepresentationMap); END_TYPE

D. 18. 2 表达资源实体的 EXPRESS 描述应按表 D. 18. 2 的规定采用。

表 D. 18. 2 表达资源实体的 EXPRESS 描述

实体	EXPRESS 描述
坐标系转换 (IfcCoordinateOperation)	ENTITY IfcCoordinateOperation ABSTRACT SUPERTYPE OF (IfcMapConversion); SourceCRS ; IfcCoordinateReferenceSystemSelect; TargetCRS ; IfcCoordinateReferenceSystem; END_ENTITY
引用坐标系 (IfcCoordinateReferenceSystem)	ENTITY IfcCoordinateReferenceSystem ABSTRACT SUPERTYPE OF (IfcProjectedCRS); Name ; OPTIONAL IfcLabel; Description ; OPTIONAL IfcText; GeodeticDatum ; IfcIdentifier; VerticalDatum ; OPTIONAL IfcIdentifier; END_ENTITY
几何表达相关环境 (IfcGeometricRepresentationContext)	ENTITY IfcGeometricRepresentationContext SUPERTYPE OF (IfcGeometricRepresentationSubContext) SUBTYPE OF IfcRepresentationContext; CoordinateSpaceDimension ; IfcDimensionCount; Precision ; OPTIONAL REAL; WorldCoordinateSystem ; IfcAxis2Placement; TrueNorth ; OPTIONAL IfcDirection; INVERSE HasSubContexts : SET OF IfcGeometricRepresentationSubContext FOR ParentContext; WHERE WR11 ; NOT(EXISTS(TrueNorth)) OR (HIINDEX(TrueNorth.DirectionRatios) = 2); END_ENTITY
几何表达相关子环境 (IfcGeometricRepresentationSubContext)	ENTITY IfcGeometricRepresentationSubContext SUBTYPE OF IfcGeometricRepresentationContext; ParentContext ; IfcGeometricRepresentationContext; TargetScale ; OPTIONAL IfcPositiveRatioMeasure; TargetView ; IfcGeometricProjectionEnum; UserDefinedTargetView ; OPTIONAL IfcLabel; DERIVE SELF\IfcGeometricRepresentationContext.WorldCoordinateSystem ; IfcAxis2Placement ;= ParentContext. WorldCoordinateSystem; SELF\IfcGeometricRepresentationContext.CoordinateSpaceDimension ; IfcDimensionCount ;= ParentContext. CoordinateSpaceDimension; SELF\IfcGeometricRepresentationContext.TrueNorth ; IfcDirection ;= NVL(ParentContext.TrueNorth, IfcConvertDirectionInto2D (SELF\IfcGeometricRepresentationContext.WorldCoordinateSystem.P[2])); SELF\IfcGeometricRepresentationContext.Precision ; REAL ;= NVL(ParentContext.Precision,1.E-5); WHERE WR31 ; NOT('IFCREPRESENTATIONRESOURCE.IFCGEOMETRICREPRESENTATIONSUBCONTEXT' IN TYPEOF(ParentContext)); WR32 ; (TargetView <> IfcGeometricProjectionEnum.USERDEFINED) OR ((TargetView = IfcGeometricProjectionEnum. USERDEFINED) AND EXISTS(UserDefinedTargetView)); END_ENTITY

续表 D. 18. 2

实体	EXPRESS 描述
映射(地图)转换 (IfcMapConversion)	ENTITY IfcMapConversion SUBTYPE OF IfcCoordinateOperation; Eastings : IfcLengthMeasure; Northings : IfcLengthMeasure; OrthogonalHeight : IfcLengthMeasure; XAxisAbscissa : OPTIONAL IfcReal; XAxisOrdinate : OPTIONAL IfcReal; Scale : OPTIONAL IfcReal; END_ENTITY
材料定义表达 (IfcMaterialDefinitionRepresentation)	ENTITY IfcMaterialDefinitionRepresentation SUBTYPE OF IfcProductRepresentation; RepresentedMaterial : IfcMaterial; WHERE OnlyStyledRepresentations : SIZEOF(QUERY(temp < * Representations (NOT('IFCREPRESENTATIONRESOURCE. IFCSTYLEDREPRESENTATION' IN TYPEOF(temp)))))) = 0; END_ENTITY
产品定义形状 (IfcProductDefinitionShape)	ENTITY IfcProductDefinitionShape SUBTYPE OF IfcProductRepresentation; INVERSE ShapeOfProduct : SET [1;?] OF IfcProduct FOR Representation; HasShapeAspects : SET OF IfcShapeAspect FOR PartOfProductDefinitionShape; WHERE OnlyShapeModel : SIZEOF(QUERY(temp < * Representations (NOT('IFCREPRESENTATIONRESOURCE. IFCSHAPEMODEL' IN TYPEOF(temp)))))) = 0; END_ENTITY
产品表达 (IfcProductRepresentation)	ENTITY IfcProductRepresentation ABSTRACT SUPERTYPE OF(ONEOF(IfcMaterialDefinitionRepresentation, IfcProductDefinitionShape)); Name : OPTIONAL IfcLabel; Description : OPTIONAL IfcText; Representations : LIST [1;?] OF IfcRepresentation; END_ENTITY
投影坐标系 (IfcProjectedCRS)	ENTITY IfcProjectedCRS SUBTYPE OF IfcCoordinateReferenceSystem; MapProjection : OPTIONAL IfcIdentifier; MapZone : OPTIONAL IfcIdentifier; MapUnit : OPTIONAL IfcNamedUnit; WHERE WR11 : NOT(EXISTS(MapUnit)) OR (MapUnit.UnitType = IfcUnitEnum.LENGTHUNIT); END_ENTITY
表达 (IfcRepresentation)	ENTITY IfcRepresentation ABSTRACT SUPERTYPE OF(ONEOF(IfcShapeModel, IfcStyleModel)); ContextOfItems : IfcRepresentationContext; RepresentationIdentifier : OPTIONAL IfcLabel; RepresentationType : OPTIONAL IfcLabel; Items : SET [1;?] OF IfcRepresentationItem; INVERSE RepresentationMap : SET [0;1] OF IfcRepresentationMap FOR MappedRepresentation; LayerAssignments : SET OF IfcPresentationLayerAssignment FOR AssignedItems; OfProductRepresentation : SET OF IfcProductRepresentation FOR Representations; END_ENTITY
表达环境 (IfcRepresentationContext)	ENTITY IfcRepresentationContext ABSTRACT SUPERTYPE OF(IfcGeometricRepresentationContext); ContextIdentifier : OPTIONAL IfcLabel; ContextType : OPTIONAL IfcLabel; INVERSE RepresentationsInContext : SET OF IfcRepresentation FOR ContextOfItems; END_ENTITY

