

续表 C. 6. 2

实体	EXPRESS 描述
太阳能装置 (IfcSolarDevice)	<pre> ENTITY IfcSolarDevice SUBTYPE OF IfcEnergyConversionDevice; PredefinedType : OPTIONAL IfcSolarDeviceTypeEnum; WHERE CorrectPredefinedType : NOT(EXISTS(PredefinedType)) OR (PredefinedType &lt;&gt; IfcSolarDeviceType Enum. USERDEFINED) OR ((PredefinedType = IfcSolarDeviceTypeEnum. USERDEFINED) AND EXISTS (SELF\IfcObject. ObjectType)); CorrectTypeAssigned : (SIZEOF(IsTypedBy) = 0) OR ('IFCELECTRICDOMAIN. IFCSOLARDEVICETYPE' IN TYPEOF(SELF\IfcObject. IsTypedBy[1]. RelatingType)); END_ENTITY                     </pre>
太阳能装置类型 (IfcSolarDeviceType)	<pre> ENTITY IfcSolarDeviceType SUBTYPE OF IfcEnergyConversionDeviceType; PredefinedType : IfcSolarDeviceTypeEnum; WHERE CorrectPredefinedType : (PredefinedType &lt;&gt; IfcSolarDeviceTypeEnum. USERDEFINED) OR ((PredefinedType = IfcSolarDeviceTypeEnum. USERDEFINED) AND EXISTS(SELF\IfcElement Type. ElementType)); END_ENTITY                     </pre>
开关装置 (IfcSwitchingDevice)	<pre> ENTITY IfcSwitchingDevice SUBTYPE OF IfcFlowController; PredefinedType : OPTIONAL IfcSwitchingDeviceTypeEnum; WHERE CorrectPredefinedType : NOT(EXISTS(PredefinedType)) OR (PredefinedType &lt;&gt; IfcSwitchingDevice TypeEnum. USERDEFINED) OR ((PredefinedType = IfcSwitchingDeviceTypeEnum. USERDEFINED) AND EXISTS (SELF\IfcObject. ObjectType)); CorrectTypeAssigned : (SIZEOF(IsTypedBy) = 0) OR ('IFCELECTRICDOMAIN. IFCSWITCHINGDEVICETYPE' IN TYPEOF(SELF\IfcObject. IsTypedBy[1]. RelatingType)); END_ENTITY                     </pre>
开关装置类型 (IfcSwitchingDeviceType)	<pre> ENTITY IfcSwitchingDeviceType SUBTYPE OF IfcFlowControllerType; PredefinedType : IfcSwitchingDeviceTypeEnum; WHERE CorrectPredefinedType : (PredefinedType &lt;&gt; IfcSwitchingDeviceTypeEnum. USERDEFINED) OR ((PredefinedType = IfcSwitchingDeviceTypeEnum. USERDEFINED) AND EXISTS (SELF\IfcElementType. ElementType)); END_ENTITY                     </pre>
变压器 (IfcTransformer)	<pre> ENTITY IfcTransformer SUBTYPE OF IfcEnergyConversionDevice; PredefinedType : OPTIONAL IfcTransformerTypeEnum; WHERE CorrectPredefinedType : NOT(EXISTS(PredefinedType)) OR (PredefinedType &lt;&gt; IfcTransformerType Enum. USERDEFINED) OR ((PredefinedType = IfcTransformerTypeEnum. USERDEFINED) AND EXISTS (SELF\IfcObject. ObjectType)); CorrectTypeAssigned : (SIZEOF(IsTypedBy) = 0) OR ('IFCELECTRICDOMAIN. IFCTRANSFORMERTYPE' IN TYPEOF(SELF\IfcObject. IsTypedBy[1]. RelatingType)); END_ENTITY                     </pre>
变压器类型 (IfcTransformerType)	<pre> ENTITY IfcTransformerType SUBTYPE OF IfcEnergyConversionDeviceType; PredefinedType : IfcTransformerTypeEnum; WHERE CorrectPredefinedType : (PredefinedType &lt;&gt; IfcTransformerTypeEnum. USERDEFINED) OR ((Pre definedType = IfcTransformerTypeEnum. USERDEFINED) AND EXISTS(SELF\IfcElement Type. ElementType)); END_ENTITY                     </pre>

## C.7 建筑智能控制应用

C.7.1 建筑智能控制类型的 EXPRESS 描述应符合表 C.7.1 的规定。

表 C.7.1 建筑智能控制类型的 EXPRESS 描述

类型	EXPRESS 描述
执行器类型枚举 (IfcActuatorTypeEnum)	TYPE IfcActuatorTypeEnum = ENUMERATION OF ( ELECTRICACTUATOR, HANDOPERATEDACTUATOR, HYDRAULICACTUATOR, PNEUMATICACTUATOR, THERMOSTATICACTUATOR, USERDEFINED, NOTDEFINED); END_TYPE
报警器类型枚举 (IfcAlarmTypeEnum)	TYPE IfcAlarmTypeEnum = ENUMERATION OF ( BELL, BREAKGLASSBUTTON, LIGHT, MANUALPULLBOX, SIREN, WHISTLE, USERDEFINED, NOTDEFINED); END_TYPE
控制器类型枚举 (IfcControllerTypeEnum)	TYPE IfcControllerTypeEnum = ENUMERATION OF ( FLOATING, PROGRAMMABLE, PROPORTIONAL, MULTIPOSITION, TWOPOSITION, USERDEFINED, NOTDEFINED); END_TYPE
流量传感器类型枚举 (IfcFlowInstrument TypeEnum)	TYPE IfcFlowInstrumentTypeEnum = ENUMERATION OF ( PRESSUREGAUGE, THERMOMETER, AMMETER, FREQUENCYMETER, POWERFACTORMETER, PHASEANGLEMETER, VOLTMETER_PEAK, VOLTMETER_RMS, USERDEFINED, NOTDEFINED); END_TYPE
传感器类型枚举 (IfcSensorTypeEnum)	TYPE IfcSensorTypeEnum = ENUMERATION OF ( CONDUCTANCESENSOR, CONTACTSENSOR, FIRESSENSOR, FLOWSSENSOR, GASENSOR, HEATSENSOR, HUMIDITYSENSOR, IONCONCENTRATIONSSENSOR, LEVELSENSOR, LIGHTSENSOR, MOISTURESENSOR,

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类型	EXPRESS 描述
传感器类型枚举 (IfcSensorTypeEnum)	MOVEMENTSENSOR, PHSENSOR, PRESSURESENSOR, RADIATIONSENSOR, RADIOACTIVITYSENSOR, SMOKESENSOR, SOUNDSSENSOR, TEMPERATURESENSOR, WINDSENSOR, USERDEFINED, NOTDEFINED); END_TYPE
同一控制元件 类型枚举 (IfcUnitaryControl ElementTypeEnum)	TYPE IfcUnitaryControlElementTypeEnum = ENUMERATION OF ( ALARMPANEL, CONTROLPANEL, GASDETECTIONPANEL, INDICATORPANEL, MIMICPANEL, HUMIDISTAT, THERMOSTAT, WEATHERSTATION, USERDEFINED, NOTDEFINED); END_TYPE

C. 7. 2 建筑智能控制实体的 EXPRESS 描述应符合表 C. 7. 2 的规定。

表 C. 7. 2 建筑智能控制实体的 EXPRESS 描述

实体	EXPRESS 描述
执行器 (IfcActuator)	ENTITY IfcActuator SUBTYPE OF IfcDistributionControlElement; PredefinedType : OPTIONAL IfcActuatorTypeEnum; WHERE CorrectPredefinedType : NOT(EXISTS(PredefinedType)) OR (PredefinedType <> IfcActuatorType Enum. USERDEFINED) OR ((PredefinedType = IfcActuatorTypeEnum. USERDEFINED) AND EXISTS (SELF\IfcObject. ObjectType)); CorrectTypeAssigned : (SIZEOF(IsTypedBy) = 0) OR ('IFCBUILDINGCONTROLSDOMAIN. IFCACTUATORATYPE' IN TYPEOF(SELF\IfcObject. IsTypedBy[1]. RelatingType)); END_ENTITY
执行器类型 (IfcActuatorType)	ENTITY IfcActuatorType SUBTYPE OF IfcDistributionControlElementType; PredefinedType : IfcActuatorTypeEnum; WHERE CorrectPredefinedType : (PredefinedType <> IfcActuatorTypeEnum. USERDEFINED) OR ((Predefined Type = IfcActuatorTypeEnum. USERDEFINED) AND EXISTS(SELF\IfcElementType. ElementType)); END_ENTITY
报警器 (IfcAlarm)	ENTITY IfcAlarm SUBTYPE OF IfcDistributionControlElement; PredefinedType : OPTIONAL IfcAlarmTypeEnum; WHERE CorrectPredefinedType : NOT(EXISTS(PredefinedType)) OR (PredefinedType <> IfcAlarm TypeEnum. USERDEFINED) OR ((PredefinedType = IfcAlarmTypeEnum. USERDEFINED) AND EXISTS (SELF\IfcObject. ObjectType)); CorrectTypeAssigned : (SIZEOF(IsTypedBy) = 0) OR ('IFCBUILDINGCONTROLSDOMA IN. IFICALARMTATYPE' IN TYPEOF(SELF\IfcObject. IsTypedBy[1]. RelatingType)); END_ENTITY

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实体	EXPRESS 描述
报警器类型 (IfcAlarmType)	ENTITY IfcAlarmType SUBTYPE OF IfcDistributionControlElementType; PredefinedType : IfcAlarmTypeEnum; WHERE CorrectPredefinedType : (PredefinedType <> IfcAlarmTypeEnum. USERDEFINED) OR ((PredefinedType = IfcAlarmTypeEnum. USERDEFINED) AND EXISTS(SELF\IfcElementType. ElementType)); END_ENTITY
控制器 (IfcController)	ENTITY IfcController SUBTYPE OF IfcDistributionControlElement; PredefinedType : OPTIONAL IfcControllerTypeEnum; WHERE CorrectPredefinedType : NOT(EXISTS(PredefinedType)) OR (PredefinedType <> IfcControllerTypeEnum. USERDEFINED) OR ((PredefinedType = IfcControllerTypeEnum. USERDEFINED) AND EXISTS (SELF\IfcObject. ObjectType)); CorrectTypeAssigned : (SIZEOF(IsTypedBy) = 0) OR ('IFCBUILDINGCONTROLSDOMAIN. IFCCONTROLLERTYPE' IN TYPEOF(SELF\IfcObject. IsTypedBy[1]. RelatingType)); END_ENTITY
控制器类型 (IfcControllerType)	ENTITY IfcControllerType SUBTYPE OF IfcDistributionControlElementType; PredefinedType : IfcControllerTypeEnum; WHERE CorrectPredefinedType : (PredefinedType <> IfcControllerTypeEnum. USERDEFINED) OR ((PredefinedType = IfcControllerTypeEnum. USERDEFINED) AND EXISTS(SELF\IfcElementType. ElementType)); END_ENTITY
流量传感器 (IfcFlowInstrument)	ENTITY IfcFlowInstrument SUBTYPE OF IfcDistributionControlElement; PredefinedType : OPTIONAL IfcFlowInstrumentTypeEnum; WHERE CorrectPredefinedType : NOT(EXISTS(PredefinedType)) OR (PredefinedType <> IfcFlowInstrumentTypeEnum. USERDEFINED) OR ((PredefinedType = IfcFlowInstrumentTypeEnum. USERDEFINED) AND EXISTS (SELF\IfcObject. ObjectType)); CorrectTypeAssigned : (SIZEOF(IsTypedBy) = 0) OR ('IFCBUILDINGCONTROLSDOMAIN. IFCFLOWINSTRUMENTTYPE' IN TYPEOF(SELF\IfcObject. IsTypedBy[1]. RelatingType)); END_ENTITY
流量传感器类型 (IfcFlowInstrumentType)	ENTITY IfcFlowInstrumentType SUBTYPE OF IfcDistributionControlElementType; PredefinedType : IfcFlowInstrumentTypeEnum; WHERE CorrectPredefinedType : (PredefinedType <> IfcFlowInstrumentTypeEnum. USERDEFINED) OR ((PredefinedType = IfcFlowInstrumentTypeEnum. USERDEFINED) AND EXISTS(SELF\IfcElementType. ElementType)); END_ENTITY
传感器 (IfcSensor)	ENTITY IfcSensor SUBTYPE OF IfcDistributionControlElement; PredefinedType : OPTIONAL IfcSensorTypeEnum; WHERE CorrectPredefinedType : NOT(EXISTS(PredefinedType)) OR (PredefinedType <> IfcSensorTypeEnum. USERDEFINED) OR ((PredefinedType = IfcSensorTypeEnum. USERDEFINED) AND EXISTS (SELF\IfcObject. ObjectType)); CorrectTypeAssigned : (SIZEOF(IsTypedBy) = 0) OR ('IFCBUILDINGCONTROLSDOMAIN. IFCSENSORTYPE' IN TYPEOF(SELF\IfcObject. IsTypedBy[1]. RelatingType)); END_ENTITY

续表 C.7.2

实体	EXPRESS 描述
传感器类型 (IfcSensorType)	ENTITY IfcSensorType SUBTYPE OF IfcDistributionControlElementType; PredefinedType : IfcSensorTypeEnum; WHERE CorrectPredefinedType : (PredefinedType <> IfcSensorTypeEnum. USERDEFINED) OR ((PredefinedType = IfcSensorTypeEnum. USERDEFINED) AND EXISTS(SELF\IfcElementType. ElementType)); END_ENTITY
同一控制元件 (IfcUnitaryControlElement)	ENTITY IfcUnitaryControlElement SUBTYPE OF IfcDistributionControlElementType; PredefinedType : OPTIONAL IfcUnitaryControlElementTypeEnum; WHERE CorrectPredefinedType : NOT(EXISTS(PredefinedType)) OR (PredefinedType <> IfcUnitaryControlElementTypeEnum. USERDEFINED) OR ((PredefinedType = IfcUnitaryControlElementTypeEnum. USERDEFINED) AND EXISTS (SELF\IfcObject. ObjectType)); CorrectTypeAssigned : (SIZEOF(IsTypedBy) = 0) OR ('IFCBUILDINGCONTROLSDOMAIN.IFCUNITARYCONTROLELEMENTTYPE' IN TYPEOF(SELF\IfcObject. IsTypedBy[1]. RelatingType)); END_ENTITY
同一控制元件类型 (IfcUnitaryControlElementType)	ENTITY IfcUnitaryControlElementType SUBTYPE OF IfcDistributionControlElementType; PredefinedType : IfcUnitaryControlElementTypeEnum; WHERE CorrectPredefinedType : (PredefinedType <> IfcUnitaryControlElementTypeEnum. USERDEFINED) OR ((PredefinedType = IfcUnitaryControlElementTypeEnum. USERDEFINED) AND EXISTS(SELF\IfcElementType. ElementType)); END_ENTITY

## C.8 施工管理应用

C.8.1 施工管理类型的 EXPRESS 描述应符合表 C.8.1 的规定。

表 C.8.1 施工管理类型的 EXPRESS 描述

类型	EXPRESS 描述
建筑施工设备 资源类型 (IfcConstructionEquipmentResourceTypeEnum)	TYPE IfcConstructionEquipmentResourceTypeEnum = ENUMERATION OF ( DEMOLISHING, EARTHMOVING, ERECTING, HEATING, LIGHTING, PAVING, PUMPING, TRANSPORTING, USERDEFINED, NOTDEFINED); END_TYPE
建筑施工材料 资源类型 (IfcConstructionMaterialResourceTypeEnum)	TYPE IfcConstructionMaterialResourceTypeEnum = ENUMERATION OF ( AGGREGATES, CONCRETE, DRYWALL, FUEL, GYPSUM, MASONRY, METAL, PLASTIC, WOOD, NOTDEFINED, USERDEFINED); END_TYPE

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类型	EXPRESS 描述
建筑施工产品 资源类型 (IfcConstructionProduct ResourceTypeEnum)	TYPE IfcConstructionProductResourceTypeEnum = ENUMERATION OF ( ASSEMBLY, FORMWORK, USERDEFINED, NOTDEFINED); END_TYPE
团队资源类型 (IfcCrewResource TypeEnum)	TYPE IfcCrewResourceTypeEnum = ENUMERATION OF ( OFFICE, SITE, USERDEFINED, NOTDEFINED); END_TYPE
技术人员资源类型 (IfcLaborResource TypeEnum)	TYPE IfcLaborResourceTypeEnum = ENUMERATION OF ( ADMINISTRATION, CARPENTRY, CLEANING, CONCRETE, DRYWALL, ELECTRIC, FINISHING, FLOORING, GENERAL, HVAC, LANDSCAPING, MASONRY, PAINTING, PAVING, PLUMBING, ROOFING, SITEGRADING, STEELWORK, SURVEYING, USERDEFINED, NOTDEFINED); END_TYPE
分包资源类型 (IfcSubContract ResourceTypeEnum)	TYPE IfcSubContractResourceTypeEnum = ENUMERATION OF ( PURCHASE, WORK, USERDEFINED, NOTDEFINED); END_TYPE

C. 8. 2 施工管理实体的 EXPRESS 描述应符合表 C. 8. 2 的规定。

表 C. 8. 2 施工管理实体的 EXPRESS 描述

实体	EXPRESS 描述
建筑施工设备资源 (IfcConstruction EquipmentResource)	ENTITY IfcConstructionEquipmentResource SUBTYPE OF IfcConstructionResource; PredefinedType : OPTIONAL IfcConstructionEquipmentResourceTypeEnum; WHERE CorrectPredefinedType : NOT(EXISTS(PredefinedType)) OR (PredefinedType <> IfcConstructionEquip- mentResourceTypeEnum. USERDEFINED) OR ((PredefinedType = IfcConstructionEquipmentResource TypeEnum. USERDEFINED) AND EXISTS (SELF\IfcObject. ObjectType)); END_ENTITY

续表 C. 8. 2

实体	EXPRESS 描述
建筑施工设备 资源类型 (IfcConstruction Equipment ResourceType)	<pre> ENTITY IfcConstructionEquipmentResourceType SUBTYPE OF IfcConstructionResourceType; PredefinedType : IfcConstructionEquipmentResourceTypeEnum; WHERE CorrectPredefinedType : (PredefinedType &lt;&gt; IfcConstructionEquipmentResourceTypeEnum. USERDEFIN ED) OR ((PredefinedType = IfcConstructionEquipmentResourceTypeEnum. USERDEFINED) AND EXIS TS(SELF\IfcTypeResource. ResourceType)); END_ENTITY                     </pre>
建筑施工材料资源 (IfcConstruction MaterialResource)	<pre> ENTITY IfcConstructionMaterialResource SUBTYPE OF IfcConstructionResource; PredefinedType : OPTIONAL IfcConstructionMaterialResourceTypeEnum; WHERE CorrectPredefinedType : NOT(EXISTS(PredefinedType)) OR (PredefinedType &lt;&gt; IfcConstructionMater ialResourceTypeEnum. USERDEFINED) OR ((PredefinedType = IfcConstructionMaterialRe sourceTypeEnum. USERDEFINED) AND EXISTS (SELF\IfcObject. ObjectType)); END_ENTITY                     </pre>
建筑施工材料 资源类型 (IfcConstruction MaterialResourceType)	<pre> ENTITY IfcConstructionMaterialResourceType SUBTYPE OF IfcConstructionResourceType; PredefinedType : IfcConstructionMaterialResourceTypeEnum; WHERE CorrectPredefinedType : (PredefinedType &lt;&gt; IfcConstructionMaterialResourceTypeEnum. USERDEFINED) OR ((PredefinedType = IfcConstructionMaterialResourceTypeEnum. USERDEFINED) AND EXISTS(SELF\IfcTypeResource. ResourceType)); END_ENTITY                     </pre>
建筑施工产品资源 (IfcConstruction ProductResource)	<pre> ENTITY IfcConstructionProductResource SUBTYPE OF IfcConstructionResource; PredefinedType : OPTIONAL IfcConstructionProductResourceTypeEnum; WHERE CorrectPredefinedType : NOT(EXISTS(PredefinedType)) OR (PredefinedType &lt;&gt; IfcConstructionProduct ResourceTypeEnum. USERDEFINED) OR ((PredefinedType = IfcConstructionProductResourceTypeEnum. USERDEFINED) AND EXISTS (SELF\IfcObject. ObjectType)); END_ENTITY                     </pre>
建筑施工产品 资源类型 (IfcConstruction ProductResource Type)	<pre> ENTITY IfcConstructionProductResourceType SUBTYPE OF IfcConstructionResourceType; PredefinedType : IfcConstructionProductResourceTypeEnum; WHERE CorrectPredefinedType : (PredefinedType &lt;&gt; IfcConstructionProductResourceTypeEnum. USERDEFINED) OR ((PredefinedType = IfcConstructionProductResourceTypeEnum. USERDEFINED) AND EXISTS(SELF\IfcTypeResource. ResourceType)); END_ENTITY                     </pre>
建筑施工资源 (IfcConstruction Resource)	<pre> ENTITY IfcConstructionResource ABSTRACT SUPERTYPE OF(ONEOF(IfcConstructionEquipmentResource, IfcConstructionMaterial Resource, IfcConstructionProductResource, IfcCrewResource, IfcLaborResource, IfcSubContractResource)) SUBTYPE OF IfcResource; Usage : OPTIONAL IfcResourceTime; BaseCosts : OPTIONAL LIST [1:?] OF IfcAppliedValue; BaseQuantity : OPTIONAL IfcPhysicalQuantity; END_ENTITY                     </pre>
建筑施工资源类型 (IfcConstruction ResourceType)	<pre> ENTITY IfcConstructionResourceType ABSTRACT SUPERTYPE OF(ONEOF(IfcConstructionEquipmentResourceType, IfcConstructionMaterial ResourceType, IfcConstructionProductResourceType, IfcCrewResourceType, IfcLaborResourceType, Ifc SubContractResourceType)) SUBTYPE OF IfcTypeResource; BaseCosts : OPTIONAL LIST [1:?] OF IfcAppliedValue; BaseQuantity : OPTIONAL IfcPhysicalQuantity; END_ENTITY                     </pre>

续表 C. 8. 2

实体	EXPRESS 描述
<p>团队资源 (IfcCrewResource)</p>	<p>ENTITY IfcCrewResource SUBTYPE OF IfcConstructionResource; PredefinedType : OPTIONAL IfcCrewResourceTypeEnum; WHERE CorrectPredefinedType : NOT(EXISTS(PredefinedType)) OR (PredefinedType &lt;&gt; IfcCrewResourceTypeEnum. USERDEFINED) OR ((PredefinedType = IfcCrewResourceTypeEnum. USERDEFINED) AND EXISTS (SELF\IfcObject. ObjectType)); END_ENTITY</p>
<p>团队资源类型 (IfcCrewResourceType)</p>	<p>ENTITY IfcCrewResourceType SUBTYPE OF IfcConstructionResourceType; PredefinedType : IfcCrewResourceTypeEnum; WHERE CorrectPredefinedType : (PredefinedType &lt;&gt; IfcCrewResourceTypeEnum. USERDEFINED) OR ((PredefinedType = IfcCrewResourceTypeEnum. USERDEFINED) AND EXISTS(SELF\IfcTypeResource. ResourceType)); END_ENTITY</p>
<p>技术人员资源 (IfcLaborResource)</p>	<p>ENTITY IfcLaborResource SUBTYPE OF IfcConstructionResource; PredefinedType : OPTIONAL IfcLaborResourceTypeEnum; WHERE CorrectPredefinedType : NOT (EXISTS(PredefinedType)) OR (PredefinedType &lt;&gt; IfcLaborResourceTypeEnum. USERDEFINED) OR ((PredefinedType = IfcLaborResourceTypeEnum. USERDEFINED) AND EXISTS (SELF\IfcObject. ObjectType)); END_ENTITY</p>
<p>技术人员资源类型 (IfcLaborResourceType)</p>	<p>ENTITY IfcLaborResourceType SUBTYPE OF IfcConstructionResourceType; PredefinedType : IfcLaborResourceTypeEnum; WHERE CorrectPredefinedType : (PredefinedType &lt;&gt; IfcLaborResourceTypeEnum. USERDEFINED) OR ((PredefinedType = IfcLaborResourceTypeEnum. USERDEFINED) AND EXISTS(SELF\IfcTypeResource. ResourceType)); END_ENTITY</p>
<p>分包资源 (IfcSubContractResource)</p>	<p>ENTITY IfcSubContractResource SUBTYPE OF IfcConstructionResource; PredefinedType : OPTIONAL IfcSubContractResourceTypeEnum; WHERE CorrectPredefinedType : NOT(EXISTS(PredefinedType)) OR (PredefinedType &lt;&gt; IfcSubContractResourceTypeEnum. USERDEFINED) OR ((PredefinedType = IfcSubContractResourceTypeEnum. USERDEFINED) AND EXISTS (SELF\IfcObject. ObjectType)); END_ENTITY</p>
<p>分包资源类型 (IfcSubContractResourceType)</p>	<p>ENTITY IfcSubContractResourceType SUBTYPE OF IfcConstructionResourceType; PredefinedType : IfcSubContractResourceTypeEnum; WHERE CorrectPredefinedType : (PredefinedType &lt;&gt; IfcSubContractResourceTypeEnum. USERDEFINED) OR ((PredefinedType = IfcSubContractResourceTypeEnum. USERDEFINED) AND EXISTS(SELF\IfcTypeResource. ResourceType)); END_ENTITY</p>



## 附录 D 资源层数据模式的 EXPRESS 描述

### D.1 参与者资源

D.1.1 参与者资源类型的 EXPRESS 描述应符合表 D.1.1 的规定。

表 D.1.1 参与者资源类型的 EXPRESS 描述

类型	EXPRESS 描述
地址类型枚举 (IfcAddressTypeEnum)	<pre> TYPE IfcAddressTypeEnum = ENUMERATION OF (OFFICE, SITE, HOME, DISTRIBUTIONPOINT, USERDEFINED); END_TYPE                     </pre>
角色枚举 (IfcRoleEnum)	<pre> TYPE IfcRoleEnum = ENUMERATION OF (SUPPLIER, MANUFACTURER, CONTRACTOR, SUBCONTRACTOR, ARCHITECT, STRUCTURALENGINEER, COSTENGINEER, CLIENT, BUILDINGOWNER, BUILDINGOPERATOR, MECHANICALENGINEER, ELECTRICALENGINEER, PROJECTMANAGER, FACILITIESMANAGER, CIVILENGINEER, COMMISSIONINGENGINEER, ENGINEER, OWNER, CONSULTANT, CONSTRUCTIONMANAGER, FIELDCONSTRUCTIONMANAGER, RESELLER, USERDEFINED); END_TYPE                     </pre>
参与者选择 (IfcActorSelect)	<pre> TYPE IfcActorSelect = SELECT (IfcOrganization, IfcPerson, IfcPersonAndOrganization); END_TYPE                     </pre>

D. 1.2 参与者资源实体的 EXPRESS 描述应符合表 D. 1.2 的规定。

表 D. 1.2 参与者资源实体的 EXPRESS 描述

实体	EXPRESS 描述
参与者角色 (IfcActorRole)	ENTITY IfcActorRole; Role: IfcRoleEnum; UserDefinedRole: OPTIONAL IfcLabel; Description: OPTIONAL IfcText; WHERE WR1: (Role <> IfcRoleEnum.USERDEFINED) OR ((Role = IfcRoleEnum.USERDEFINED) AND EXISTS(SELF.UserDefinedRole)); END_ENTITY
组织 (IfcOrganization)	ENTITY IfcOrganization; Identification: OPTIONAL IfcIdentifier; Name: IfcLabel; Description: OPTIONAL IfcText; Roles: OPTIONAL LIST [1:?] OF IfcActorRole; Addresses: OPTIONAL LIST [1:?] OF IfcAddress; INVERSE IsRelatedBy: SET OF IfcOrganizationRelationship FOR RelatedOrganizations; Relates: SET OF IfcOrganizationRelationship FOR RelatingOrganization; Engages: SET OF IfcPersonAndOrganization FOR TheOrganization; END_ENTITY
组织关系 (IfcOrganization Relationship)	ENTITY IfcOrganizationRelationship; Name: IfcLabel; Description: OPTIONAL IfcText; RelatingOrganization: IfcOrganization; RelatedOrganizations: SET [1:?] OF IfcOrganization; END_ENTITY
人员 (IfcPerson)	ENTITY IfcPerson; Identification: OPTIONAL IfcIdentifier; FamilyName: OPTIONAL IfcLabel; GivenName: OPTIONAL IfcLabel; MiddleNames: OPTIONAL LIST [1:?] OF IfcLabel; PrefixTitles: OPTIONAL LIST [1:?] OF IfcLabel; SuffixTitles: OPTIONAL LIST [1:?] OF IfcLabel; Roles: OPTIONAL LIST [1:?] OF IfcActorRole; Addresses: OPTIONAL LIST [1:?] OF IfcAddress; INVERSE EngagedIn: SET OF IfcPersonAndOrganization FOR ThePerson; WHERE IdentifiablePerson; EXISTS(Identification) OR EXISTS(FamilyName) OR EXISTS(GivenName); ValidSetOfNames; NOT EXISTS(MiddleNames) OR EXISTS(FamilyName) OR EXISTS(GivenName); END_ENTITY
组织人员 (IfcPersonAnd Organization)	ENTITY IfcPersonAndOrganization; ThePerson: IfcPerson; TheOrganization: IfcOrganization; Roles: OPTIONAL LIST [1:?] OF IfcActorRole; END_ENTITY
地址 (IfcAddress)	ENTITY IfcAddress ABSTRACT SUPERTYPE OF (ONEOF(IfcPostalAddress, IfcTelecomAddress)); Purpose: OPTIONAL IfcAddressTypeEnum; Description: OPTIONAL IfcText; UserDefinedPurpose: OPTIONAL IfcLabel; INVERSE OfPerson: SET OF IfcPerson FOR Addresses; OfOrganization: SET OF IfcOrganization FOR Addresses; WHERE WR1: (NOT(EXISTS(Purpose))) OR ((Purpose <> IfcAddressTypeEnum.USERDEFINED) OR ((Purpose = IfcAddressTypeEnum.USERDEFINED) AND EXISTS(SELF.UserDefinedPurpose))); END_ENTITY