续表 D. 18. 2

实体	EXPRESS 描述
形状方面 (IfcShapeAspect)	ENTITY IfcShapeAspect; ShapeRepresentations : LIST [1:?] OF IfcShapeModel; Name : OPTIONAL IfcLabel; Description : OPTIONAL IfcText; ProductDefinitional : LOGICAL; PartOfProductDefinitionShape : OPTIONAL IfcProductRepresentationSelect; END_ENTITY
形状模型 (IfcShapeModel)	ENTITY IfcShapeModel ABSTRACT SUPERTYPE OF(ONEOF(IfcShapeRepresentation, IfcTopologyRepresentation)) SUBTYPE OF IfcRepresentation; INVERSE OfShapeAspect : SET [0:1] OF IfcShapeAspect FOR ShapeRepresentations; WHERE WR11 : (SIZEOF(SELF\IfcRepresentation.OfProductRepresentation) = 1) XOR (SIZEOF(SELF\IfcRepresentation.RepresentationMap) = 1) XOR (SIZEOF(OfShapeAspect) = 1); END_ENTITY
形状表达 (IfcShapeRepresentation)	ENTITY IfcShapeRepresentation SUBTYPE OF IfcShapeModel; WHERE WR21 : 'IFCREPRESENTATIONRESOURCE. IFCGEOMETRICREPRESENTATIONCONTEXT' IN TYPEOF(SELF\IfcRepresentation.ContextOfItems); WR22 : SIZEOF(QUERY(temp < * Items ('IFCTOPOLOGYRESOURCE. IFCTOPOLOGICALREPRESENTATIONITEM' IN TYPEOF(temp)) AND (NOT(SIZEOF(['IFCTOPOLOGYRESOURCE. IFCVERTEXPOINT', 'IFCTOPOLOGYRESOURCE. IFCEDGECURVE', 'IFCTOPOLOGYRESOURCE. IFCFACESURFACE'] * TYPEOF(temp)) = 1))) = 0; WR23 : EXISTS(SELF\IfcRepresentation.RepresentationType); WR24 : IfcShapeRepresentationTypes(SELF\IfcRepresentation.RepresentationType, SELF\IfcRepresentation.Items); END_ENTITY
样式表达 (IfcStyledRepresentation)	ENTITY IfcStyledRepresentation SUBTYPE OF IfcStyleModel; WHERE OnlyStyledItems : SIZEOF(QUERY(temp < * SELF\IfcRepresentation.Items (NOT('IFCPRESENTATIONAPPEARANCERESOURCE. IFCSTYLEDITEM' IN TYPEOF(temp)))) = 0; END_ENTITY
样式模型 (IfcStyleModel)	ENTITY IfcStyleModel ABSTRACT SUPERTYPE OF(IfcStyledRepresentation) SUBTYPE OF IfcRepresentation; END_ENTITY
拓扑表达 (IfcTopologyRepresentation)	ENTITY IfcTopologyRepresentation SUBTYPE OF IfcShapeModel; WHERE WR21 : SIZEOF(QUERY(temp < * SELF\IfcRepresentation.Items NOT('IFCTOPOLOGYRESOURCE. IFCTOPOLOGICALREPRESENTATIONITEM' IN TYPEOF(temp)))) = 0; WR22 : EXISTS(SELF\IfcRepresentation.RepresentationType); WR23 : IfcTopologyRepresentationTypes(SELF\IfcRepresentation.RepresentationType, SELF\IfcRepresentation.Items); END_ENTITY

D. 18. 3 表达资源函数的 EXPRESS 描述应按表 D. 18. 3 的规定采用。

表 D. 18.3 表达资源函数的 EXPRESS 描述

函数	EXPRESS 描述
转换方向至二维 (IfcConvertDirectionInto2D)	<pre> FUNCTION IfcConvertDirectionInto2D (Direction : IfcDirection) : IfcDirection; LOCAL Direction2D : IfcDirection := IfcRepresentationItem() IfcGeometricRepresentationItem() IfcDirection([0., 1.]); END_LOCAL; Direction2D.DirectionRatios[1] := Direction.DirectionRatios[1]; Direction2D.DirectionRatios[2] := Direction.DirectionRatios[2]; RETURN (Direction2D); END_FUNCTION </pre>
同轴 2 方位 (IfcSameAxis2Placement)	<pre> FUNCTION IfcSameAxis2Placement (ap1, ap2 : IfcAxis2Placement; Epsilon : REAL) : LOGICAL; RETURN (IfcSameDirection(ap1.P[1], ap2.P[1], Epsilon) AND IfcSameDirection(ap1.P[2], ap2.P[2], Epsilon) AND IfcSameCartesianPoint(ap1.Location, ap2.Location, Epsilon)); END_FUNCTION </pre>
同笛卡尔点 (IfcSameCartesianPoint)	<pre> FUNCTION IfcSameCartesianPoint (cp1, cp2 : IfcCartesianPoint; Epsilon : REAL) : LOGICAL; LOCAL cp1x : REAL := cp1.Coordinates[1]; cp1y : REAL := cp1.Coordinates[2]; cp1z : REAL := 0; cp2x : REAL := cp2.Coordinates[1]; cp2y : REAL := cp2.Coordinates[2]; cp2z : REAL := 0; END_LOCAL; IF (SIZEOF(cp1.Coordinates) > 2) THEN cp1z := cp1.Coordinates[3]; END_IF; IF (SIZEOF(cp2.Coordinates) > 2) THEN cp2z := cp2.Coordinates[3]; END_IF; RETURN (IfcSameValue(cp1x, cp2x, Epsilon) AND IfcSameValue(cp1y, cp2y, Epsilon) AND IfcSameValue(cp1z, cp2z, Epsilon)); END_FUNCTION </pre>
同方向 (IfcSameDirection)	<pre> FUNCTION IfcSameDirection (dir1, dir2 : IfcDirection; Epsilon : REAL) : LOGICAL; LOCAL dir1x : REAL := dir1.DirectionRatios[1]; dir1y : REAL := dir1.DirectionRatios[2]; dir1z : REAL := 0; dir2x : REAL := dir2.DirectionRatios[1]; dir2y : REAL := dir2.DirectionRatios[2]; dir2z : REAL := 0; END_LOCAL; IF (SIZEOF(dir1.DirectionRatios) > 2) THEN dir1z := dir1.DirectionRatios[3]; END_IF; IF (SIZEOF(dir2.DirectionRatios) > 2) THEN dir2z := dir2.DirectionRatios[3]; END_IF; RETURN (IfcSameValue(dir1x, dir2x, Epsilon) AND IfcSameValue(dir1y, dir2y, Epsilon) AND IfcSameValue(dir1z, dir2z, Epsilon)); END_FUNCTION </pre>