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实体	EXPRESS 描述
邮政地址 (IfcPostalAddress)	<pre> ENTITY IfcPostalAddress SUBTYPE OF(IfcAddress);     InternalLocation: OPTIONAL IfcLabel;     AddressLines: OPTIONAL LIST [1:?] OF IfcLabel;     PostalBox: OPTIONAL IfcLabel;     Town: OPTIONAL IfcLabel;     Region: OPTIONAL IfcLabel;     PostalCode: OPTIONAL IfcLabel;     Country: OPTIONAL IfcLabel; WHERE     WR1 : EXISTS (InternalLocation) OR         EXISTS (AddressLines) OR         EXISTS (PostalBox) OR         EXISTS (PostalCode) OR         EXISTS (Town) OR         EXISTS (Region) OR         EXISTS (Country); END_ENTITY                     </pre>
电信地址 (IfcTelecomAddress)	<pre> ENTITY IfcTelecomAddress SUBTYPE OF(IfcAddress);     TelephoneNumbers: OPTIONAL LIST [1:?] OF IfcLabel;     FacsimileNumbers: OPTIONAL LIST [1:?] OF IfcLabel;     PagerNumber: OPTIONAL IfcLabel;     ElectronicMailAddresses: OPTIONAL LIST [1:?] OF IfcLabel;     WWWHomePageURL: OPTIONAL IfcURIReference;     MessagingIDs: OPTIONAL LIST [1:?] OF IfcURIReference; WHERE     MinimumDataProvided: EXISTS (TelephoneNumbers) OR         EXISTS (PagerNumber) OR         EXISTS (FacsimileNumbers) OR         EXISTS (ElectronicMailAddresses) OR         EXISTS (WWWHomePageURL) OR         EXISTS (MessagingIDs); END_ENTITY                     </pre>

## D. 2 审批资源

D. 2. 1 审批资源实体的 EXPRESS 描述应符合表 D. 2. 1 的规定。

表 D. 2. 1 审批资源实体的 EXPRESS 描述

实体	EXPRESS 描述
审批 (IfcApproval)	<pre> ENTITY IfcApproval; Identifier: OPTIONAL IfcIdentifier; Name: OPTIONAL IfcLabel; Description: OPTIONAL IfcText; TimeOfApproval: OPTIONAL IfcDateTime; Status: OPTIONAL IfcLabel; Level: OPTIONAL IfcLabel; Qualifier: OPTIONAL IfcText; RequestingApproval: OPTIONAL IfcActorSelect; GivingApproval: OPTIONAL IfcActorSelect; INVERSE HasExternalReferences: SET OF IfcExternalReferenceRelationship FOR RelatedResourceObjects; ApprovedObjects: SET OF IfcRelAssociatesApproval FOR RelatingApproval; ApprovedResources: SET OF IfcResourceApprovalRelationship FOR RelatingApproval; IsRelatedWith: SET OF IfcApprovalRelationship FOR RelatedApprovals; Relates: SET OF IfcApprovalRelationship FOR RelatingApproval; WHERE HasIdentifierOrName: EXISTS (Identifier) OR EXISTS (Name); END_ENTITY                     </pre>

续表 D. 2. 1

实体	EXPRESS 描述
审批关联 (IfcApproval Relationship)	ENTITY IfcApprovalRelationship SUBTYPE OF IfcResourceLevelRelationship; RelatingApproval; IfcApproval; RelatedApprovals; SET [1: ?] OF IfcApproval; END_ENTITY
审批关联资源 (IfcResourceApproval Relationship)	ENTITY IfcResourceApprovalRelationship SUBTYPE OF IfcResourceLevelRelationship; RelatedResourceObjects; SET [1: ?] OF IfcResourceObjectSelect; RelatingApproval; IfcApproval; END_ENTITY

### D. 3 约束资源

D. 3. 1 约束资源类型的 EXPRESS 描述应符合表 D. 3. 1 的规定。

表 D. 3. 1 约束资源类型的 EXPRESS 描述

类型	EXPRESS 描述
基准枚举 (IfcBenchmark Enum)	TYPE IfcBenchmarkEnum = ENUMERATION OF ( GREATERTHAN, GREATERTHANOREQUALTO, LESSTHAN, LESSTHANOREQUALTO, EQUALTO, NOTEQUALTO, INCLUDES, NOTINCLUDES, INCLUDEDIN, NOTINCLUDEDIN); END_TYPE
约束枚举 (IfcConstraintEnum)	TYPE IfcConstraintEnum = ENUMERATION OF ( HARD, SOFT, ADVISORY, USERDEFINED, NOTDEFINED); END_TYPE
逻辑运算符枚举 (IfcLogicalOperator Enum)	TYPE IfcLogicalOperatorEnum = ENUMERATION OF ( LOGICALAND, LOGICALOR, LOGICALXOR, LOGICALNOTAND, LOGICALNOTOR); END_TYPE
目标枚举 (IfcObjectiveEnum)	TYPE IfcObjectiveEnum = ENUMERATION OF ( CODECOMPLIANCE, CODEWAIVER, DESIGNINTENT, EXTERNAL, HEALTHANDSAFETY, MERGECONFLICT, MODELVIEW, PARAMETER, REQUIREMENT, SPECIFICATION, TRIGGERCONDITION, USERDEFINED, NOTDEFINED); END_TYPE

续表 D. 3. 1

类型	EXPRESS 描述
度量值选择 (IfcMetricValue Select)	<pre> TYPE IfcMetricValueSelect = SELECT (   IfcMeasureWithUnit,   IfcTable,   IfcTimeSeries,   IfcAppliedValue,   IfcValue,   IfcReference); END_TYPE </pre>

D. 3. 2 约束资源实体的 EXPRESS 描述应符合表 D. 3. 2 的规定。

表 D. 3. 2 约束资源实体的 EXPRESS 描述

实体	EXPRESS 描述
约束 (IfcConstraint)	<pre> ENTITY IfcConstraint   ABSTRACT SUPERTYPE OF(ONEOF(IfcMetric, IfcObjective));   Name; IfcLabel;   Description; OPTIONAL IfcText;   ConstraintGrade; IfcConstraintEnum;   ConstraintSource; OPTIONAL IfcLabel;   CreatingActor; OPTIONAL IfcActorSelect;   CreationTime; OPTIONAL IfcDateTime;   UserDefinedGrade; OPTIONAL IfcLabel;   INVERSE   HasExternalReferences; SET OF IfcExternalReferenceRelationship FOR RelatedResourceObjects;   PropertiesForConstraint; SET OF IfcResourceConstraintRelationship FOR RelatingConstraint;   WHERE   WR11: (ConstraintGrade &lt;&gt; IfcConstraintEnum. USERDEFINED) OR ((ConstraintGrade = Ifc   ConstraintEnum. USERDEFINED) AND EXISTS(SELF\IfcConstraint. UserDefinedGrade)); END_ENTITY </pre>
度量 (IfcMetric)	<pre> ENTITY IfcMetric   SUBTYPE OF IfcConstraint;   Benchmark; IfcBenchmarkEnum;   ValueSource; OPTIONAL IfcLabel;   DataValue; IfcMetricValueSelect;   ReferencePath; OPTIONAL IfcReference; END_ENTITY </pre>
目标 (IfcObjective)	<pre> ENTITY IfcObjective   SUBTYPE OF IfcConstraint;   BenchmarkValues; OPTIONAL LIST [1; ?] OF IfcConstraint;   LogicalAggregator; OPTIONAL IfcLogicalOperatorEnum;   ObjectiveQualifier; IfcObjectiveEnum;   UserDefinedQualifier; OPTIONAL IfcLabel;   WHERE   WR21: (ObjectiveQualifier &lt;&gt; IfcObjectiveEnum. USERDEFINED) OR ((ObjectiveQualifier = IfcObj   ectiveEnum. USERDEFINED) AND EXISTS(SELF\IfcObjective. UserDefinedQualifier)); END_ENTITY </pre>
引用 (IfcReference)	<pre> ENTITY IfcReference;   TypeIdentifier; OPTIONAL IfcIdentifier;   AttributeIdentifier; OPTIONAL IfcIdentifier;   InstanceName; OPTIONAL IfcLabel;   ListPositions; OPTIONAL LIST [1; ?] OF INTEGER;   InnerReference; OPTIONAL IfcReference; END_ENTITY </pre>
约束关联资源 (IfcResourceConstraint Relationship)	<pre> ENTITY IfcResourceConstraintRelationship   SUBTYPE OF IfcResourceLevelRelationship;   RelatingConstraint; IfcConstraint;   RelatedResourceObjects; SET [1; ?] OF IfcResourceObjectSelect; END_ENTITY </pre>

## D.4 成本资源

D.4.1 成本资源类型的 EXPRESS 描述应按表 D.4.1 的规定采用。

表 D.4.1 成本资源类型的 EXPRESS 描述

类型	EXPRESS 描述
算术运算符枚举 (IfcArithmeticOperatorEnum)	TYPE IfcArithmeticOperatorEnum = ENUMERATION OF ( ADD, DIVIDE, MULTIPLY, SUBTRACT); END_TYPE
应用价值选择 (IfcAppliedValueSelect)	TYPE IfcAppliedValueSelect = SELECT ( IfcMeasureWithUnit, IfcValue, IfcReference); END_TYPE

D.4.2 成本资源实体的 EXPRESS 描述应按表 D.4.2 的规定采用。

表 D.4.2 成本资源实体的 EXPRESS 描述

实体	EXPRESS 描述
应用值 (IfcAppliedValue)	ENTITY IfcAppliedValue SUPERTYPE OF (IfcCostValue); Name : OPTIONAL IfcLabel; Description : OPTIONAL IfcText; AppliedValue : OPTIONAL IfcAppliedValueSelect; UnitBasis : OPTIONAL IfcMeasureWithUnit; ApplicableDate : OPTIONAL IfcDate; FixedUntilDate : OPTIONAL IfcDate; Category : OPTIONAL IfcLabel; Condition : OPTIONAL IfcLabel; ArithmeticOperator : OPTIONAL IfcArithmeticOperatorEnum; Components : OPTIONAL LIST [1:?] OF IfcAppliedValue; INVERSE HasExternalReference : SET OF IfcExternalReferenceRelationship FOR RelatedResourceObjects; END_ENTITY
成本值 (IfcCostValue)	ENTITY IfcCostValue SUBTYPE OF IfcAppliedValue; END_ENTITY
货币关系 (IfcCurrencyRelationship)	ENTITY IfcCurrencyRelationship SUBTYPE OF IfcResourceLevelRelationship; RelatingMonetaryUnit : IfcMonetaryUnit; RelatedMonetaryUnit : IfcMonetaryUnit; ExchangeRate : IfcPositiveRatioMeasure; RateDateTime : OPTIONAL IfcDateTime; RateSource : OPTIONAL IfcLibraryInformation; END_ENTITY

## D.5 日期时间资源

D.5.1 日期时间资源类型的 EXPRESS 描述应按表 D.5.1 的规定采用。

表 D.5.1 日期时间资源类型的 EXPRESS 描述

类型	EXPRESS 描述
日期 (IfcDate)	TYPE IfcDate = STRING; END_TYPE
日期时间 (IfcDateTime)	TYPE IfcDateTime = STRING; END_TYPE
月中日序数 (IfcDayInMonth Number)	TYPE IfcDayInMonthNumber = INTEGER; WHERE ValidRange : {1 <= SELF <= 31} END_TYPE
周中日序数 (IfcDayInWeekNumber)	TYPE IfcDayInWeekNumber = INTEGER; WHERE ValidRange : {1 <= SELF <= 7} END_TYPE
持续时间 (IfcDuration)	TYPE IfcDuration = STRING; END_TYPE
年中月序数 (IfcMonthIn YearNumber)	TYPE IfcMonthInYearNumber = INTEGER; WHERE ValidRange : {1 <= SELF <= 12} END_TYPE
时间 (IfcTime)	TYPE IfcTime = STRING; END_TYPE
时间戳 (IfcTimeStamp)	TYPE IfcTimeStamp = INTEGER; END_TYPE
数据源枚举 (IfcDataOriginEnum)	TYPE IfcDataOriginEnum = ENUMERATION OF ( MEASURED, PREDICTED, SIMULATED, USERDEFINED, NOTDEFINED); END_TYPE
循环类型枚举 (IfcRecurrence TypeEnum)	TYPE IfcRecurrenceTypeEnum = ENUMERATION OF ( DAILY, WEEKLY, MONTHLY_BY_DAY_OF_MONTH, MONTHLY_BY_POSITION, BY_DAY_COUNT, BY_WEEKDAY_COUNT, YEARLY_BY_DAY_OF_MONTH, YEARLY_BY_POSITION); END_TYPE
任务期限枚举 (IfcTaskDuration Enum)	TYPE IfcTaskDurationEnum = ENUMERATION OF ( ELAPSEDTIME, WORKTIME, NOTDEFINED); END_TYPE
时间序列类型枚举 (IfcTimeSeriesData TypeEnum)	TYPE IfcTimeSeriesDataTypeEnum = ENUMERATION OF ( CONTINUOUS, DISCRETE, DISCRETEBINARY, PIECEWISEBINARY, PIECEWISECONSTANT, PIECEWISECONTINUOUS, NOTDEFINED); END_TYPE

续表 D. 5. 1

类型	EXPRESS 描述
时间比例选择 (IfcTimeOrRatioSelect)	TYPE IfcTimeOrRatioSelect = SELECT ( IfcRatioMeasure, IfcDuration); END_TYPE

D. 5. 2 日期时间资源实体的 EXPRESS 描述应按表 D. 5. 2 的规定采用。

表 D. 5. 2 日期时间资源实体的 EXPRESS 描述

实体	EXPRESS 描述
事件时间 (IfcEventTime)	ENTITY IfcEventTime SUBTYPE OF IfcSchedulingTime; ActualDate : OPTIONAL IfcDateTime; EarlyDate : OPTIONAL IfcDateTime; LateDate : OPTIONAL IfcDateTime; ScheduleDate : OPTIONAL IfcDateTime; END_ENTITY
不规则时间序列 (IfcIrregularTimeSeries)	ENTITY IfcIrregularTimeSeries SUBTYPE OF IfcTimeSeries; Values : LIST [1:?] OF IfcIrregularTimeSeriesValue; END_ENTITY
时延 (IfcLagTime)	ENTITY IfcLagTime SUBTYPE OF IfcSchedulingTime; LagValue : IfcTimeOrRatioSelect; DurationType : IfcTaskDurationEnum; END_ENTITY
循环模式 (IfcRecurrencePattern)	ENTITY IfcRecurrencePattern; RecurrenceType : IfcRecurrenceTypeEnum; DayComponent : OPTIONAL SET [1:?] OF IfcDayInMonthNumber; WeekdayComponent : OPTIONAL SET [1:?] OF IfcDayInWeekNumber; MonthComponent : OPTIONAL SET [1:?] OF IfcMonthInYearNumber; Position : OPTIONAL IfcInteger; Interval : OPTIONAL IfcInteger; Occurrences : OPTIONAL IfcInteger; TimePeriods : OPTIONAL LIST [1:?] OF IfcTimePeriod; END_ENTITY
规则时间序列 (IfcRegularTimeSeries)	ENTITY IfcRegularTimeSeries SUBTYPE OF IfcTimeSeries; TimeStep : IfcTimeMeasure; Values : LIST [1:?] OF IfcTimeSeriesValue; END_ENTITY
资源时间 (IfcResourceTime)	ENTITY IfcResourceTime SUBTYPE OF IfcSchedulingTime; ScheduleWork : OPTIONAL IfcDuration; ScheduleUsage : OPTIONAL IfcPositiveRatioMeasure; ScheduleStart : OPTIONAL IfcDateTime; ScheduleFinish : OPTIONAL IfcDateTime; ScheduleContour : OPTIONAL IfcLabel; LevelingDelay : OPTIONAL IfcDuration; IsOverAllocated : OPTIONAL BOOLEAN; StatusTime : OPTIONAL IfcDateTime; ActualWork : OPTIONAL IfcDuration; ActualUsage : OPTIONAL IfcPositiveRatioMeasure; ActualStart : OPTIONAL IfcDateTime; ActualFinish : OPTIONAL IfcDateTime; RemainingWork : OPTIONAL IfcDuration; RemainingUsage : OPTIONAL IfcPositiveRatioMeasure; Completion : OPTIONAL IfcPositiveRatioMeasure; END_ENTITY