续表 D. 18. 3

函数	EXPRESS 描述
<p>同有效精度 (IfcSameValidPrecision)</p>	<pre> FUNCTION IfcSameValidPrecision (Epsilon1, Epsilon2 : REAL) : LOGICAL ; LOCAL ValidEps1, ValidEps2 : REAL; DefaultEps : REAL := 0.000001; DerivationOfEps : REAL := 1.001; UpperEps : REAL := 1.0; END_LOCAL; ValidEps1 := NVL(Epsilon1, DefaultEps); ValidEps2 := NVL(Epsilon2, DefaultEps); RETURN ((0.0 < ValidEps1) AND (ValidEps1 <= (DerivationOfEps * ValidEps2)) AND (ValidEps2 <= (DerivationOfEps * ValidEps1)) AND (ValidEps2 < UpperEps)); END_FUNCTION </pre>
<p>同值 (IfcSameValue)</p>	<pre> FUNCTION IfcSameValue (Value1, Value2 : REAL; Epsilon : REAL) : LOGICAL; LOCAL ValidEps : REAL; DefaultEps : REAL := 0.000001; END_LOCAL; ValidEps := NVL(Epsilon, DefaultEps); RETURN ((Value1 + ValidEps > Value2) AND (Value1 < Value2 + ValidEps)); END_FUNCTION </pre>
<p>形状表达类型 (IfcShapeRepresentationTypes)</p>	<pre> FUNCTION IfcShapeRepresentationTypes (RepType : IfcLabel; Items : SET OF IfcRepresentationItem) : LOGICAL; LOCAL Count : INTEGER := 0; END_LOCAL; CASE RepType OF 'Point' : BEGIN Count := SIZEOF(QUERY(temp < * Items ('IFCGEOMETRYRESOURCE. IFCPPOINT' IN TYPEOF(temp)))); END; 'PointCloud' : BEGIN Count := SIZEOF(QUERY(temp < * Items ('IFCGEOMETRYRESOURCE. IFCCARTESIAN POINTLIST3D' IN TYPEOF(temp)))); END; 'Curve' : BEGIN Count := SIZEOF(QUERY(temp < * Items ('IFCGEOMETRYRESOURCE. IFCCURVE' IN TYPEOF(temp)))); END; 'Curve2D' : BEGIN Count := SIZEOF(QUERY(temp < * Items ('IFCGEOMETRYRESOURCE. IFCCURVE' IN TYPEOF(temp)) AND (temp\IfcCurve. Dim = 2))); END; 'Curve3D' : BEGIN Count := SIZEOF(QUERY(temp < * Items ('IFCGEOMETRYRESOURCE. IFCCURVE' IN TYPEOF(temp)) AND (temp\IfcCurve. Dim = 3))); END; 'Surface' : BEGIN Count := SIZEOF(QUERY(temp < * Items ('IFCGEOMETRYRESOURCE. IFCSURFACE' IN TYPEOF(temp)))); END; END_CASE; RETURN (Count > 0); END_FUNCTION </pre>

续表 D. 18. 3

函数	EXPRESS 描述
形状表达类型 (IfcShapeRepresentationTypes)	<pre> END; 'Surface2D' : BEGIN Count := SIZEOF(QUERY(temp < * Items ('IFCGEOMETRYRESOURCE. IFCSURFACE' IN TYPEOF(temp)) AND (temp\IfcSurface. Dim = 2))); END; 'Surface3D' : BEGIN Count := SIZEOF(QUERY(temp < * Items ('IFCGEOMETRYRESOURCE. IFCSURFACE' IN TYPEOF(temp)) AND (temp\IfcSurface. Dim = 3))); END; 'FillArea' : BEGIN Count := SIZEOF(QUERY(temp < * Items ('IFCGEOMETRYRESOURCE. IFCANNOTATIO NFILLAREA' IN TYPEOF(temp)))); END; 'Text' : BEGIN Count := SIZEOF(QUERY(temp < * Items ('IFCGEOMETRYRESOURCE. IFCTEXTLITER AL' IN TYPEOF(temp)))); END; 'AdvancedSurface' : BEGIN Count := SIZEOF(QUERY(temp < * Items ('IFCGEOMETRYRESOURCE. IFCBSPLINESUR FACE' IN TYPEOF(temp)))); END; 'Annotation2D' : BEGIN Count := SIZEOF(QUERY(temp < * Items (SIZEOF(TYPEOF(temp) * ['IFCGEOMETRYRESOURCE. IFCPOINT', 'IFCGEOMETRYRESOURCE. IFCCURVE', 'IFCGEOMETRICMODELRESOURCE. IFCGEOMETRICCURVESET', 'IFCPRESENTATIONDEFINITIONRESOURCE. IFCANNOTATIONFILLAREA', 'IFCPRESENTATIONDEFINITIONRESOURCE. IFCTEXTLITERAL']) = 1))); END; 'GeometricSet' : BEGIN Count := SIZEOF(QUERY(temp < * Items ('IFCGEOMETRICMODELRESOURCE. IFCGEO METRICSET' IN TYPEOF(temp)) OR ('IFCGEOMETRYRESOURCE. IFCPOINT' IN TYPEOF(temp)) OR ('IFCGEOMETRYRESOURCE. IFCCURVE' IN TYPEOF(temp)) OR ('IFCGEOMETRYRESOURCE. IFCSURFACE' IN TYPEOF(temp)))); END; 'GeometricCurveSet' : BEGIN Count := SIZEOF(QUERY(temp < * Items ('IFCGEOMETRICMODELRESOURCE. IFCGEO METRICCURVESET' IN TYPEOF(temp)) OR ('IFCGEOMETRICMODELRESOURCE. IFCGEOMETRICSET' IN TYPEOF(temp)) OR ('IFCGEOMETRYRESOURCE. IFCPOINT' IN TYPEOF(temp)) OR ('IFCGEOMETRYRESOURCE. IFCCURVE' IN TYPEOF(temp)))); REPEAT i:=1 TO HIINDEX(Items); IF ('IFCGEOMETRYRESOURCE. IFCGEOMETRICSET' IN TYPEOF(Items[i])) THEN IF (SIZEOF(QUERY(temp < * Items[i]\IfcGeometricSet. Elements 'IFCGEOMETRYRES OURCE. IFCSURFACE' IN TYPEOF(temp))) > 0) </pre>

续表 D. 18. 3

函数	EXPRESS 描述
形状表达类型 (IfcShapeRepresentationTypes)	<pre> THEN Count := Count - 1; END_IF; END_IF; END_REPEAT; END; 'Tessellation': BEGIN Count := SIZEOF(QUERY(temp < * Items 'IFCGEOMETRICMODELRESOURCE. IFCTESSELLATEDITEM' IN TYPEOF(temp))); END; 'SurfaceOrSolidModel': BEGIN Count := SIZEOF(QUERY(temp < * Items SIZEOF(['IFCGEOMETRICMODELRESOURCE. IFCTESSELLATEDITEM', 'IFCGEOMETRICMODELRESOURCE. IFCHELLBASEDSURFACEMODEL', 'IFCGEOMETRICMODELRESOURCE. IFCFACEBASEDSURFACEMODEL', 'IFCGEOMETRICMODELRESOURCE. IFC SOLIDMODEL'] * TYPEOF(temp)) >= 1)); END; 'SurfaceModel': BEGIN Count := SIZEOF(QUERY(temp < * Items SIZEOF(['IFCGEOMETRICMODELRESOURCE. IFCTESSELLATEDITEM', 'IFCGEOMETRICMODELRESOURCE. IFCHELLBASEDSURFACEMODEL', 'IFCGEOMETRICMODELRESOURCE. IFCFACEBASEDSURFACEMODEL'] * TYPEOF(temp)) >= 1)); END; 'SolidModel': BEGIN Count := SIZEOF(QUERY(temp < * Items ('IFCGEOMETRICMODELRESOURCE. IFC SOLIDMODEL' IN TYPEOF(temp)))); END; 'SweptSolid': BEGIN Count := SIZEOF(QUERY(temp < * Items (SIZEOF(['IFCGEOMETRICMODELRESOURCE. IFCEXTRUDEDAREASOLID', 'IFCGEOMETRICMODELRESOURCE. IFCREVOLVEDAREASOLID'] * TYPEOF(temp)) >= 1) AND (SIZEOF(['IFCGEOMETRICMODELRESOURCE. IFCEXTRUDEDAREASOLIDTAPERED', 'IFCGEOMETRICMODELRESOURCE. IFCREVOLVEDAREASOLIDTAPERED'] * TYPEOF(temp)) = 0))); END; 'AdvancedSweptSolid': BEGIN Count := SIZEOF(QUERY(temp < * Items SIZEOF(['IFCGEOMETRICMODELRESOURCE. IFC SWEPTAREASOLID', 'IFCGEOMETRICMODELRESOURCE. IFC SWEPTDISKSOLID'] * TYPEOF(temp)) >= 1)); END; 'CSG': BEGIN Count := SIZEOF(QUERY(temp < * Items SIZEOF([</pre>

续表 D. 18. 3

函数	EXPRESS 描述
形状表达类型 (IfcShapeRepresentationTypes)	<pre> 'IFCGEOMETRICMODELRESOURCE. IFCBOOLEANRESULT', 'IFCGEOMETRICMODELRESOURCE. IFCCSGPRIMITIVE3D', 'IFCGEOMETRICMODELRESOURCE. IFCCSGSOLID'] * TYPEOF(temp)) >= 1)); END; 'Clipping' : BEGIN Count := SIZEOF(QUERY(temp < * Items ('IFCGEOMETRICMODELRESOURCE. IFCBOO LEANCLIPPINGRESULT' IN TYPEOF(temp)))); END; 'Brep' : BEGIN Count := SIZEOF(QUERY(temp < * Items ('IFCGEOMETRICMODELRESOURCE. IFCFAC ETEDBREP' IN TYPEOF(temp)))); END; 'AdvancedBrep' : BEGIN Count := SIZEOF(QUERY(temp < * Items ('IFCGEOMETRICMODELRESOURCE. IFCMA NIFOLDSOLIDBREP' IN TYPEOF(temp)))); END; 'BoundingBox' : BEGIN Count := SIZEOF(QUERY(temp < * Items ('IFCGEOMETRICMODELRESOURCE. IFCBOU NDINGBOX' IN TYPEOF(temp)))); IF (SIZEOF(Items) > 1) THEN Count := 0; END_IF; END; 'SectionedSpine' : BEGIN Count := SIZEOF(QUERY(temp < * Items ('IFCGEOMETRICMODELRESOURCE. IFCSEC TIONEDSPINE' IN TYPEOF(temp)))); END; 'LightSource' : BEGIN Count := SIZEOF(QUERY(temp < * Items ('IFCPRESENTATIONORGANIZATIONRESOU RCE. IFCLIGHTSOURCE' IN TYPEOF(temp)))); END; 'MappedRepresentation' : BEGIN Count := SIZEOF(QUERY(temp < * Items ('IFCGEOMETRYRESOURCE. IFCMAPPEDITE M' IN TYPEOF(temp)))); END; OTHERWISE : RETURN(?); END_CASE; RETURN (Count = SIZEOF(Items)); END_FUNCTION </pre>
拓扑表达类型 (IfcTopologyRepresentationTypes)	<pre> FUNCTION IfcTopologyRepresentationTypes (RepType : IfcLabel; Items : SET OF IfcRepresentationItem) : LOGICAL; LOCAL Count : INTEGER := 0; END_LOCAL; CASE RepType OF 'Vertex' : BEGIN </pre>

续表 D. 18. 3

函数	EXPRESS 描述
拓扑表达类型 (IfcTopologyRepresentationTypes)	<pre> Count := SIZEOF(QUERY(temp < * Items ('IFCTOPOLOGYRESOURCE. IFCVERTEX' IN TYPEOF(temp)))); END; 'Edge': BEGIN Count := SIZEOF(QUERY(temp < * Items ('IFCTOPOLOGYRESOURCE. IFCEDGE' IN TYPEOF(temp)))); END; 'Path': BEGIN Count := SIZEOF(QUERY(temp < * Items ('IFCTOPOLOGYRESOURCE. IFCPATH' IN TYPEOF(temp)))); END; 'Face': BEGIN Count := SIZEOF(QUERY(temp < * Items ('IFCTOPOLOGYRESOURCE. IFCFACE' IN TYPEOF(temp)))); END; 'Shell': BEGIN Count := SIZEOF(QUERY(temp < * Items ('IFCTOPOLOGYRESOURCE. IFCOPENSHELL' IN TYPEOF(temp)) OR('IFCTOPOLOGYRESOURCE. IFCCLOSEDSHELL' IN TYPEOF(temp)))); END; 'Undefined': RETURN(TRUE); OTHERWISE : RETURN(?); END_CASE; RETURN (Count = SIZEOF(Items)); END_FUNCTION </pre>

D. 19 结构荷载资源

D. 19. 1 结构荷载资源类型的 EXPRESS 描述应按表 D. 19. 1 的规定采用。

表 D. 19. 1 结构荷载资源类型的 EXPRESS 描述

类型	EXPRESS 描述
地基反应转动模量选择 (IfcModulusOfRotationalSubgradeReactionSelect)	<pre> TYPE IfcModulusOfRotationalSubgradeReactionSelect = SELECT (IfcBoolean, IfcModulusOfRotationalSubgradeReactionMeasure); END_TYPE </pre>
地基反应模量选择 (IfcModulusOfSubgradeReactionSelect)	<pre> TYPE IfcModulusOfSubgradeReactionSelect = SELECT (IfcBoolean, IfcModulusOfSubgradeReactionMeasure); END_TYPE </pre>
地基反应剪切模量选择 (IfcModulusOfTranslationalSubgradeReactionSelect)	<pre> TYPE IfcModulusOfTranslationalSubgradeReactionSelect = SELECT (IfcBoolean, IfcModulusOfLinearSubgradeReactionMeasure); END_TYPE </pre>
转动刚度选择 (IfcRotationalStiffnessSelect)	<pre> TYPE IfcRotationalStiffnessSelect = SELECT (IfcBoolean, IfcRotationalStiffnessMeasure); END_TYPE </pre>

续表 D. 19. 1

类型	EXPRESS 描述
剪切刚度选择 (IfcTranslationalStiffnessSelect)	TYPE IfcTranslationalStiffnessSelect = SELECT (IfcBoolean, IfcLinearStiffnessMeasure); END_TYPE
弯曲刚度选择 (IfcWarpingStiffnessSelect)	TYPE IfcWarpingStiffnessSelect = SELECT (IfcBoolean, IfcWarpingMomentMeasure); END_TYPE