续表 D.5.2

实体	EXPRESS 描述
<p>计划时间 (IfcSchedulingTime)</p>	<p>ENTITY IfcSchedulingTime ABSTRACT SUPERTYPE OF (ONEOF (IfcEventTime, IfcLagTime, IfcResourceTime, IfcTaskTime, IfcWorkTime)); Name : OPTIONAL IfcLabel; DataOrigin : OPTIONAL IfcDataOriginEnum; UserDefinedDataOrigin : OPTIONAL IfcLabel; END_ENTITY</p>
<p>任务时间 (IfcTaskTime)</p>	<p>ENTITY IfcTaskTime SUPERTYPE OF (IfcTaskTimeRecurring) SUBTYPE OF IfcSchedulingTime; DurationType : OPTIONAL IfcTaskDurationEnum; ScheduleDuration : OPTIONAL IfcDuration; ScheduleStart : OPTIONAL IfcDateTime; ScheduleFinish : OPTIONAL IfcDateTime; EarlyStart : OPTIONAL IfcDateTime; EarlyFinish : OPTIONAL IfcDateTime; LateStart : OPTIONAL IfcDateTime; LateFinish : OPTIONAL IfcDateTime; FreeFloat : OPTIONAL IfcDuration; TotalFloat : OPTIONAL IfcDuration; IsCritical : OPTIONAL BOOLEAN; StatusTime : OPTIONAL IfcDateTime; ActualDuration : OPTIONAL IfcDuration; ActualStart : OPTIONAL IfcDateTime; ActualFinish : OPTIONAL IfcDateTime; RemainingTime : OPTIONAL IfcDuration; Completion : OPTIONAL IfcPositiveRatioMeasure; END_ENTITY</p>
<p>任务时间循环 (IfcTaskTimeRecurring)</p>	<p>ENTITY IfcTaskTimeRecurring SUBTYPE OF IfcTaskTime; Recurrence : IfcRecurrencePattern; END_ENTITY</p>
<p>时间周期 (IfcTimePeriod)</p>	<p>ENTITY IfcTimePeriod; StartTime : IfcTime; EndTime : IfcTime; END_ENTITY</p>
<p>时间序列 (IfcTimeSeries)</p>	<p>ENTITY IfcTimeSeries ABSTRACT SUPERTYPE OF (ONEOF (IfcIrregularTimeSeries, IfcRegularTimeSeries)); Name : IfcLabel; Description : OPTIONAL IfcText; StartTime : IfcDateTime; EndTime : IfcDateTime; TimeSeriesDataType : IfcTimeSeriesDataTypeEnum; DataOrigin : IfcDataOriginEnum; UserDefinedDataOrigin : OPTIONAL IfcLabel; Unit : OPTIONAL IfcUnit; INVERSE HasExternalReference : SET [1:?] OF IfcExternalReferenceRelationship FOR RelatedResourceObjects; END_ENTITY</p>
<p>时间序列值 (IfcTimeSeriesValue)</p>	<p>ENTITY IfcTimeSeriesValue; ListValues : LIST [1:?] OF IfcValue; END_ENTITY</p>
<p>工作时间 (IfcWorkTime)</p>	<p>ENTITY IfcWorkTime SUBTYPE OF IfcSchedulingTime; RecurrencePattern : OPTIONAL IfcRecurrencePattern; Start : OPTIONAL IfcDate; Finish : OPTIONAL IfcDate; END_ENTITY</p>

## D.6 外部引用资源

D.6.1 外部引用资源类型的 EXPRESS 描述应按表 D.6.1 的规定采用。

表 D.6.1 外部引用资源类型的 EXPRESS 描述

类型	EXPRESS 描述
语言标识 (IfcLanguageId)	TYPE IfcLanguageId = IfcIdentifier; END_TYPE
统一资源标 识符引用 (IfcURIReference)	TYPE IfcURIReference = STRING; END_TYPE
文档机密类型枚举 (IfcDocument ConfidentialityEnum)	TYPE IfcDocumentConfidentialityEnum = ENUMERATION OF ( PUBLIC, RESTRICTED, CONFIDENTIAL, PERSONAL, USERDEFINED, NOTDEFINED); END_TYPE
文档状态枚举 (IfcDocument StatusEnum)	TYPE IfcDocumentStatusEnum = ENUMERATION OF ( DRAFT, FINALDRAFT, FINAL, REVISION, NOTDEFINED); END_TYPE
分类引用选择 (IfcClassification ReferenceSelect)	TYPE IfcClassificationReferenceSelect = SELECT ( IfcClassificationReference, IfcClassification); END_TYPE
分类选择 (IfcClassification Select)	TYPE IfcClassificationSelect = SELECT ( IfcClassification, IfcClassificationReference); END_TYPE
文档选择 (IfcDocumentSelect)	TYPE IfcDocumentSelect = SELECT ( IfcDocumentReference, IfcDocumentInformation); END_TYPE
库选择 (IfcLibrarySelect)	TYPE IfcLibrarySelect = SELECT ( IfcLibraryReference, IfcLibraryInformation); END_TYPE
资源对象选择 (IfcResource ObjectSelect)	TYPE IfcResourceObjectSelect = SELECT ( IfcPropertyAbstraction, IfcPhysicalQuantity, IfcAppliedValue, IfcContextDependentUnit, IfcConversionBasedUnit, IfcProfileDef, IfcActorRole, IfcApproval, IfcConstraint, IfcTimeSeries, IfcMaterialDefinition, IfcPerson, IfcPersonAndOrganization, IfcOrganization, IfcExternalReference, IfcExternalInformation); END_TYPE

D. 6. 2 外部引用资源实体的 EXPRESS 描述应按表 D. 6. 2 的规定采用。

表 D. 6. 2 外部引用资源实体的 EXPRESS 描述

实体	EXPRESS 描述
<p>分类 (IfcClassification)</p>	<p>ENTITY IfcClassification                      SUBTYPE OF IfcExternalInformation;                      Source : OPTIONAL IfcLabel;                      Edition : OPTIONAL IfcLabel;                      EditionDate : OPTIONAL IfcDate;                      Name : IfcLabel;                      Description : OPTIONAL IfcText;                      Location : OPTIONAL IfcURIReference;                      ReferenceTokens : OPTIONAL LIST [1:?] OF IfcIdentifier;                      INVERSE                      ClassificationForObjects : SET OF IfcRelAssociatesClassification FOR RelatingClassification;                      HasReferences : SET OF IfcClassificationReference FOR ReferencedSource;                      END_ENTITY</p>
<p>分类引用 (IfcClassificationReference)</p>	<p>ENTITY IfcClassificationReference                      SUBTYPE OF IfcExternalReference;                      ReferencedSource : OPTIONAL IfcClassificationReferenceSelect;                      Description : OPTIONAL IfcText;                      Sort : OPTIONAL IfcIdentifier;                      INVERSE                      ClassificationRefForObjects : SET [0:?] OF IfcRelAssociatesClassification FOR RelatingClassification;                      HasReferences : SET [0:?] OF IfcClassificationReference FOR ReferencedSource;                      END_ENTITY</p>
<p>文档信息 (IfcDocumentInformation)</p>	<p>ENTITY IfcDocumentInformation                      SUBTYPE OF IfcExternalInformation;                      Identification : IfcIdentifier;                      Name : IfcLabel;                      Description : OPTIONAL IfcText;                      Location : OPTIONAL IfcURIReference;                      Purpose : OPTIONAL IfcText;                      IntendedUse : OPTIONAL IfcText;                      Scope : OPTIONAL IfcText;                      Revision : OPTIONAL IfcLabel;                      DocumentOwner : OPTIONAL IfcActorSelect;                      Editors : OPTIONAL SET [1:?] OF IfcActorSelect;                      CreationTime : OPTIONAL IfcDateTime;                      LastRevisionTime : OPTIONAL IfcDateTime;                      ElectronicFormat : OPTIONAL IfcIdentifier;                      ValidFrom : OPTIONAL IfcDate;                      ValidUntil : OPTIONAL IfcDate;                      Confidentiality : OPTIONAL IfcDocumentConfidentialityEnum;                      Status : OPTIONAL IfcDocumentStatusEnum;                      INVERSE                      DocumentInfoForObjects : SET OF IfcRelAssociatesDocument FOR RelatingDocument;                      HasDocumentReferences : SET OF IfcDocumentReference FOR ReferencedDocument;                      IsPointedTo : SET OF IfcDocumentInformationRelationship FOR RelatedDocuments;                      IsPointer : SET [0:1] OF IfcDocumentInformationRelationship FOR RelatingDocument;                      END_ENTITY</p>
<p>文档信息关系 (IfcDocumentInformationRelationship)</p>	<p>ENTITY IfcDocumentInformationRelationship                      SUBTYPE OF IfcResourceLevelRelationship;                      RelatingDocument : IfcDocumentInformation;                      RelatedDocuments : SET [1:?] OF IfcDocumentInformation;                      RelationshipType : OPTIONAL IfcLabel;                      END_ENTITY</p>

续表 D. 6. 2

实体	EXPRESS 描述
<p>文档引用 (IfcDocumentReference)</p>	<p>ENTITY IfcDocumentReference SUBTYPE OF IfcExternalReference; Description: OPTIONAL IfcText; ReferencedDocument: OPTIONAL IfcDocumentInformation; INVERSE DocumentRefForObjects: SET OF IfcRelAssociatesDocument FOR RelatingDocument; WHERE WR1: EXISTS(Name) XOR EXISTS(ReferencedDocument); END_ENTITY</p>
<p>外部信息 (IfcExternalInformation)</p>	<p>ENTITY IfcExternalInformation ABSTRACT SUPERTYPE OF(ONEOF(IfcClassification, IfcDocumentInformation, IfcLibraryInformation)); END_ENTITY</p>
<p>外部引用 (IfcExternalReference)</p>	<p>ENTITY IfcExternalReference ABSTRACT SUPERTYPE OF(ONEOF(IfcClassificationReference, IfcDocumentReference, IfcExternallyDefinedHatchStyle, IfcExternallyDefinedSurfaceStyle, IfcExternallyDefinedTextFont, IfcLibraryReference)); Location: OPTIONAL IfcURIReference; Identification: OPTIONAL IfcIdentifier; Name: OPTIONAL IfcLabel; INVERSE ExternalReferenceForResources: SET [0:?] OF IfcExternalReferenceRelationship FOR RelatingReference; WHERE WR1: EXISTS(Identification) OR EXISTS(Location) OR EXISTS(Name); END_ENTITY</p>
<p>外部引用关系 (IfcExternalReferenceRelationship)</p>	<p>ENTITY IfcExternalReferenceRelationship SUBTYPE OF IfcResourceLevelRelationship; RelatingReference: IfcExternalReference; RelatedResourceObjects: SET [1:?] OF IfcResourceObjectSelect; END_ENTITY</p>
<p>库信息 (IfcLibraryInformation)</p>	<p>ENTITY IfcLibraryInformation SUBTYPE OF IfcExternalInformation; Name: IfcLabel; Version: OPTIONAL IfcLabel; Publisher: OPTIONAL IfcActorSelect; VersionDate: OPTIONAL IfcDateTime; Location: OPTIONAL IfcURIReference; Description: OPTIONAL IfcText; INVERSE LibraryInfoForObjects: SET [0:?] OF IfcRelAssociatesLibrary FOR RelatingLibrary; HasLibraryReferences: SET OF IfcLibraryReference FOR ReferencedLibrary; END_ENTITY</p>
<p>库引用 (IfcLibraryReference)</p>	<p>ENTITY IfcLibraryReference SUBTYPE OF IfcExternalReference; Description: OPTIONAL IfcText; Language: OPTIONAL IfcLanguageId; ReferencedLibrary: OPTIONAL IfcLibraryInformation; INVERSE LibraryRefForObjects: SET [0:?] OF IfcRelAssociatesLibrary FOR RelatingLibrary; END_ENTITY</p>
<p>资源层关系 (IfcResourceLevelRelationship)</p>	<p>ENTITY IfcResourceLevelRelationship ABSTRACT SUPERTYPE OF(ONEOF(IfcApprovalRelationship, IfcCurrencyRelationship, IfcDocumentInformationRelationship, IfcExternalReferenceRelationship, IfcMaterialRelationship, IfcOrganizationRelationship, IfcPropertyDependencyRelationship, IfcResourceApprovalRelationship, IfcResourceConstraintRelationship)); Name: OPTIONAL IfcLabel; Description: OPTIONAL IfcText; END_ENTITY</p>

## D.7 几何约束资源

**D.7.1** 几何约束资源类型的 EXPRESS 描述应按表 D.7.1 的规定采用。

**表 D.7.1 几何约束资源类型的 EXPRESS 描述**

类型	EXPRESS 描述
边曲线 (IfcCurveOrEdgeCurve)	TYPE IfcCurveOrEdgeCurve = SELECT ( IfcBoundedCurve, IfcEdgeCurve); END_TYPE
栅格坐标方向选择 (IfcGridPlacementDirectionSelect)	TYPE IfcGridPlacementDirectionSelect = SELECT ( IfcVirtualGridIntersection, IfcDirection); END_TYPE
点或顶点 (IfcPointOrVertexPoint)	TYPE IfcPointOrVertexPoint = SELECT ( IfcPoint, IfcVertexPoint); END_TYPE
实体或壳 (IfcSolidOrShell)	TYPE IfcSolidOrShell = SELECT ( IfcSolidModel, IfcClosedShell); END_TYPE
表面或面 (IfcSurfaceOrFaceSurface)	TYPE IfcSurfaceOrFaceSurface = SELECT ( IfcSurface, IfcFaceSurface, IfcFaceBasedSurfaceModel); END_TYPE

**D.7.2** 几何约束资源实体的 EXPRESS 描述应按表 D.7.2 的规定采用。

**表 D.7.2 几何约束资源实体的 EXPRESS 描述**

类型	EXPRESS 描述
连接几何曲线 (IfcConnectionCurveGeometry)	ENTITY IfcConnectionCurveGeometry SUBTYPE OF IfcConnectionGeometry; CurveOnRelatingElement : IfcCurveOrEdgeCurve; CurveOnRelatedElement : OPTIONAL IfcCurveOrEdgeCurve; END_ENTITY
连接几何 (IfcConnectionGeometry)	ENTITY IfcConnectionGeometry ABSTRACT SUPERTYPE OF(ONEOF(IfcConnectionCurveGeometry, IfcConnectionPointGeometry, IfcConnectionSurfaceGeometry, IfcConnectionVolumeGeometry)); END_ENTITY
连接点偏心 (IfcConnectionPointEccentricity)	ENTITY IfcConnectionPointEccentricity SUBTYPE OF IfcConnectionPointGeometry; EccentricityInX : OPTIONAL IfcLengthMeasure; EccentricityInY : OPTIONAL IfcLengthMeasure; EccentricityInZ : OPTIONAL IfcLengthMeasure; END_ENTITY
连接点几何 (IfcConnectionPointGeometry)	ENTITY IfcConnectionPointGeometry SUPERTYPE OF(IfcConnectionPointEccentricity) SUBTYPE OF IfcConnectionGeometry; PointOnRelatingElement : IfcPointOrVertexPoint; PointOnRelatedElement : OPTIONAL IfcPointOrVertexPoint; END_ENTITY