D. 19. 2 结构荷载资源实体的 EXPRESS 描述应按表 D. 19. 2 的规定采用。

表 D. 19. 2 结构荷载资源实体的 EXPRESS 描述

实体	EXPRESS 描述
边界条件 (IfcBoundaryCondition)	ENTITY IfcBoundaryCondition ABSTRACT SUPERTYPE OF (ONEOF(IfcBoundaryEdgeCondition, IfcBoundaryFaceCondition, IfcBoundaryNodeCondition)); Name : OPTIONAL IfcLabel; END_ENTITY
线边界条件 (IfcBoundaryEdgeCondition)	ENTITY IfcBoundaryEdgeCondition SUBTYPE OF IfcBoundaryCondition; TranslationalStiffnessByLengthX : OPTIONAL IfcModulusOfTranslationalSubgradeReactionSelect; TranslationalStiffnessByLengthY : OPTIONAL IfcModulusOfTranslationalSubgradeReactionSelect; TranslationalStiffnessByLengthZ : OPTIONAL IfcModulusOfTranslationalSubgradeReactionSelect; RotationalStiffnessByLengthX : OPTIONAL IfcModulusOfRotationalSubgradeReactionSelect; RotationalStiffnessByLengthY : OPTIONAL IfcModulusOfRotationalSubgradeReactionSelect; RotationalStiffnessByLengthZ : OPTIONAL IfcModulusOfRotationalSubgradeReactionSelect; END_ENTITY
面边界条件 (IfcBoundaryFaceCondition)	ENTITY IfcBoundaryFaceCondition SUBTYPE OF IfcBoundaryCondition; TranslationalStiffnessByAreaX : OPTIONAL IfcModulusOfSubgradeReactionSelect; TranslationalStiffnessByAreaY : OPTIONAL IfcModulusOfSubgradeReactionSelect; TranslationalStiffnessByAreaZ : OPTIONAL IfcModulusOfSubgradeReactionSelect; END_ENTITY
点边界条件 (IfcBoundaryNodeCondition)	ENTITY IfcBoundaryNodeCondition SUPERTYPE OF (IfcBoundaryNodeConditionWarping) SUBTYPE OF IfcBoundaryCondition; TranslationalStiffnessX : OPTIONAL IfcTranslationalStiffnessSelect; TranslationalStiffnessY : OPTIONAL IfcTranslationalStiffnessSelect; TranslationalStiffnessZ : OPTIONAL IfcTranslationalStiffnessSelect; RotationalStiffnessX : OPTIONAL IfcRotationalStiffnessSelect; RotationalStiffnessY : OPTIONAL IfcRotationalStiffnessSelect; RotationalStiffnessZ : OPTIONAL IfcRotationalStiffnessSelect; END_ENTITY
点边界条件弯曲 (IfcBoundaryNodeConditionWarping)	ENTITY IfcBoundaryNodeConditionWarping SUBTYPE OF IfcBoundaryNodeCondition; WarpingStiffness : OPTIONAL IfcWarpingStiffnessSelect; END_ENTITY
失效连接条件 (IfcFailureConnectionCondition)	ENTITY IfcFailureConnectionCondition SUBTYPE OF IfcStructuralConnectionCondition; TensionFailureX : OPTIONAL IfcForceMeasure; TensionFailureY : OPTIONAL IfcForceMeasure; TensionFailureZ : OPTIONAL IfcForceMeasure; CompressionFailureX : OPTIONAL IfcForceMeasure; CompressionFailureY : OPTIONAL IfcForceMeasure; CompressionFailureZ : OPTIONAL IfcForceMeasure; END_ENTITY

续表 D.19.2

实体	EXPRESS 描述
滑移连接条件 (IfcSlippageConnectionCondition)	ENTITY IfcSlippageConnectionCondition SUBTYPE OF IfcStructuralConnectionCondition; SlippageX : OPTIONAL IfcLengthMeasure; SlippageY : OPTIONAL IfcLengthMeasure; SlippageZ : OPTIONAL IfcLengthMeasure; END_ENTITY
结构连接条件 (IfcStructuralConnectionCondition)	ENTITY IfcStructuralConnectionCondition ABSTRACT SUPERTYPE OF (ONEOF (IfcFailureConnectionCondition, IfcSlippageConnectionCondition)); Name : OPTIONAL IfcLabel; END_ENTITY
结构荷载 (IfcStructuralLoad)	ENTITY IfcStructuralLoad ABSTRACT SUPERTYPE OF (ONEOF (IfcStructuralLoadConfiguration, IfcStructuralLoadOrResult)); Name : OPTIONAL IfcLabel; END_ENTITY
结构荷载配置 (IfcStructuralLoadConfiguration)	ENTITY IfcStructuralLoadConfiguration SUBTYPE OF IfcStructuralLoad; Values : LIST [1: ?] OF IfcStructuralLoadOrResult; Locations : OPTIONAL LIST [1: ?] OF UNIQUE LIST [1: 2] OF IfcLengthMeasure; WHERE ValidListSize : NOT EXISTS (Locations) OR (SIZEOF (Locations) = SIZEOF (Values)); END_ENTITY
线性荷载力 (IfcStructuralLoadLinearForce)	ENTITY IfcStructuralLoadLinearForce SUBTYPE OF IfcStructuralLoadStatic; LinearForceX : OPTIONAL IfcLinearForceMeasure; LinearForceY : OPTIONAL IfcLinearForceMeasure; LinearForceZ : OPTIONAL IfcLinearForceMeasure; LinearMomentX : OPTIONAL IfcLinearMomentMeasure; LinearMomentY : OPTIONAL IfcLinearMomentMeasure; LinearMomentZ : OPTIONAL IfcLinearMomentMeasure; END_ENTITY
结构荷载或结果 (IfcStructuralLoadOrResult)	ENTITY IfcStructuralLoadOrResult ABSTRACT SUPERTYPE OF (ONEOF (IfcStructuralLoadStatic, IfcSurfaceReinforcementArea)); SUBTYPE OF IfcStructuralLoad; END_ENTITY
结构平面荷载力 (IfcStructuralLoadPlanarForce)	ENTITY IfcStructuralLoadPlanarForce SUBTYPE OF IfcStructuralLoadStatic; PlanarForceX : OPTIONAL IfcPlanarForceMeasure; PlanarForceY : OPTIONAL IfcPlanarForceMeasure; PlanarForceZ : OPTIONAL IfcPlanarForceMeasure; END_ENTITY
结构荷载单一位移 (IfcStructuralLoadSingleDisplacement)	ENTITY IfcStructuralLoadSingleDisplacement SUPERTYPE OF (IfcStructuralLoadSingleDisplacementDistortion) SUBTYPE OF IfcStructuralLoadStatic; DisplacementX : OPTIONAL IfcLengthMeasure; DisplacementY : OPTIONAL IfcLengthMeasure; DisplacementZ : OPTIONAL IfcLengthMeasure; RotationalDisplacementRX : OPTIONAL IfcPlaneAngleMeasure; RotationalDisplacementRY : OPTIONAL IfcPlaneAngleMeasure; RotationalDisplacementRZ : OPTIONAL IfcPlaneAngleMeasure; END_ENTITY
结构荷载位移畸变 (IfcStructuralLoadSingleDisplacementDistortion)	ENTITY IfcStructuralLoadSingleDisplacementDistortion SUBTYPE OF IfcStructuralLoadSingleDisplacement; Distortion : OPTIONAL IfcCurvatureMeasure; END_ENTITY

续表 D. 19. 2

实体	EXPRESS 描述
结构荷载单力 (IfcStructuralLoadSingleForce)	<pre> ENTITY IfcStructuralLoadSingleForce SUPERTYPE OF (IfcStructuralLoadSingleForceWarping) SUBTYPE OF IfcStructuralLoadStatic; ForceX : OPTIONAL IfcForceMeasure; ForceY : OPTIONAL IfcForceMeasure; ForceZ : OPTIONAL IfcForceMeasure; MomentX : OPTIONAL IfcTorqueMeasure; MomentY : OPTIONAL IfcTorqueMeasure; MomentZ : OPTIONAL IfcTorqueMeasure; END_ENTITY </pre>
结构荷载单力翘曲 (IfcStructuralLoadSingleForceWarping)	<pre> ENTITY IfcStructuralLoadSingleForceWarping SUBTYPE OF IfcStructuralLoadSingleForce; WarpingMoment : OPTIONAL IfcWarpingMomentMeasure; END_ENTITY </pre>
结构静荷载 (IfcStructuralLoadStatic)	<pre> ENTITY IfcStructuralLoadStatic ABSTRACT SUPERTYPE OF (ONEOF (IfcStructuralLoadLinearForce, IfcStructuralLoadPlanarForce, IfcStructuralLoadSingleDisplacement, IfcStructuralLoadSingleForce, IfcStructuralLoadTemperature)) SUBTYPE OF IfcStructuralLoadOrResult; END_ENTITY </pre>
结构温度荷载 (IfcStructuralLoadTemperature)	<pre> ENTITY IfcStructuralLoadTemperature SUBTYPE OF IfcStructuralLoadStatic; DeltaTConstant : OPTIONAL IfcThermodynamicTemperatureMeasure; DeltaTY : OPTIONAL IfcThermodynamicTemperatureMeasure; DeltaTZ : OPTIONAL IfcThermodynamicTemperatureMeasure; END_ENTITY </pre>
表面增强区 (IfcSurfaceReinforcementArea)	<pre> ENTITY IfcSurfaceReinforcementArea SUBTYPE OF IfcStructuralLoadOrResult; SurfaceReinforcement1 : OPTIONAL LIST [2;3] OF IfcLengthMeasure; SurfaceReinforcement2 : OPTIONAL LIST [2;3] OF IfcLengthMeasure; ShearReinforcement : OPTIONAL IfcRatioMeasure; WHERE SurfaceAndOrShearAreaSpecified : EXISTS (SurfaceReinforcement1) OR EXISTS (SurfaceReinforcement2) OR EXISTS (ShearReinforcement); NonnegativeArea1 : (NOT EXISTS (SurfaceReinforcement1)) OR ((SurfaceReinforcement1[1] >= 0.) AND (SurfaceReinforcement1[2] >= 0.) AND ((SIZEOF (SurfaceReinforcement1) = 1) OR (SurfaceReinforcement1[1] >= 0.))); NonnegativeArea2 : (NOT EXISTS (SurfaceReinforcement2)) OR ((SurfaceReinforcement2[1] >= 0.) AND (SurfaceReinforcement2[2] >= 0.) AND ((SIZEOF (SurfaceReinforcement2) = 1) OR (SurfaceReinforcement2[1] >= 0.))); NonnegativeArea3 : (NOT EXISTS (ShearReinforcement)) OR (ShearReinforcement >= 0.); END_ENTITY </pre>

D. 20 拓 扑 资 源

D. 20. 1 拓扑资源应采用壳类型的 EXPRESS 描述，并应符合下列规定。

```

TYPE IfcShell = SELECT (
    IfcClosedShell,
    IfcOpenShell);
END_TYPE
                    
```

D. 20. 2 拓扑资源实体的 EXPRESS 描述应按表 D. 20. 2 的规定采用。

表 D. 20.2 拓扑资源实体的 EXPRESS 描述

实体	EXPRESS 描述
高级面 (IfcAdvancedFace)	<pre> ENTITY IfcAdvancedFace SUBTYPE OF IfcFaceSurface; WHERE ApplicableSurface : SIZEOF (['IFCGEOMETRYRESOURCE. IFCELEMENTARYSURFACE', 'IFCGEOME TRYRESOURCE. IFCSWEPTSURFACE', 'IFCGEOMETRYRESOURCE. IFCBSPLINESURFACE'] * TYP EOF (SELF\IfcFaceSurface. FaceSurface)) = 1; RequiresEdgeCurve : SIZEOF (QUERY (ElpFbnds < * QUERY (Bnds < * SELF\IfcFace. Bounds 'IFCT OPOLOGYRESOURCE. IFCEDEGLOOP' IN TYPEOF (Bnds. Bound)) NOT (SIZEOF (QUERY (Oe < * ElpFbnds. Bound\IfcEdgeLoop. EdgeList NOT ('IFCTOPOLOGYRESOURCE. IFCEDEGLOOP' IN TYPE OF (Oe\IfcOrientedEdge. EdgeElement)))) = 0))) = 0; ApplicableEdgeCurves : SIZEOF (QUERY (ElpFbnds < * QUERY (Bnds < * SELF\IfcFace. Bounds 'IF CTOPOLOGYRESOURCE. IFCEDEGLOOP' IN TYPEOF (Bnds. Bound)) NOT (SIZEOF (QUERY (Oe < * ElpFbnds. Bound\IfcEdgeLoop. EdgeList NOT (SIZEOF (['IFCGEOMETRYRESOURCE. IFCLINE', IFCGEOMETRYRESOURCE. IFCCONIC', 'IFCGEOMETRYRESOURCE. IFCPOLYLINE', 'IFCGEOMETR YRESOURCE. IFCBSPLINECURVE'] * TYPEOF (Oe\IfcOrientedEdge. EdgeElement\IfcEdgeCurve. Edge Geometry)) = 1))) = 0))) = 0; END_ENTITY </pre>
封闭壳 (IfcClosedShell)	<pre> ENTITY IfcClosedShell SUBTYPE OF IfcConnectedFaceSet; END_ENTITY </pre>
连通面集 (IfcConnectedFaceSet)	<pre> ENTITY IfcConnectedFaceSet SUPERTYPE OF (ONEOF (IfcClosedShell, IfcOpenShell)) SUBTYPE OF IfcTopologicalRepresentationItem; CfsFaces : SET [1: ?] OF IfcFace; END_ENTITY </pre>
边 (IfcEdge)	<pre> ENTITY IfcEdge SUPERTYPE OF (ONEOF (IfcEdgeCurve, IfcOrientedEdge, IfcSubedge)) SUBTYPE OF IfcTopologicalRepresentationItem; EdgeStart : IfcVertex; EdgeEnd : IfcVertex; END_ENTITY </pre>
边曲线 (IfcEdgeCurve)	<pre> ENTITY IfcEdgeCurve SUBTYPE OF IfcEdge; EdgeGeometry : IfcCurve; SameSense : BOOLEAN; END_ENTITY </pre>
边环 (IfcEdgeLoop)	<pre> ENTITY IfcEdgeLoop SUBTYPE OF IfcLoop; EdgeList : LIST [1: ?] OF IfcOrientedEdge; DERIVE Ne : INTEGER := SIZEOF (EdgeList); WHERE IsClosed : (EdgeList[1].EdgeStart) := (EdgeList[Ne].EdgeEnd); IsContinuous : IfcLoopHeadToTail (SELF); END_ENTITY </pre>
面 (IfcFace)	<pre> ENTITY IfcFace SUPERTYPE OF (IfcFaceSurface) SUBTYPE OF IfcTopologicalRepresentationItem; Bounds : SET [1: ?] OF IfcFaceBound; INVERSE HasTextureMaps : SET [0: ?] OF IfcTextureMap FOR MappedTo; WHERE HasOuterBound : SIZEOF (QUERY (temp < * Bounds 'IFCTOPOLOGYRESOURCE. IFCFACEOUTER BOUND' IN TYPEOF (temp))) <= 1; END_ENTITY </pre>