续表 D. 7. 2

类型	EXPRESS 描述
连接表面几何 (IfcConnection SurfaceGeometry)	ENTITY IfcConnectionSurfaceGeometry SUBTYPE OF IfcConnectionGeometry; SurfaceOnRelatingElement ; IfcSurfaceOrFaceSurface; SurfaceOnRelatedElement ; OPTIONAL IfcSurfaceOrFaceSurface; END_ENTITY
连接体积几何 (IfcConnection VolumeGeometry)	ENTITY IfcConnectionVolumeGeometry SUBTYPE OF IfcConnectionGeometry; VolumeOnRelatingElement ; IfcSolidOrShell; VolumeOnRelatedElement ; OPTIONAL IfcSolidOrShell; END_ENTITY
栅格轴 (IfcGridAxis)	ENTITY IfcGridAxis; AxisTag ; OPTIONAL IfcLabel; AxisCurve ; IfcCurve; SameSense ; IfcBoolean; INVERSE PartOfW ; SET [0;1] OF IfcGrid FOR WAxes; PartOfV ; SET [0;1] OF IfcGrid FOR VAxes; PartOfU ; SET [0;1] OF IfcGrid FOR UAxes; HasIntersections ; SET OF IfcVirtualGridIntersection FOR IntersectingAxes; WHERE WR1 ; AxisCurve. Dim = 2; WR2 ; (SIZEOF(PartOfU) = 1) XOR (SIZEOF(PartOfV) = 1) XOR (SIZEOF(PartOfW) = 1); END_ENTITY
栅格坐标系 (IfcGridPlacement)	ENTITY IfcGridPlacement SUBTYPE OF IfcObjectPlacement; PlacementLocation ; IfcVirtualGridIntersection; PlacementRefDirection ; OPTIONAL IfcGridPlacementDirectionSelect; END_ENTITY
局部坐标系 (IfcLocalPlacement)	ENTITY IfcLocalPlacement SUBTYPE OF IfcObjectPlacement; PlacementRelTo ; OPTIONAL IfcObjectPlacement; RelativePlacement ; IfcAxis2Placement; WHERE WR21 ; IfcCorrectLocalPlacement(RelativePlacement, PlacementRelTo); END_ENTITY
对象坐标系 (IfcObjectPlacement)	ENTITY IfcObjectPlacement ABSTRACT SUPERTYPE OF(ONEOF(IfcGridPlacement, IfcLocalPlacement)); INVERSE PlacesObject ; SET [0;?] OF IfcProduct FOR ObjectPlacement; ReferencedByPlacements ; SET OF IfcLocalPlacement FOR PlacementRelTo; END_ENTITY
虚栅格交点 (IfcVirtual GridIntersection)	ENTITY IfcVirtualGridIntersection; IntersectingAxes ; LIST [2;2] OF UNIQUE IfcGridAxis; OffsetDistances ; LIST [2;3] OF IfcLengthMeasure; END_ENTITY

**D. 7. 3** 几何约束资源应采用正确局部坐标系 (IfcCorrectLocalPlacement) 函数, 函数的 EXPRESS 描述应符合下列规定:

```
FUNCTION IfcCorrectLocalPlacement
  (AxisPlacement ; IfcAxis2Placement;
   RelPlacement ; IfcObjectPlacement) : LOGICAL;
IF (EXISTS(RelPlacement)) THEN
```

```

IF ( 'IFCGEOMETRICCONSTRAINTRESOURCE. IFCGRIDPLACEMENT' IN TYPEOF (Rel-
Placement)) THEN
    RETURN(?);
END_IF;
IF ( 'IFCGEOMETRICCONSTRAINTRESOURCE. IFCLOCALPLACEMENT' IN TYPEOF
(RelPlacement)) THEN
    IF ( 'IFCGEOMETRYRESOURCE. IFCAXIS2PLACEMENT2D' IN TYPEOF (AxisPlace-
ment)) THEN
        RETURN(TRUE);
    END_IF;
    IF ( 'IFCGEOMETRYRESOURCE. IFCAXIS2PLACEMENT3D' IN TYPEOF ( AxisPlace-
ment)) THEN
        IF (RelPlacement\IfcLocalPlacement. RelativePlacement. Dim = 3) THEN
            RETURN(TRUE);
        ELSE
            RETURN(FALSE);
        END_IF;
    END_IF;
END_IF;
ELSE
    RETURN(TRUE);
END_IF;
RETURN(?);
END_FUNCTION

```

## D.8 几何模型资源

**D.8.1** 几何模型资源类型的 EXPRESS 描述应按表 D.8.1 的规定采用。

表 D.8.1 几何模型资源类型的 EXPRESS 描述

类型	EXPRESS 描述
布尔运算符 (IfcBoolean Operator)	TYPE IfcBooleanOperator = ENUMERATION OF ( UNION, INTERSECTION, DIFFERENCE); END_TYPE
布尔运算项 (IfcBooleanOperand)	TYPE IfcBooleanOperand = SELECT ( IfcSolidModel, IfcHalfSpaceSolid, IfcBooleanResult, IfcCsgPrimitive3D); END_TYPE
CSG 选择 (IfcCsgSelect)	TYPE IfcCsgSelect = SELECT ( IfcBooleanResult, IfcCsgPrimitive3D); END_TYPE
几何集选择 (IfcGeometric SetSelect)	TYPE IfcGeometricSetSelect = SELECT ( IfcPoint, IfcCurve, IfcSurface); END_TYPE

D. 8. 2 几何模型资源实体的 EXPRESS 描述应按表 D. 8. 2 的规定采用。

表 D. 8. 2 几何模型资源实体的 EXPRESS 描述

实体	EXPRESS 描述
高级边界表达 (IfcAdvancedBrep)	ENTITY IfcAdvancedBrep SUPERTYPE OF (IfcAdvancedBrepWithVoids) SUBTYPE OF IfcManifoldSolidBrep; WHERE HasAdvancedFaces : SIZEOF(QUERY(Afs < * SELF\IfcManifoldSolidBrep. Outer. CfsFaces   (NOT ('IFCTOPOLOGYRESOURCE. IFCADVANCEDFACE' IN TYPEOF(Afs)))) = 0; END_ENTITY
带孔洞高级边界表达 (IfcAdvancedBrepWithVoids)	ENTITY IfcAdvancedBrepWithVoids SUBTYPE OF IfcAdvancedBrep; Voids : SET [1:?] OF IfcClosedShell; WHERE VoidsHaveAdvancedFaces : SIZEOF ( QUERY ( Vsh < * Voids   SIZEOF ( QUERY ( Afs < * Vsh. CfsFaces   (NOT ('IFCTOPOLOGYRESOURCE. IFCADVANCEDFACE' IN TYPEOF(Afs)))) ) ) = 0; END_ENTITY
块 (IfcBlock)	ENTITY IfcBlock SUBTYPE OF IfcCsgPrimitive3D; XLength : IfcPositiveLengthMeasure; YLength : IfcPositiveLengthMeasure; ZLength : IfcPositiveLengthMeasure; END_ENTITY
布尔剪辑结果 (IfcBooleanClippingResult)	ENTITY IfcBooleanClippingResult SUBTYPE OF IfcBooleanResult; WHERE FirstOperandType : ('IFCGEOMETRICMODELRESOURCE. IFCSWEPTAREASOLID' IN TYPEOF(FirstOperand)) OR ('IFCGEOMETRICMODELRESOURCE. IFCSWEPTDISCSOLID' IN TYPEOF(FirstOperand)) OR ('IFCGEOMETRICMODELRESOURCE. IFCBOOLEANCLIPPINGRESULT' IN TYPEOF(FirstOperand)); SecondOperandType : ('IFCGEOMETRICMODELRESOURCE. IFCHALFSPACESOLID' IN TYPEOF(SecondOperand)); OperatorType : Operator = DIFFERENCE; END_ENTITY
布尔结果 (IfcBooleanResult)	ENTITY IfcBooleanResult SUPERTYPE OF (IfcBooleanClippingResult) SUBTYPE OF IfcGeometricRepresentationItem; Operator : IfcBooleanOperator; FirstOperand : IfcBooleanOperand; SecondOperand : IfcBooleanOperand; DERIVE Dim : IfcDimensionCount := FirstOperand. Dim; WHERE SameDim : FirstOperand. Dim = SecondOperand. Dim; END_ENTITY
包围盒 (IfcBoundingBox)	ENTITY IfcBoundingBox SUBTYPE OF IfcGeometricRepresentationItem; Corner : IfcCartesianPoint; XDim : IfcPositiveLengthMeasure; YDim : IfcPositiveLengthMeasure; ZDim : IfcPositiveLengthMeasure; DERIVE Dim : IfcDimensionCount := 3; END_ENTITY



续表 D. 8. 2

实体	EXPRESS 描述
半空间包围盒 (IfcBoxedHalfSpace)	ENTITY IfcBoxedHalfSpace SUBTYPE OF IfcHalfSpaceSolid; Enclosure : IfcBoundingBox; END_ENTITY
笛卡尔点列 (IfcCartesianPointList)	ENTITY IfcCartesianPointList ABSTRACT SUPERTYPE OF (IfcCartesianPointList3D) SUBTYPE OF IfcGeometricRepresentationItem; END_ENTITY
三维笛卡尔点列 (IfcCartesianPointList3D)	ENTITY IfcCartesianPointList3D SUBTYPE OF IfcCartesianPointList; CoordList : LIST [1:?] OF LIST [3:3] OF IfcLengthMeasure; END_ENTITY
三维 CSG 体素 (IfcCsgPrimitive3D)	ENTITY IfcCsgPrimitive3D ABSTRACT SUPERTYPE OF (ONEOF (IfcBlock, IfcRectangularPyramid, IfcRightCircularCone, IfcRightCircularCylinder, IfcSphere)) SUBTYPE OF IfcGeometricRepresentationItem; Position : IfcAxis2Placement3D; DERIVE Dim : IfcDimensionCount := 3; END_ENTITY
CSG 立体 (IfcCsgSolid)	ENTITY IfcCsgSolid SUBTYPE OF IfcSolidModel; TreeRootEXPRESSIon : IfcCsgSelect; END_ENTITY
拉伸体 (IfcExtrudedAreaSolid)	ENTITY IfcExtrudedAreaSolid SUPERTYPE OF (IfcExtrudedAreaSolidTapered) SUBTYPE OF IfcSweptAreaSolid; ExtrudedDirection : IfcDirection; Depth : IfcPositiveLengthMeasure; WHERE ValidExtrusionDirection : IfcDotProduct (IfcRepresentationItem()    IfcGeometricRepresentationItem()    IfcDirection([0.0,0.0,1.0]), SELF.ExtrudedDirection) <> 0.0; END_ENTITY
拉伸锥 (IfcExtrudedAreaSolidTapered)	ENTITY IfcExtrudedAreaSolidTapered SUBTYPE OF IfcExtrudedAreaSolid; EndSweptArea : IfcProfileDef; WHERE CorrectProfileAssignment : IfcTaperedSweptAreaProfiles (SELF\IfcSweptAreaSolid.SweptArea, SELF.EndSweptArea); END_ENTITY
基于面的表面模型 (IfcFaceBasedSurfaceModel)	ENTITY IfcFaceBasedSurfaceModel SUBTYPE OF IfcGeometricRepresentationItem; FbsmFaces : SET [1:?] OF IfcConnectedFaceSet; DERIVE Dim : IfcDimensionCount := 3; END_ENTITY
小面片 Brep (IfcFacetedBrep)	ENTITY IfcFacetedBrep SUPERTYPE OF (IfcFacetedBrepWithVoids) SUBTYPE OF IfcManifoldSolidBrep; END_ENTITY
小面片空洞 Brep (IfcFacetedBrepWithVoids)	ENTITY IfcFacetedBrepWithVoids SUBTYPE OF IfcFacetedBrep; Voids : SET [1:?] OF IfcClosedShell; END_ENTITY

续表 D. 8. 2

实体	EXPRESS 描述
固定参考方向扫掠体 (IfcFixedReferenceSweptAreaSolid)	<pre> ENTITY IfcFixedReferenceSweptAreaSolid SUBTYPE OF IfcSweptAreaSolid; Directrix : IfcCurve; StartParam : OPTIONAL IfcParameterValue; EndParam : OPTIONAL IfcParameterValue; FixedReference : IfcDirection; WHERE DirectrixBounded : (EXISTS(StartParam) AND EXISTS(EndParam)) OR (SIZEOF(['IFCGEOMETRYRE SOURCE. IFCCONIC', 'IFCGEOMETRYRESOURCE. IFCBOUNDED_CURVE'] * TYPEOF(Directrix)) = 1); END_ENTITY                     </pre>
几何曲线集 (IfcGeometricCurveSet)	<pre> ENTITY IfcGeometricCurveSet SUBTYPE OF IfcGeometricSet; WHERE NoSurfaces : SIZEOF(QUERY(Temp &lt; * SELF.IfGeometricSet.Elements   'IFCGEOMETRYRE SOURCE. IFCSURFACE' IN TYPEOF(Temp))) = 0; END_ENTITY                     </pre>
几何集 (IfcGeometricSet)	<pre> ENTITY IfcGeometricSet SUPERTYPE OF (IfcGeometricCurveSet) SUBTYPE OF IfcGeometricRepresentationItem; Elements : SET [1:?] OF IfcGeometricSetSelect; DERIVE Dim : IfcDimensionCount := Elements[1].Dim; WHERE ConsistentDim : SIZEOF(QUERY(Temp &lt; * Elements   Temp.Dim &lt;&gt; Elements[1].Dim)) = 0; END_ENTITY                     </pre>
半空间立体 (IfcHalfSpaceSolid)	<pre> ENTITY IfcHalfSpaceSolid SUPERTYPE OF (ONEOF(IfcBoxedHalfSpace, IfcPolygonalBoundedHalfSpace)) SUBTYPE OF IfcGeometricRepresentationItem; BaseSurface : IfcSurface; AgreementFlag : BOOLEAN; DERIVE Dim : IfcDimensionCount := 3; END_ENTITY                     </pre>
流形立体 Brep (IfcManifoldSolidBrep)	<pre> ENTITY IfcManifoldSolidBrep ABSTRACT SUPERTYPE OF (ONEOF(IfcAdvancedBrep, IfcFacetedBrep)) SUBTYPE OF IfcSolidModel; Outer : IfcClosedShell; END_ENTITY                     </pre>
多边形有界半空间 (IfcPolygonalBoundedHalfSpace)	<pre> ENTITY IfcPolygonalBoundedHalfSpace SUBTYPE OF IfcHalfSpaceSolid; Position : IfcAxis2Placement3D; PolygonalBoundary : IfcBoundedCurve; WHERE BoundaryDim : PolygonalBoundary.Dim = 2; BoundaryType : SIZEOF(TYPEOF(PolygonalBoundary) * ['IFCGEOMETRYRESOURCE. IFCPOLYLINE', 'IFCGEOMETRYRESOURCE. IFCCOMPOSITE_CURVE']) = 1; END_ENTITY                     </pre>
四棱锥 (IfcRectangularPyramid)	<pre> ENTITY IfcRectangularPyramid SUBTYPE OF IfcCsgPrimitive3D; XLength : IfcPositiveLengthMeasure; YLength : IfcPositiveLengthMeasure; Height : IfcPositiveLengthMeasure; END_ENTITY                     </pre>