续表 D. 20. 2

实体	EXPRESS 描述
面边界 (IfcFaceBound)	ENTITY IfcFaceBound SUPERTYPE OF(IfcFaceOuterBound) SUBTYPE OF IfcTopologicalRepresentationItem; Bound ; IfcLoop; Orientation ; BOOLEAN; END_ENTITY
面外边界 (IfcFaceOuterBound)	ENTITY IfcFaceOuterBound SUBTYPE OF IfcFaceBound; END_ENTITY
面曲面 (IfcFaceSurface)	ENTITY IfcFaceSurface SUPERTYPE OF(IfcAdvancedFace) SUBTYPE OF IfcFace; FaceSurface ; IfcSurface; SameSense ; BOOLEAN; END_ENTITY
环(IfcLoop)	ENTITY IfcLoop SUPERTYPE OF(ONEOF(IfcEdgeLoop, IfcPolyLoop, IfcVertexLoop)) SUBTYPE OF IfcTopologicalRepresentationItem; END_ENTITY
开敞壳 (IfcOpenShell)	ENTITY IfcOpenShell SUBTYPE OF IfcConnectedFaceSet; END_ENTITY
有向边 (IfcOrientedEdge)	ENTITY IfcOrientedEdge SUBTYPE OF IfcEdge; EdgeElement ; IfcEdge; Orientation ; BOOLEAN; DERIVE SELF\IfcEdge, EdgeStart ; IfcVertex := IfcBooleanChoose (Orientation, EdgeElement, EdgeStart, EdgeElement, EdgeEnd); SELF\IfcEdge, EdgeEnd ; IfcVertex := IfcBooleanChoose (Orientation, EdgeElement, EdgeEnd, EdgeElement, EdgeStart); WHERE EdgeElementNotOriented ; NOT('IFCTOPOLOGYRESOURCE.IFCORIENTEDEDGE' IN TYPEOF(EdgeElement)); END_ENTITY
路径(IfcPath)	ENTITY IfcPath SUBTYPE OF IfcTopologicalRepresentationItem; EdgeList ; LIST [1:?] OF UNIQUE IfcOrientedEdge; WHERE IsContinuous ; IfcPathHeadToTail(SELF); END_ENTITY
多边环(IfcPolyLoop)	ENTITY IfcPolyLoop SUBTYPE OF IfcLoop; Polygon ; LIST [3:?] OF UNIQUE IfcCartesianPoint; WHERE AllPointsSameDim ; SIZEOF(QUERY(Temp < * Polygon Temp. Dim <> Polygon[1]. Dim)) = 0; END_ENTITY
子边(IfcSubedge)	ENTITY IfcSubedge SUBTYPE OF IfcEdge; ParentEdge ; IfcEdge; END_ENTITY
拓扑表达项 (IfcTopologicalRepresentationItem)	ENTITY IfcTopologicalRepresentationItem ABSTRACT SUPERTYPE OF(ONEOF(IfcConnectedFaceSet, IfcEdge, IfcFace, IfcFaceBound, IfcLoop, IfcPath, IfcVertex)) SUBTYPE OF IfcRepresentationItem; END_ENTITY

续表 D. 20. 2

实体	EXPRESS 描述
顶点 (IfcVertex)	ENTITY IfcVertex SUPERTYPE OF (IfcVertexPoint) SUBTYPE OF IfcTopologicalRepresentationItem; END_ENTITY
顶点环 (IfcVertexLoop)	ENTITY IfcVertexLoop SUBTYPE OF IfcLoop; LoopVertex : IfcVertex; END_ENTITY
顶点点 (IfcVertexPoint)	ENTITY IfcVertexPoint SUBTYPE OF IfcVertex; VertexGeometry : IfcPoint; END_ENTITY

D. 20. 3 拓扑资源函数的 EXPRESS 描述应按表 D. 20. 3 的规定采用。

表 D. 20. 3 拓扑资源函数的 EXPRESS 描述

函数	EXPRESS 描述
布尔选择 (IfcBooleanChoose)	FUNCTION IfcBooleanChoose (B : BOOLEAN ; Choice1, Choice2 : Generic : Item) : Generic : Item; IF B THEN RETURN (Choice1); ELSE RETURN (Choice2); END_IF; END_FUNCTION
环首尾 (IfcLoopHeadToTail)	FUNCTION IfcLoopHeadToTail (ALoop : IfcEdgeLoop) : LOGICAL; LOCAL N : INTEGER; P : LOGICAL := TRUE; END_LOCAL; N := SIZEOF (ALoop. EdgeList); REPEAT i := 2 TO N; P := P AND (ALoop. EdgeList[i-1]. EdgeEnd := ALoop. EdgeList[i]. EdgeStart); END_REPEAT; RETURN (P); END_FUNCTION
路径首尾 (IfcPathHeadToTail)	FUNCTION IfcPathHeadToTail (APath : IfcPath) : LOGICAL; LOCAL N : INTEGER := 0; P : LOGICAL := UNKNOWN; END_LOCAL; N := SIZEOF (APath. EdgeList); REPEAT i := 2 TO N; P := P AND (APath. EdgeList[i-1]. EdgeEnd := APath. EdgeList[i]. EdgeStart); END_REPEAT; RETURN (P); END_FUNCTION

D. 21 工 具 资 源

D. 21. 1 工具资源类型的 EXPRESS 描述应按表 D. 21. 1 的规定采用。

表 D. 21. 1 工具资源类型的 EXPRESS 描述

类型	EXPRESS 描述
全球唯一标识 (IfcGloballyUniqueId)	TYPE IfcGloballyUniqueId = STRING (22) FIXED; END_TYPE
变更操作枚举 (IfcChangeAction Enum)	TYPE IfcChangeActionEnum = ENUMERATION OF (NOCHANGE, MODIFIED, ADDED, DELETED, NOTDEFINED); END_TYPE
对象状态枚举 (IfcStateEnum)	TYPE IfcStateEnum = ENUMERATION OF (READWRITE, READONLY, LOCKED, READWRITELOCKED, READONLYLOCKED); END_TYPE