续表 D. 8. 2

实体	EXPRESS 描述
旋转体 (IfcRevolved AreaSolid)	<pre> ENTITY IfcRevolvedAreaSolid SUPERTYPE OF (IfcRevolvedAreaSolidTapered) SUBTYPE OF IfcSweptAreaSolid; Axis : IfcAxis1Placement; Angle : IfcPlaneAngleMeasure; DERIVE AxisLine : IfcLine := IfcRepresentationItem()    IfcGeometricRepresentationItem()    IfcCurve()    IfcLine(Axis. Location, IfcRepresentationItem()    IfcGeometricRepresentationItem()    IfcVector(Axis. Z, 1. 0)); WHERE AxisStartInXY : Axis. Location. Coordinates[3] = 0. 0; AxisDirectionInXY : Axis. Z. DirectionRatios[3] = 0. 0; END_ENTITY                     </pre>
锥形旋转区域 (IfcRevolvedArea SolidTapered)	<pre> ENTITY IfcRevolvedAreaSolidTapered SUBTYPE OF IfcRevolvedAreaSolid; EndSweptArea : IfcProfileDef; WHERE CorrectProfileAssignment : IfcTaperedSweptAreaProfiles(SELF\IfcSweptAreaSolid. SweptArea, SELF. EndSweptArea); END_ENTITY                     </pre>
正圆锥 (IfcRight CircularCone)	<pre> ENTITY IfcRightCircularCone SUBTYPE OF IfcCsgPrimitive3D; Height : IfcPositiveLengthMeasure; BottomRadius : IfcPositiveLengthMeasure; END_ENTITY                     </pre>
正圆柱 (IfcRightCircular Cylinder)	<pre> ENTITY IfcRightCircularCylinder SUBTYPE OF IfcCsgPrimitive3D; Height : IfcPositiveLengthMeasure; Radius : IfcPositiveLengthMeasure; END_ENTITY                     </pre>
切片脊柱 (IfcSectionedSpine)	<pre> ENTITY IfcSectionedSpine SUBTYPE OF IfcGeometricRepresentationItem; SpineCurve : IfcCompositeCurve; CrossSections : LIST [2;?] OF IfcProfileDef; CrossSectionPositions : LIST [2;?] OF IfcAxis2Placement3D; DERIVE Dim : IfcDimensionCount := 3; WHERE CorrespondingSectionPositions : SIZEOF(CrossSections) = SIZEOF(CrossSectionPositions); ConsistentProfileTypes : SIZEOF(QUERY(temp &lt; * CrossSections   CrossSections[1]. ProfileType &lt;&gt; temp. ProfileType)) = 0; SpineCurveDim : SpineCurve. Dim = 3; END_ENTITY                     </pre>
基于壳的表面模型 (IfcShellBased SurfaceModel)	<pre> ENTITY IfcShellBasedSurfaceModel SUBTYPE OF IfcGeometricRepresentationItem; SbsmBoundary : SET [1;?] OF IfcShell; DERIVE Dim : IfcDimensionCount := 3; END_ENTITY                     </pre>
立体模型 (IfcSolidModel)	<pre> ENTITY IfcSolidModel ABSTRACT SUPERTYPE OF (ONEOF (IfcCsgSolid, IfcManifoldSolidBrep, IfcSweptAreaSolid, IfcSweptDiskSolid)) SUBTYPE OF IfcGeometricRepresentationItem; DERIVE Dim : IfcDimensionCount := 3; END_ENTITY                     </pre>

续表 D. 8. 2

实体	EXPRESS 描述
球 (IfcSphere)	ENTITY IfcSphere SUBTYPE OF IfcCsgPrimitive3D; Radius : IfcPositiveLengthMeasure; END_ENTITY
面线扫掠体 (IfcSurfaceCurveSweptAreaSolid)	ENTITY IfcSurfaceCurveSweptAreaSolid SUBTYPE OF IfcSweptAreaSolid; Directrix : IfcCurve; StartParam : OPTIONAL IfcParameterValue; EndParam : OPTIONAL IfcParameterValue; ReferenceSurface : IfcSurface; WHERE DirectrixBounded : (EXISTS(StartParam) AND EXISTS(EndParam)) OR (SIZEOF(['IFCGEOMETRYRESOURCE. IFCCONIC', 'IFCGEOMETRYRESOURCE. IFCBOUNDEDCURVE'] * TYPEOF(Directrix)) = 1); END_ENTITY
扫掠面 (IfcSweptAreaSolid)	ENTITY IfcSweptAreaSolid ABSTRACT SUPERTYPE OF(ONEOF(IfcExtrudedAreaSolid, IfcFixedReferenceSweptAreaSolid, IfcRevolvedAreaSolid, IfcSurfaceCurveSweptAreaSolid)) SUBTYPE OF IfcSolidModel; SweptArea : IfcProfileDef; Position : OPTIONAL IfcAxis2Placement3D; WHERE SweptAreaType : SweptArea.ProfileType = IfcProfileTypeEnum. Area; END_ENTITY
扫掠圆盘体 (IfcSweptDiskSolid)	ENTITY IfcSweptDiskSolid SUPERTYPE OF(IfcSweptDiskSolidPolygonal) SUBTYPE OF IfcSolidModel; Directrix : IfcCurve; Radius : IfcPositiveLengthMeasure; InnerRadius : OPTIONAL IfcPositiveLengthMeasure; StartParam : OPTIONAL IfcParameterValue; EndParam : OPTIONAL IfcParameterValue; WHERE DirectrixDim : Directrix.Dim = 3; InnerRadiusSize : (NOT EXISTS(InnerRadius)) OR (Radius > InnerRadius); DirectrixBounded : (EXISTS(StartParam) AND EXISTS(EndParam)) OR (SIZEOF(['IFCGEOMETRYRESOURCE. IFCCONIC', 'IFCGEOMETRYRESOURCE. IFCBOUNDEDCURVE'] * TYPEOF(Directrix)) = 1); END_ENTITY
多边形扫掠圆盘体 (IfcSweptDiskSolidPolygonal)	ENTITY IfcSweptDiskSolidPolygonal SUBTYPE OF IfcSweptDiskSolid; FilletRadius : OPTIONAL IfcPositiveLengthMeasure; WHERE CorrectRadii : NOT(EXISTS(FilletRadius)) OR (FilletRadius >= SELF\IfcSweptDiskSolid. Radius); DirectrixIsPolyline : 'IFCGEOMETRYRESOURCE. IFCPOLYLINE' IN TYPEOF(SELF\IfcSweptDiskSolid. Directrix); END_ENTITY
细分面集合 (IfcTessellatedFaceSet)	ENTITY IfcTessellatedFaceSet ABSTRACT SUPERTYPE OF(IfcTriangulatedFaceSet) SUBTYPE OF IfcTessellatedItem; Coordinates : IfcCartesianPointList3D; Normals : OPTIONAL LIST [1:?] OF LIST [3:3] OF IfcParameterValue; Closed : OPTIONAL BOOLEAN; INVERSE HasColours : SET [0:1] OF IfcIndexedColourMap FOR MappedTo; HasTextures : SET [0:?] OF IfcIndexedTextureMap FOR MappedTo; END_ENTITY

续表 D. 8. 2

实体	EXPRESS 描述
细分项 (IfcTessellatedItem)	<pre>ENTITY IfcTessellatedItem ABSTRACT SUPERTYPE OF (IfcTessellatedFaceSet) SUBTYPE OF IfcGeometricRepresentationItem; END_ENTITY</pre>
细分三角面集合 (IfcTriangulatedFaceSet)	<pre>ENTITY IfcTriangulatedFaceSet SUBTYPE OF IfcTessellatedFaceSet; CoordIndex : LIST [1:?] OF LIST [3:3] OF INTEGER; NormalIndex : OPTIONAL LIST [1:?] OF LIST [3:3] OF INTEGER; DERIVE NumberOfTriangles : INTEGER := SIZEOF(CoordIndex); END_ENTITY</pre>

D. 8. 3 几何模型资源函数的 EXPRESS 描述应按表 D. 8. 3 的规定采用。

表 D. 8. 3 几何模型资源函数的 EXPRESS 描述

函数	EXPRESS 描述
点乘函数 (IfcDotProduct)	<pre>FUNCTION IfcDotProduct (Arg1, Arg2 : IfcDirection) : REAL; LOCAL Scalar : REAL; Vec1, Vec2 : IfcDirection; Ndim : INTEGER; END_LOCAL; IF NOT EXISTS (Arg1) OR NOT EXISTS (Arg2) THEN Scalar := ?; ELSE IF (Arg1.Dim &lt;&gt; Arg2.Dim) THEN Scalar := ?; ELSE BEGIN Vec1 := IfcNormalise(Arg1); Vec2 := IfcNormalise(Arg2); Ndim := Arg1.Dim; Scalar := 0.0; REPEAT i := 1 TO Ndim; Scalar := Scalar + Vec1.DirectionRatios[i] * Vec2.DirectionRatios[i]; END_REPEAT; END; END_IF; END_IF; RETURN (Scalar); END_FUNCTION</pre>
锥形扫描面截面 检查函数 (IfcTaperedSweptAreaProfiles)	<pre>FUNCTION IfcTaperedSweptAreaProfiles (StartArea, EndArea : IfcProfileDef) : LOGICAL; LOCAL Result : LOGICAL := FALSE; END_LOCAL; IF ('IFCProfilerResource.IFCParameterizedProfileDef' IN TYPEOF(StartArea)) THEN IF ('IFCProfilerResource.IFCDerivedProfileDef' IN TYPEOF(EndArea)) THEN Result := (StartArea := EndArea\IfcDerivedProfileDef.ParentProfile); ELSE Result := (TYPEOF(StartArea) = TYPEOF(EndArea)); END_IF; ELSE IF ('IFCProfilerResource.IFCDerivedProfileDef' IN TYPEOF(EndArea)) THEN Result := (StartArea := EndArea\IfcDerivedProfileDef.ParentProfile); ELSE Result := FALSE; END_IF; END_IF; RETURN(Result); END_FUNCTION</pre>

函数	EXPRESS 描述
<p>矢量和函数 (IfcVectorSum)</p>	<pre> FUNCTION IfcVectorSum   (Arg1, Arg2 : IfcVectorOrDirection)   : IfcVector; LOCAL   Result : IfcVector;   Res, Vec1, Vec2 : IfcDirection;   Mag, Mag1, Mag2 : REAL;   Ndim : INTEGER; END_LOCAL; IF ((NOT EXISTS (Arg1)) OR (NOT EXISTS (Arg2))) OR (Arg1. Dim &lt;&gt; Arg2. Dim) THEN   RETURN (?); ELSE   BEGIN     IF 'IFCGEOMETRYRESOURCE.IFCVECTOR' IN TYPEOF(Arg1) THEN       Mag1 := Arg1\IfcVector. Magnitude;       Vec1 := Arg1\IfcVector. Orientation;     ELSE       Mag1 := 1. 0;       Vec1 := Arg1;     END_IF;     IF 'IFCGEOMETRYRESOURCE.IFCVECTOR' IN TYPEOF(Arg2) THEN       Mag2 := Arg2\IfcVector. Magnitude;       Vec2 := Arg2\IfcVector. Orientation;     ELSE       Mag2 := 1. 0;       Vec2 := Arg2;     END_IF;     Vec1 := IfcNormalise (Vec1);     Vec2 := IfcNormalise (Vec2);     Ndim := SIZEOF(Vec1. DirectionRatios);     Mag := 0. 0;     Res := IfcRepresentationItem ()    IfcGeometricRepresentationItem ()    IfcDirection ([0. 0;     Ndim]);     REPEAT i := 1 TO Ndim;       Res. DirectionRatios[i] := Mag1 * Vec1. DirectionRatios[i] + Mag2 * Vec2. DirectionRatios[i];       Mag := Mag + (Res. DirectionRatios[i] * Res. DirectionRatios[i]);     END_REPEAT;     IF (Mag &gt; 0. 0) THEN       Result := IfcRepresentationItem ()    IfcGeometricRepresentationItem ()    IfcVector ( Res,       SQRT(Mag));     ELSE       Result := IfcRepresentationItem ()    IfcGeometricRepresentationItem ()    IfcVector ( Vec1,       0. 0);     END_IF;   END; END_IF; RETURN (Result); END_FUNCTION         </pre>

## D. 9 几何资源

D. 9. 1 几何资源类型的 EXPRESS 描述应按表 D. 9. 1 的规定采用。

表 D. 9. 1 几何资源类型的 EXPRESS 描述

类型	EXPRESS 描述
<p>维数 (IfcDimensionCount)</p>	<pre> TYPE IfcDimensionCount = INTEGER; WHERE   WR1 : { 0 &lt; SELF &lt;= 3 }; END_TYPE         </pre>

续表 D.9.1

类型	EXPRESS 描述
B 样条曲线样式枚举 (IfcBSplineCurveForm)	TYPE IfcBSplineCurveForm = ENUMERATION OF ( POLYLINE_FORM, CIRCULAR_ARC, ELLIPTIC_ARC, PARABOLIC_ARC, HYPERBOLIC_ARC, UNSPECIFIED); END_TYPE
B 样条曲面样式枚举 (IfcBSplineSurfaceForm)	TYPE IfcBSplineSurfaceForm = ENUMERATION OF ( PLANE_SURF, CYLINDRICAL_SURF, CONICAL_SURF, SPHERICAL_SURF, TOROIDAL_SURF, SURF_OF_REVOLUTION, RULED_SURF, GENERALISED_CONE, QUADRIC_SURF, SURF_OF_LINEAR_EXTRUSION, UNSPECIFIED); END_TYPE
节点向量类型枚举 (IfcKnotType)	TYPE IfcKnotType = ENUMERATION OF ( UNIFORM_KNOTS, QUASI_UNIFORM_KNOTS, PIECEWISE_BEZIER_KNOTS, UNSPECIFIED); END_TYPE
过渡代码枚举 (IfcTransitionCode)	TYPE IfcTransitionCode = ENUMERATION OF ( DISCONTINUOUS, CONTINUOUS, CONTSAMEGRADIENT, CONTSAMEGRADIENTSAMECURVATURE); END_TYPE
裁剪优先权枚举 (IfcTrimmingPreference)	TYPE IfcTrimmingPreference = ENUMERATION OF ( CARTESIAN, PARAMETER, UNSPECIFIED); END_TYPE
轴 2 方位 (IfcAxis2Placement)	TYPE IfcAxis2Placement = SELECT ( IfcAxis2Placement2D, IfcAxis2Placement3D); END_TYPE
面上曲线 (IfcCurveOnSurface)	TYPE IfcCurveOnSurface = SELECT ( IfcCompositeCurveOnSurface, IfcPcurve); END_TYPE
裁剪选择 (IfcTrimmingSelect)	TYPE IfcTrimmingSelect = SELECT ( IfcCartesianPoint, IfcParameterValue); END_TYPE
矢量或方向 (IfcVectorOrDirection)	TYPE IfcVectorOrDirection = SELECT ( IfcDirection, IfcVector); END_TYPE

D. 9. 2 几何资源实体的 EXPRESS 描述应按表 D. 9. 2 的规定采用。

表 D. 9. 2 几何资源实体的 EXPRESS 描述

实体	EXPRESS 描述
轴 1 方位 (IfcAxis1Placement)	<p>ENTITY IfcAxis1Placement            SUBTYPE OF IfcPlacement;            Axis : OPTIONAL IfcDirection;            DERIVE            Z : IfcDirection := NVL (IfcNormalise(Axis), IfcRepresentationItem()    IfcGeometricRepresentationItem            ()    IfcDirection([0. 0, 0. 0, 1. 0]));            WHERE            AxisIs3D : (NOT (EXISTS (Axis))) OR (Axis. Dim = 3);            LocationIs3D : SELF\IfcPlacement. Location. Dim = 3;            END_ENTITY</p>
二维轴 2 方位 (IfcAxis2Placement2D)	<p>ENTITY IfcAxis2Placement2D            SUBTYPE OF IfcPlacement;            RefDirection : OPTIONAL IfcDirection;            DERIVE            P : LIST [2;2] OF IfcDirection := IfcBuild2Axes(RefDirection);            WHERE            RefDirIs2D : (NOT (EXISTS (RefDirection))) OR (RefDirection. Dim = 2);            LocationIs2D : SELF\IfcPlacement. Location. Dim = 2;            END_ENTITY</p>
三维轴 2 方位 (IfcAxis2Placement3D)	<p>ENTITY IfcAxis2Placement3D            SUBTYPE OF IfcPlacement;            Axis : OPTIONAL IfcDirection;            RefDirection : OPTIONAL IfcDirection;            DERIVE            P : LIST [3;3] OF IfcDirection := IfcBuildAxes(Axis, RefDirection);            WHERE            LocationIs3D : SELF\IfcPlacement. Location. Dim = 3;            AxisIs3D : (NOT (EXISTS (Axis))) OR (Axis. Dim = 3);            RefDirIs3D : (NOT (EXISTS (RefDirection))) OR (RefDirection. Dim = 3);            AxisToRefDirPosition : (NOT (EXISTS (Axis))) OR (NOT (EXISTS (RefDirection))) OR (IfcCrossProd            uct(Axis, RefDirection). Magnitude &gt; 0. 0);            AxisAndRefDirProvision : NOT ((EXISTS (Axis)) XOR (EXISTS (RefDirection)));            END_ENTITY</p>
边界曲线 (IfcBoundaryCurve)	<p>ENTITY IfcBoundaryCurve            SUPERTYPE OF (IfcOuterBoundaryCurve)            SUBTYPE OF IfcCompositeCurveOnSurface;            WHERE            IsClosed : SELF\IfcCompositeCurve. ClosedCurve;            END_ENTITY</p>
有界曲线 (IfcBoundedCurve)	<p>ENTITY IfcBoundedCurve            ABSTRACT SUPERTYPE OF (ONEOF (IfcBSplineCurve, IfcCompositeCurve, IfcPolyline, IfcTrimmed            Curve))            SUBTYPE OF IfcCurve;            END_ENTITY</p>
有界曲面 (IfcBoundedSurface)	<p>ENTITY IfcBoundedSurface            ABSTRACT SUPERTYPE OF (ONEOF            (IfcBSplinesurface, IfcCurveBoundedplane,            IfcCurve BoundedSurface,            IfcRectangularTrimmedSurface))            SUBTYPE OF IfcSurface;            END_ENTITY</p>



续表 D. 9. 2

实体	EXPRESS 描述
<p>B 样条曲线 (IfcBSplineCurve)</p>	<pre> ENTITY IfcBSplineCurve ABSTRACT SUPERTYPE OF(IfcBSplineCurveWithKnots) SUBTYPE OF IfcBoundedCurve; Degree : INTEGER; ControlPointsList : LIST [2:?] OF IfcCartesianPoint; CurveForm : IfcBSplineCurveForm; ClosedCurve : LOGICAL; SelfIntersect : LOGICAL; DERIVE UpperIndexOnControlPoints : INTEGER := (SIZEOF(ControlPointsList) - 1); ControlPoints : ARRAY [0:UpperIndexOnControlPoints] OF IfcCartesianPoint := IfcListToArray(ControlPointsList,0,UpperIndexOnControlPoints); WHERE SameDim : SIZEOF(QUERY(Temp &lt; * ControlPointsList   Temp. Dim &lt;&gt; ControlPointsList[1]. Dim)) = 0; END_ENTITY                     </pre>
<p>节点向量 B 样条曲线 (IfcBSplineCurveWithKnots)</p>	<pre> ENTITY IfcBSplineCurveWithKnots SUPERTYPE OF(IfcRationalBSplineCurveWithKnots) SUBTYPE OF IfcBSplineCurve; KnotMultiplicities : LIST [2:?] OF INTEGER; Knots : LIST [2:?] OF IfcParameterValue; KnotSpec : IfcKnotType; DERIVE UpperIndexOnKnots : INTEGER := SIZEOF(Knots); WHERE ConsistentBSpline : IfcConstraintsParamBSpline(Degree, UpperIndexOnKnots, UpperIndexOnControlPoints, KnotMultiplicities, Knots); CorrespondingKnotLists : SIZEOF(KnotMultiplicities) = UpperIndexOnKnots; END_ENTITY                     </pre>
<p>B 样条曲面 (IfcBSplineSurface)</p>	<pre> ENTITY IfcBSplineSurface ABSTRACT SUPERTYPE OF(IfcBSplineSurfaceWithKnots) SUBTYPE OF IfcBoundedSurface; UDegree : INTEGER; VDegree : INTEGER; ControlPointsList : LIST [2:?] OF LIST [2:?] OF IfcCartesianPoint; SurfaceForm : IfcBSplineSurfaceForm; UClosed : LOGICAL; VClosed : LOGICAL; SelfIntersect : LOGICAL; DERIVE UUpper : INTEGER := SIZEOF(ControlPointsList) - 1; VUpper : INTEGER := SIZEOF(ControlPointsList[1]) - 1; ControlPoints : ARRAY [0:UUpper] OF ARRAY [0:VUpper] OF IfcCartesianPoint := IfcMakeArrayOfArray(ControlPointsList, 0, UUpper, 0, VUpper); END_ENTITY                     </pre>
<p>节点向量 B 样条曲面 (IfcBSplineSurfaceWithKnots)</p>	<pre> ENTITY IfcBSplineSurfaceWithKnots SUPERTYPE OF(IfcRationalBSplineSurfaceWithKnots) SUBTYPE OF IfcBSplineSurface; UMultiplicities : LIST [2:?] OF INTEGER; VMultiplicities : LIST [2:?] OF INTEGER; UKnots : LIST [2:?] OF IfcParameterValue; VKnots : LIST [2:?] OF IfcParameterValue; KnotSpec : IfcKnotType; DERIVE KnotUUpper : INTEGER := SIZEOF(VKnots); KnotVUpper : INTEGER := SIZEOF(UKnots); WHERE UDirectionConstraints : IfcConstraintsParamBSpline ( SELF \ IfcBSplineSurface. UDegree, KnotUUpper, SELF\IfcBSplineSurface. UUpper, UMultiplicities, UKnots); VDirectionConstraints : IfcConstraintsParamBSpline ( SELF \ IfcBSplineSurface. VDegree, KnotVUpper, SELF\IfcBSplineSurface. VUpper, VMultiplicities, VKnots); CorrespondingULists : SIZEOF(UMultiplicities) = KnotUUpper; CorrespondingVLlists : SIZEOF(VMultiplicities) = KnotVUpper; END_ENTITY                     </pre>

续表 D. 9. 2

实体	EXPRESS 描述
笛卡尔点 (IfcCartesianPoint)	ENTITY IfcCartesianPoint SUBTYPE OF IfcPoint; Coordinates : LIST [1;3] OF IfcLengthMeasure; DERIVE Dim : IfcDimensionCount := HIINDEX(Coordinates); WHERE CP2Dor3D : HIINDEX(Coordinates) >= 2; END_ENTITY
笛卡尔变换运算符 (IfcCartesianTransformationOperator)	ENTITY IfcCartesianTransformationOperator ABSTRACT SUPERTYPE OF (ONEOF(IfcCartesianTransformationOperator2D, IfcCartesianTransformationOperator3D)) SUBTYPE OF IfcGeometricRepresentationItem; Axis1 : OPTIONAL IfcDirection; Axis2 : OPTIONAL IfcDirection; LocalOrigin : IfcCartesianPoint; Scale : OPTIONAL REAL; DERIVE Scl : REAL := NVL(Scale, 1.0); Dim : IfcDimensionCount := LocalOrigin.Dim; WHERE ScaleGreaterZero : Scl > 0.0; END_ENTITY
二维笛卡尔变换运算符 (IfcCartesianTransformationOperator2D)	ENTITY IfcCartesianTransformationOperator2D SUPERTYPE OF (IfcCartesianTransformationOperator2DnonUniform) SUBTYPE OF IfcCartesianTransformationOperator; DERIVE U : LIST [2;2] OF IfcDirection := IfcBaseAxis(2, SELF\IfcCartesianTransformationOperator.Axis1, SELF\IfcCartesianTransformationOperator.Axis2,?); WHERE DimEqual2 : SELF\IfcCartesianTransformationOperator.Dim = 2; Axis1Is2D : NOT (EXISTS (SELF\IfcCartesianTransformationOperator.Axis1)) OR (SELF\IfcCartesianTransformationOperator.Axis1.Dim = 2); Axis2Is2D : NOT (EXISTS (SELF\IfcCartesianTransformationOperator.Axis2)) OR (SELF\IfcCartesianTransformationOperator.Axis2.Dim = 2); END_ENTITY
二维笛卡尔非均匀比例变换运算符 (IfcCartesianTransformationOperator2DnonUniform)	ENTITY IfcCartesianTransformationOperator2DnonUniform SUBTYPE OF IfcCartesianTransformationOperator2D; Scale2 : OPTIONAL REAL; DERIVE Scl2 : REAL := NVL(Scale2, SELF\IfcCartesianTransformationOperator.Scl); WHERE Scale2GreaterZero : Scl2 > 0.0; END_ENTITY
三维笛卡尔变换运算符 (IfcCartesianTransformationOperator3D)	ENTITY IfcCartesianTransformationOperator3D SUPERTYPE OF (IfcCartesianTransformationOperator3DnonUniform) SUBTYPE OF IfcCartesianTransformationOperator; Axis3 : OPTIONAL IfcDirection; DERIVE U : LIST [3;3] OF IfcDirection := IfcBaseAxis(3, SELF\IfcCartesianTransformationOperator.Axis1, SELF\IfcCartesianTransformationOperator.Axis2, Axis3); WHERE DimIs3D : SELF\IfcCartesianTransformationOperator.Dim = 3; Axis1Is3D : NOT (EXISTS (SELF\IfcCartesianTransformationOperator.Axis1)) OR (SELF\IfcCartesianTransformationOperator.Axis1.Dim = 3); Axis2Is3D : NOT (EXISTS (SELF\IfcCartesianTransformationOperator.Axis2)) OR (SELF\IfcCartesianTransformationOperator.Axis2.Dim = 3); Axis3Is3D : NOT (EXISTS (Axis3)) OR (Axis3.Dim = 3); END_ENTITY

续表 D.9.2

实体	EXPRESS 描述
三维笛卡尔非均匀比例变换运算符 (IfcCartesianTransformationOperator3DnonUniform)	<pre> ENTITY IfcCartesianTransformationOperator3DnonUniform SUBTYPE OF IfcCartesianTransformationOperator3D; Scale2 : OPTIONAL REAL; Scale3 : OPTIONAL REAL; DERIVE Scl2 : REAL := NVL(Scale2, SELF\IfcCartesianTransformationOperator.Scl); Scl3 : REAL := NVL(Scale3, SELF\IfcCartesianTransformationOperator.Scl); WHERE Scale2GreaterZero : Scl2 &gt; 0.0; Scale3GreaterZero : Scl3 &gt; 0.0; END_ENTITY                     </pre>
圆 (IfcCircle)	<pre> ENTITY IfcCircle SUBTYPE OF IfcConic; Radius : IfcPositiveLengthMeasure; END_ENTITY                     </pre>
复合曲线 (IfcCompositeCurve)	<pre> ENTITY IfcCompositeCurve SUPERTYPE OF (IfcCompositeCurveOnSurface) SUBTYPE OF IfcBoundedCurve; Segments : LIST [1;?] OF IfcCompositeCurveSegment; SelfIntersect : LOGICAL; DERIVE NSegments : INTEGER := SIZEOF(Segments); ClosedCurve : LOGICAL := Segments[NSegments].Transition &lt;&gt; Discontinuous; WHERE CurveContinuous : ((NOT ClosedCurve) AND (SIZEOF(QUERY(Temp &lt; * Segments   Temp.Transition = Discontinuous)) = 1)) OR ((ClosedCurve) AND (SIZEOF(QUERY(Temp &lt; * Segments   Temp.Transition = Discontinuous)) = 0)); SameDim : SIZEOF(QUERY(Temp &lt; * Segments   Temp.Dim &lt;&gt; Segments[1].Dim)) = 0; END_ENTITY                     </pre>
面上复合曲线 (IfcCompositeCurveOnSurface)	<pre> ENTITY IfcCompositeCurveOnSurface SUPERTYPE OF (IfcBoundaryCurve) SUBTYPE OF IfcCompositeCurve; DERIVE BasisSurface : SET [0;1] OF IfcSurface := IfcGetBasisSurface(SELF); WHERE SameSurface : SIZEOF(BasisSurface) &gt; 0; END_ENTITY                     </pre>
复合曲线段 (IfcCompositeCurveSegment)	<pre> ENTITY IfcCompositeCurveSegment SUPERTYPE OF (IfcReparametrisedCompositeCurveSegment) SUBTYPE OF IfcGeometricRepresentationItem; Transition : IfcTransitionCode; SameSense : BOOLEAN; ParentCurve : IfcCurve; INVERSE UsingCurves : SET [1;?] OF IfcCompositeCurve FOR Segments; DERIVE Dim : IfcDimensionCount := ParentCurve.Dim; WHERE ParentIsBoundedCurve : ('IFCGEOMETRYRESOURCE.IFCBOUNDEDCURVE' IN TYPEOF(ParentCurve)); END_ENTITY                     </pre>
圆锥曲线 (IfcConic)	<pre> ENTITY IfcConic ABSTRACT SUPERTYPE OF (ONEOF(IfcCircle, IfcEllipse)) SUBTYPE OF IfcCurve; Position : IfcAxis2Placement; END_ENTITY                     </pre>