D. 21. 2 工具资源实体的 EXPRESS 描述应按表 D. 21. 2 的规定采用。

表 D. 21. 2 工具资源实体的 EXPRESS 描述

实体	EXPRESS 描述
应用程序 (IfcApplication)	ENTITY IfcApplication; ApplicationDeveloper : IfcOrganization; Version : IfcLabel; ApplicationFullName : IfcLabel; ApplicationIdentifier : IfcIdentifier; UNIQUE UR1 : ApplicationIdentifier; UR2 : ApplicationFullName, Version; END_ENTITY
归属历史 (IfcOwnerHistory)	ENTITY IfcOwnerHistory; OwningUser : IfcPersonAndOrganization; OwningApplication : IfcApplication; State : OPTIONAL IfcStateEnum; ChangeAction : OPTIONAL IfcChangeActionEnum; LastModifiedDate : OPTIONAL IfcTimeStamp; LastModifyingUser : OPTIONAL IfcPersonAndOrganization; LastModifyingApplication : OPTIONAL IfcApplication; CreationDate : IfcTimeStamp; WHERE CorrectChangeAction : (EXISTS(LastModifiedDate)) OR (NOT(EXISTS(LastModifiedDate)) AND NOT (EXISTS(ChangeAction))) OR (NOT(EXISTS(LastModifiedDate)) AND EXISTS(ChangeAction) AND ((ChangeAction = IfcChangeActionEnum. NOTDEFINED) OR (ChangeAction = IfcChangeActionEnum. N OCHANGE))); END_ENTITY

续表 D. 21. 2

实体	EXPRESS 描述
表格 (IfcTable)	<pre> ENTITY IfcTable; Name : OPTIONAL IfcLabel; Rows : OPTIONAL LIST [1;?] OF IfcTableRow; Columns : OPTIONAL LIST [1;?] OF IfcTableColumn; DERIVE NumberOfCellsInRow : INTEGER := HIINDEX(Rows[1]. RowCells); NumberOfHeadings : INTEGER := SIZEOF(QUERY(Temp < * Rows Temp. IsHeading)); NumberOfDataRows : INTEGER := SIZEOF(QUERY(Temp < * Rows NOT(Temp. IsHeading))); WHERE WR1 : SIZEOF(QUERY(Temp < * Rows HIINDEX(Temp. RowCells) <> HIINDEX(Rows[1]. Row Cells))) = 0; WR2 : { 0 <= NumberOfHeadings <= 1 }; END_ENTITY </pre>
表格列 (IfcTableColumn)	<pre> ENTITY IfcTableColumn; Identifier : OPTIONAL IfcIdentifier; Name : OPTIONAL IfcLabel; Description : OPTIONAL IfcText; Unit : OPTIONAL IfcUnit; ReferencePath : OPTIONAL IfcReference; END_ENTITY </pre>
表格行 (IfcTableRow)	<pre> ENTITY IfcTableRow; RowCells : OPTIONAL LIST [1;?] OF IfcValue; IsHeading : OPTIONAL BOOLEAN; INVERSE OfTable : IfcTable FOR Rows; END_ENTITY </pre>

附录 E 元数据数据模式

E.0.1 元数据的 EXPRESS 数据模式描述应符合下列规定：

```
( *  
  BIM file exchange meta-data EXPRESS schema  
* )
```

SCHEMA BIMHeader

```
TYPE FILEFORMAT = STRING;  
  WHERE  
  FILE_FORMAT: SELF IN ['XML', 'EXPRESS'];  
END_TYPE;
```

```
TYPE FILENUMBER = INTEGER;  
  WHERE  
  BE_POSITVIE: SELF >= 1;  
END_TYPE;
```

```
TYPE REFERENCENUMBER = INTEGER;  
  WHERE  
  NONE_NEGATIVE: SELF >= 0;  
END_TYPE;
```

```
ENTITY HeadInfo;  
  Author:STRING;  
  Version:STRING;
```

END_ENTITY ;

```
ENTITY ModelInfo;  
  FileType: FILEFORMAT;  
  FileCount: FILENUMBER;
```

END_ENTITY ;

```
ENTITY ReferenceInfo;  
  TextNumber: REFERENCENUMBER;  
  ImageNumber: REFERENCENUMBER;  
  AudioNumber: REFERENCENUMBER;  
  VideoNumber: REFERENCENUMBER;  
  OthersNumber: REFERENCENUMBER;  
  TotalRefNumber: REFERENCENUMBER;
```

END_ENTITY ;

END_SCHEMA

E.0.2 元数据的 XML 数据模式描述应符合下列规定：

```

<? xml version="1.0" encoding="UTF-8"? >
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
  targetNamespace="http://www.cabr.com.cn/define"
  elementFormDefault="qualified">

<xs:element name="BIMHeader" type=" FileExchangeInfo" abstract="false"/>

<xs:complexType name="FileExchangeInfo">
  <xs:sequence>
    <!-- FileExchange Infomation composed by three parts -->
    <xs:element name="HeadInfo" type=" HeadInfo"/>
    <xs:element name="ModelInfo" type=" ModelInfo"/>
    <xs:element name="ReferenceInfo" type=" ReferenceInfo"/>
  </xs:sequence>
</xs:complexType>

<xs:simpleType name="FileFormat">
  <!-- Can only be "XML" or "EXPRESS" -->
  <xs:restriction base="xs:string">
    <xs:enumeration value="XML"/>
    <xs:enumeration value="EXPRESS"/>
  </xs:restriction>
</xs:simpleType>

<xs:simpleType name="FileNumber">
  <xs:restriction base="xs:integer">
    <xs:minInclusive value="1"/>
  </xs:restriction>
</xs:simpleType>

<xs:simpleType name="ReferenceNumber">
  <xs:restriction base="xs:integer">
    <xs:minInclusive value="0"/>
  </xs:restriction>
</xs:simpleType>

<xs:complexType name="HeadInfo">
  <xs:sequence>
    <!-- Record the head has been extended or not -->
    <xs:element name="Author" type="xs:string"/>
    <xs:element name="Version" type="xs:string"/>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="ModelInfo">

```

```
<xs:sequence>
  <! -- Record there are how many model files -->
  <xs:element name="FileType" type=" FileFormat"/>
  <xs:element name="FileCount" type=" FileNumber"/>
</xs:sequence>
</xs:complexType>

<xs:complexType name="ReferenceInfo">
  <xs:sequence>
    <! -- Record how many reference files -->
    <xs:element name="TextNumber" type=" ReferenceNumber"/>
    <xs:element name="ImageNumber" type=" ReferenceNumber"/>
    <xs:element name="AudioNumber" type=" ReferenceNumber"/>
    <xs:element name="VideoNumber" type=" ReferenceNumber"/>
    <xs:element name="OthersNumber" type=" ReferenceNumber"/>
    <xs:element name="TotalRefNumber" type=" ReferenceNumber "/>
  </xs:sequence>
</xs:complexType>

</xs:schema>
```

住房城乡建设部信息中心
浏览专用

本标准用词说明

- 1 为便于在执行本标准条文时区别对待，对于要求严格程度不同的用词说明如下：
 - 1) 表示很严格，非这样做不可的：
正面词采用“必须”；反面词采用“严禁”；
 - 2) 表示严格，在正常情况下均应这样做的：
正面词采用“应”；反面词采用“不应”或“不得”；
 - 3) 表示允许稍有选择，在条件许可时首先应这样做的：
正面词采用“宜”；反面词采用“不宜”；
 - 4) 表示有选择，在一定条件下可以这样做的，采用“可”。
- 2 条文中指明应按其他有关标准执行的写法为：“应符合……的规定”或“应按……执行”。