续表 D. 9. 2

实体	EXPRESS 描述
曲线 (IfcCurve)	ENTITY IfcCurve ABSTRACT SUPERTYPE OF(ONEOF(IfcBoundedCurve, IfcConic, IfcLine, IfcOffsetCurve2D, IfcOffsetCurve3D, IfcPcurve)) SUBTYPE OF IfcGeometricRepresentationItem; DERIVE Dim ; IfcDimensionCount := IfcCurveDim(SELF); END_ENTITY
曲边有界平面 (IfcCurveBoundedPlane)	ENTITY IfcCurveBoundedPlane SUBTYPE OF IfcBoundedSurface; BasisSurface ; IfcPlane; OuterBoundary ; IfcCurve; InnerBoundaries ; SET OF IfcCurve; END_ENTITY
曲边有界曲面 (IfcCurveBoundedSurface)	ENTITY IfcCurveBoundedSurface SUBTYPE OF IfcBoundedSurface; BasisSurface ; IfcSurface; Boundaries ; SET [1;?] OF IfcBoundaryCurve; ImplicitOuter ; BOOLEAN; END_ENTITY
圆柱面 (IfcCylindricalSurface)	ENTITY IfcCylindricalSurface SUBTYPE OF IfcElementarySurface; Radius ; IfcPositiveLengthMeasure; END_ENTITY
方向 (IfcDirection)	ENTITY IfcDirection SUBTYPE OF IfcGeometricRepresentationItem; DirectionRatios ; LIST [2;3] OF REAL; DERIVE Dim ; IfcDimensionCount := HIINDEX(DirectionRatios); WHERE MagnitudeGreaterZero ; SIZEOF(QUERY(Tmp < * DirectionRatios   Tmp <> 0.0)) > 0; END_ENTITY
基本曲面 (IfcElementarySurface)	ENTITY IfcElementarySurface ABSTRACT SUPERTYPE OF(ONEOF(IfcCylindricalSurface, IfcPlane)) SUBTYPE OF IfcSurface; Position ; IfcAxis2Placement3D; END_ENTITY
椭圆 (IfcEllipse)	ENTITY IfcEllipse SUBTYPE OF IfcConic; SemiAxis1 ; IfcPositiveLengthMeasure; SemiAxis2 ; IfcPositiveLengthMeasure; END_ENTITY
几何表达项 (IfcGeometricRepresentationItem)	ENTITY IfcGeometricRepresentationItem ABSTRACT SUPERTYPE OF(ONEOF(IfcAnnotationFillArea, IfcBooleanResult, IfcBoundingBox, IfcCartesianPointList, IfcCartesianTransformationOperator, IfcCompositeCurveSegment, IfcCsgPrimitive3D, IfcCurve, IfcDirection, IfcFaceBasedSurfaceModel, IfcFillAreaStyleHatching, IfcFillAreaStyleTiles, IfcGeometricSet, IfcHalfSpaceSolid, IfcLightSource, IfcPlacement, IfcPlanarExtent, IfcPoint, IfcSectionedSpine, IfcShellBasedSurfaceModel, IfcSolidModel, IfcSurface, IfcTessellatedItem, IfcTextLiteral, IfcVector)) SUBTYPE OF IfcRepresentationItem; END_ENTITY
直线 (IfcLine)	ENTITY IfcLine SUBTYPE OF IfcCurve; Pnt ; IfcCartesianPoint; Dir ; IfcVector; WHERE SameDim ; Dir. Dim = Pnt. Dim; END_ENTITY

续表 D.9.2

实体	EXPRESS 描述
映射项 (IfcMappedItem)	ENTITY IfcMappedItem SUBTYPE OF IfcRepresentationItem; MappingSource : IfcRepresentationMap; MappingTarget : IfcCartesianTransformationOperator; END_ENTITY
二维偏置曲线 (IfcOffsetCurve2D)	ENTITY IfcOffsetCurve2D SUBTYPE OF IfcCurve; BasisCurve : IfcCurve; Distance : IfcLengthMeasure; SelfIntersect : LOGICAL; WHERE DimIs2D : BasisCurve. Dim = 2; END_ENTITY
三维偏置曲线 IfcOffsetCurve3D	ENTITY IfcOffsetCurve3D SUBTYPE OF IfcCurve; BasisCurve : IfcCurve; Distance : IfcLengthMeasure; SelfIntersect : LOGICAL; RefDirection : IfcDirection; WHERE DimIs3D : BasisCurve. Dim = 3; END_ENTITY
外边界曲线 (IfcOuterBoundaryCurve)	ENTITY IfcOuterBoundaryCurve SUBTYPE OF IfcBoundaryCurve; END_ENTITY
P 曲线 (IfcPcurve)	ENTITY IfcPcurve SUBTYPE OF IfcCurve; BasisSurface : IfcSurface; ReferenceCurve : IfcCurve; WHERE DimIs2D : ReferenceCurve. Dim = 2; END_ENTITY
方位 (IfcPlacement)	ENTITY IfcPlacement ABSTRACT SUPERTYPE OF(ONEOF(IfcAxis1Placement, IfcAxis2Placement2D, IfcAxis2Placement3D)) SUBTYPE OF IfcGeometricRepresentationItem; Location : IfcCartesianPoint; DERIVE Dim : IfcDimensionCount := Location. Dim; END_ENTITY
平面 (IfcPlane)	ENTITY IfcPlane SUBTYPE OF IfcElementarySurface; END_ENTITY
点 (IfcPoint)	ENTITY IfcPoint ABSTRACT SUPERTYPE OF(ONEOF(IfcCartesianPoint, IfcPointOnCurve, IfcPointOnSurface)) SUBTYPE OF IfcGeometricRepresentationItem; END_ENTITY
曲线上点 (IfcPointOnCurve)	ENTITY IfcPointOnCurve SUBTYPE OF IfcPoint; BasisCurve : IfcCurve; PointParameter : IfcParameterValue; DERIVE Dim : IfcDimensionCount := BasisCurve. Dim; END_ENTITY

续表 D. 9. 2

实体	EXPRESS 描述
<p>曲面上点 (IfcPointOnSurface)</p>	<pre>ENTITY IfcPointOnSurface SUBTYPE OF IfcPoint; BasisSurface : IfcSurface; PointParameterU : IfcParameterValue; PointParameterV : IfcParameterValue; DERIVE Dim : IfcDimensionCount := BasisSurface. Dim; END_ENTITY</pre>
<p>折线 (IfcPolyline)</p>	<pre>ENTITY IfcPolyline SUBTYPE OF IfcBoundedCurve; Points : LIST [2;?] OF IfcCartesianPoint; WHERE SameDim : SIZEOF(QUERY(Temp &lt; * Points   Temp. Dim &lt;&gt; Points[1]. Dim)) = 0; END_ENTITY</pre>
<p>节点向量有理 B 样条曲线 (IfcRationalBSpline CurveWithKnots)</p>	<pre>ENTITY IfcRationalBSplineCurveWithKnots SUBTYPE OF IfcBSplineCurveWithKnots; WeightsData : LIST [2;?] OF REAL; DERIVE Weights : ARRAY [0;UpperIndexOnControlPoints] OF REAL := IfcListToArray(WeightsData,0,SELF\ IfcBSplineCurve. UpperIndexOnControlPoints); WHERE SameNumOfWeightsAndPoints : SIZEOF(WeightsData) = SIZEOF(SELF\IfcBSplineCurve. ControlPointsList); WeightsGreaterZero : IfcCurveWeightsPositive(SELF); END_ENTITY</pre>
<p>节点向量有理 B 样条曲面 (IfcRationalBSpline SurfaceWithKnots)</p>	<pre>ENTITY IfcRationalBSplineSurfaceWithKnots SUBTYPE OF IfcBSplineSurfaceWithKnots; WeightsData : LIST [2;?] OF LIST [2;?] OF REAL; DERIVE Weights : ARRAY [0;UUpper] OF ARRAY [0;VUpper] OF REAL := IfcMakeArrayOfArray(Weights Data,0,UUpper,0,VUpper); WHERE CorrespondingWeightsDataLists : (SIZEOF(WeightsData) = SIZEOF(SELF\IfcBSplineSurface. ControlPointsList)) AND (SIZEOF(WeightsData[1]) = SIZEOF(SELF\IfcBSplineSur face. ControlPointsList[1])); WeightValuesGreaterZero : IfcSurfaceWeightsPositive(SELF); END_ENTITY</pre>
<p>矩形裁剪曲面 (IfcRectangular TrimmedSurface)</p>	<pre>ENTITY IfcRectangularTrimmedSurface SUBTYPE OF IfcBoundedSurface; BasisSurface : IfcSurface; U1 : IfcParameterValue; V1 : IfcParameterValue; U2 : IfcParameterValue; V2 : IfcParameterValue; Usense : BOOLEAN; Vsense : BOOLEAN; WHERE U1AndU2Different : U1 &lt;&gt; U2; V1AndV2Different : V1 &lt;&gt; V2; UsenseCompatible : (('IFCGEOMETRYRESOURCE. IFCELEMENTARYSURFACE' IN TYPEOF(Basis Surface)) AND (NOT ('IFCGEOMETRYRESOURCE. IFCPLANE' IN TYPEOF(BasisSurface)))) OR ('IFC GEOMETRYRESOURCE. IFCSURFACEOFFREVOLUTION' IN TYPEOF(BasisSurface)) OR (Usense = (U2 &gt; U1)); VsenseCompatible : Vsense = (V2 &gt; V1); END_ENTITY</pre>

续表 D.9.2

实体	EXPRESS 描述
重参数化复合曲线段 (IfcReparametrised CompositeCurve Segment)	ENTITY IfcReparametrisedCompositeCurveSegment SUBTYPE OF IfcCompositeCurveSegment; ParamLength : IfcParameterValue; WHERE PositiveLengthParameter : ParamLength > 0.0; END_ENTITY
表达项 (IfcRepresenta tionItem)	ENTITY IfcRepresentationItem ABSTRACT SUPERTYPE OF (ONEOF (IfcGeometricRepresentationItem, IfcMappedItem, IfcStyledItem, IfcTopologicalRepresentationItem)); INVERSE LayerAssignment : SET [0;1] OF IfcPresentationLayerAssignment FOR AssignedItems; StyledByItem : SET [0;1] OF IfcStyledItem FOR Item; END_ENTITY
表达映射 (IfcRepresenta tionMap)	ENTITY IfcRepresentationMap; MappingOrigin : IfcAxis2Placement; MappedRepresentation : IfcRepresentation; INVERSE HasShapeAspects : SET [0;?] OF IfcShapeAspect FOR PartOfProductDefinitionShape; MapUsage : SET OF IfcMappedItem FOR MappingSource; WHERE ApplicableMappedRepr : 'IFCREPRESENTATIONRESOURCE.IFCSHAPEMODEL' IN TYPEOF(Mapped Representation); END_ENTITY
曲面 (IfcSurface)	ENTITY IfcSurface ABSTRACT SUPERTYPE OF (ONEOF (IfcBoundedSurface, IfcElementarySurface, IfcSweptSurface)) SUBTYPE OF IfcGeometricRepresentationItem; DERIVE Dim : IfcDimensionCount := 3; END_ENTITY
线性拉伸面 (IfcSurfaceOf LinearExtrusion)	ENTITY IfcSurfaceOfLinearExtrusion SUBTYPE OF IfcSweptSurface; ExtrudedDirection : IfcDirection; Depth : IfcLengthMeasure; DERIVE ExtrusionAxis : IfcVector := IfcRepresentationItem()    IfcGeometricRepresentationItem ()    IfcVector (ExtrudedDirection, Depth); WHERE DepthGreaterZero : Depth > 0. ; END_ENTITY
旋转曲面 (IfcSurfaceOf Revolution)	ENTITY IfcSurfaceOfRevolution SUBTYPE OF IfcSweptSurface; AxisPosition : IfcAxis1Placement; DERIVE AxisLine : IfcLine := IfcRepresentationItem()    IfcGeometricRepresentationItem ()    IfcCurve()    Ifc Line(AxisPosition. Location, IfcRepresentationItem()    IfcGeometricRepresentationItem ()    IfcVector (AxisPosition. Z, 1. 0)); END_ENTITY
扫掠曲面 (IfcSweptSurface)	ENTITY IfcSweptSurface ABSTRACT SUPERTYPE OF (ONEOF (IfcSurfaceOfLinearExtrusion, IfcSurfaceOfRevolution)) SUBTYPE OF IfcSurface; SweptCurve : IfcProfileDef; Position : OPTIONAL IfcAxis2Placement3D; WHERE SweptCurveType : SweptCurve. ProfileType = IfcProfileTypeEnum. Curve; END_ENTITY

续表 D.9.2

实体	EXPRESS 描述
裁剪曲线 (IfcTrimmedCurve)	<pre> ENTITY IfcTrimmedCurve SUBTYPE OF IfcBoundedCurve; BasisCurve : IfcCurve; Trim1 : SET [1:2] OF IfcTrimmingSelect; Trim2 : SET [1:2] OF IfcTrimmingSelect; SenseAgreement : BOOLEAN; MasterRepresentation : IfcTrimmingPreference; WHERE Trim1ValuesConsistent : (HIINDEX(Trim1) = 1) OR (TYPEOF(Trim1[1]) &lt;&gt; TYPEOF(Trim1[2])); Trim2ValuesConsistent : (HIINDEX(Trim2) = 1) OR (TYPEOF(Trim2[1]) &lt;&gt; TYPEOF(Trim2[2])); NoTrimOfBoundedCurves : NOT('IFCGEOMETRYRESOURCE.IFCBOUNDEDCURVE' IN TYPEOF (BasisCurve)); END_ENTITY </pre>
矢量 (IfcVector)	<pre> ENTITY IfcVector SUBTYPE OF IfcGeometricRepresentationItem; Orientation : IfcDirection; Magnitude : IfcLengthMeasure; DERIVE Dim : IfcDimensionCount := Orientation.Dim; WHERE MagGreaterOrEqualZero : Magnitude &gt;= 0.0; END_ENTITY </pre>

D.9.3 几何资源函数的 EXPRESS 描述应按表 D.9.3 的规定采用。

表 D.9.3 几何资源函数的 EXPRESS 描述

函数	EXPRESS 描述
基轴 (IfcBaseAxis)	<pre> FUNCTION IfcBaseAxis (Dim : INTEGER; Axis1, Axis2, Axis3 : IfcDirection) : LIST [2:3] OF IfcDirection; LOCAL U : LIST [2:3] OF IfcDirection; Factor : REAL; D1, D2 : IfcDirection; END_LOCAL; IF (Dim = 3) THEN D1 := NVL(IfcNormalise(Axis3), IfcRepresentationItem()    IfcGeometricRepresentationItem()    IfcDirection([0.0, 0.0, 1.0])); D2 := IfcFirstProjAxis(D1, Axis1); U := [D2, IfcSecondProjAxis(D1, D2, Axis2), D1]; ELSE IF EXISTS(Axis1) THEN D1 := IfcNormalise(Axis1); U := [D1, IfcOrthogonalComplement(D1)]; IF EXISTS(Axis2) THEN Factor := IfcDotProduct(Axis2, U[2]); IF (Factor &lt; 0.0) THEN U[2].DirectionRatios[1] := -U[2].DirectionRatios[1]; U[2].DirectionRatios[2] := -U[2].DirectionRatios[2]; END_IF; END_IF; ELSE IF EXISTS(Axis2) THEN D1 := IfcNormalise(Axis2); U := [IfcOrthogonalComplement(D1), D1]; U[1].DirectionRatios[1] := -U[1].DirectionRatios[1]; U[1].DirectionRatios[2] := -U[1].DirectionRatios[2]; ELSE U := [IfcRepresentationItem()    IfcGeometricRepresentationItem()    IfcDirection([1.0, 0.0]), IfcRepresentationItem()    IfcGeometricRepresentationItem()    IfcDirection([0.0, 1.0])]; END_IF; END_IF; END_IF; RETURN(U); END_FUNCTION </pre>