

6.1.3.46 IfcWall



▼ Natural language names

DE	Wand
EN	Wall
FR	Mur

▼ Change log

Item	SPF	XML	Change	Description
4.0.0.0				
IfcWall				
OwnerHistory			MODIFIED	Instantiation changed to <i>OPTIONAL</i> .
PredefinedType			ADDED	

6.1.3.46.1 Semantic definitions at the entity

▼ Entity definition

The wall represents a vertical construction that bounds or subdivides spaces. Wall are usually vertical, or nearly vertical, planar elements, often designed to bear structural loads. A wall is however not required to be load bearing.

NOTE Definition according to ISO 6707-1: vertical construction usually in masonry or in concrete which bounds or subdivides a construction works and fulfils a load bearing or retaining function.

NOTE There is a representation of walls for structural analysis provided by a proper subtype of *IfcStructuralMember* being part of the *IfcStructuralAnalysisModel*.

NOTE An arbitrary planar element to which this semantic information is not applicable (is not predominantly vertical), shall be modeled as *IfcPlate*.

There are two main representations for for wall occurrences:

- IfcWall with *IfcMaterialLayerSetUsage* is used for all occurrences of walls, that have a non-changing thickness along the wall path and where the thickness parameter can be fully described by a material layer set. These walls are always represented geometrically by an 'Axis' and a 'SweptSolid' shape representation (or by a 'Clipping' geometry based on 'SweptSolid'), if a 3D geometric representation is assigned.

NOTE The entity *IfcWallStandardCase* has been deprecated, IfcWall with *IfcMaterialLayerSetUsage* is used instead.

- IfcWall without *IfcMaterialLayerSetUsage* is used for all other occurrences of wall, particularly for walls with changing thickness along the wall path (e.g. polygonal walls), or walls with a non-rectangular cross sections (e.g. L-shaped retaining walls), and walls having an extrusion axis that is unequal to the global Z axis of the project (i.e. non-vertical walls), or walls having only 'Brep', or 'SurfaceModel' geometry, or if a more parametric representation is not intended.

NOTE The entity *IfcWallElementedCase* has been deprecated, *IfcWall* with *IfcRelAggregates* is used to describe occurrences of wall which are aggregated from subordinate elements, such as wall panels.

HISTORY New entity in IFC1.0

▼ Attribute definitions

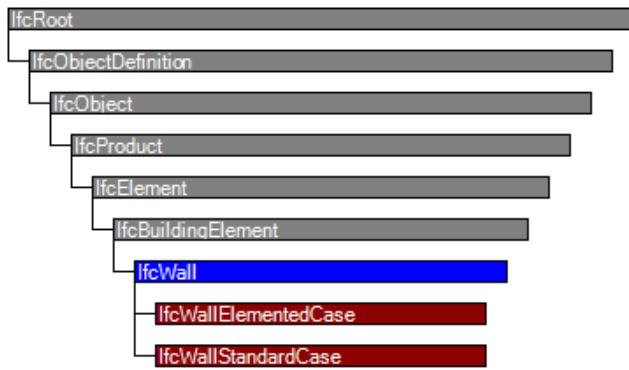
#	Attribute	Type	Cardinality	Description	G
9	PredefinedType	IfcWallTypeEnum	?	Predefined generic type for a wall that is specified in an enumeration. There may be a property set given specifically for the predefined types. NOTE The <i>PredefinedType</i> shall only be used, if no <i>IfcWallType</i> is assigned, providing its own <i>IfcWallType.PredefinedType</i> . IFC4 CHANGE The attribute has been added at the end of the entity definition.	X

▼ Formal Propositions

Rule	Description
CorrectPredefinedType	Either the <i>PredefinedType</i> attribute is unset (e.g. because an <i>IfcWallType</i> is associated), or the inherited attribute <i>ObjectType</i> shall be provided, if the <i>PredefinedType</i> is set to USERDEFINED.
CorrectTypeAssigned	Either there is no wall type object associated, i.e. the <i>IsTypedBy</i> inverse relationship is not provided, or the associated type object has to be of type <i>IfcWallType</i> .

6.1.3.46.2 Inherited definitions from supertypes

▼ Entity inheritance



▼ Attribute inheritance

#	Attribute	Type	Cardinality	Description	G
<i>IfcRoot</i>					
1	GlobalId	IfcGloballyUniqueId		Assignment of a globally unique identifier within the entire software world.	X
2	OwnerHistory	IfcOwnerHistory	?	Assignment of the information about the current ownership of that object, including owning actor, application, local identification and information captured about the recent changes of the object. NOTE only the last modification is stored - either as addition, deletion or modification. IFC4 CHANGE The attribute has been changed to be OPTIONAL.	X
3	Name	IfcLabel	?	Optional name for use by the participating software systems or users. For some subtypes of IfcRoot the insertion of the Name attribute may be required. This would be enforced by a where rule.	X
4	Description	IfcText	?	Optional description, provided for exchanging informative comments.	X
<i>IfcObjectDefinition</i>					
	HasAssignments	IfcRelAssigns @RelatedObjects	S[0:?]	Reference to the relationship objects, that assign (by an association relationship) other subtypes of IfcObject to this object instance. Examples are the association to products, processes, controls, resources or groups.	X
	Nests	IfcRelNests @RelatedObjects	S[0:1]	References to the decomposition relationship being a nesting. It determines that this object definition is a part within an ordered whole/part decomposition relationship. An object occurrence or type can only be part of a single decomposition (to allow hierarchical structures only). IFC4 CHANGE The inverse attribute datatype has been added and separated from <i>Decomposes</i> defined at <i>IfcObjectDefinition</i> .	X
	IsNestedBy	IfcRelNests @RelatingObject	S[0:?]	References to the decomposition relationship being a nesting. It determines that this object definition is the whole within an ordered whole/part decomposition relationship. An object or object type can be nested by several other objects (occurrences or types). IFC4 CHANGE The inverse attribute datatype has been added and separated from <i>IsDecomposedBy</i> defined at <i>IfcObjectDefinition</i> .	X
	HasContext	IfcRelDeclares @RelatedDefinitions	S[0:1]	References to the context providing context information such as project unit or representation context. It should only be asserted for the uppermost non-spatial object. IFC4 CHANGE The inverse attribute datatype has been added.	X
	IsDecomposedBy	IfcRelAggregates @RelatingObject	S[0:?]	References to the decomposition relationship being an aggregation. It determines that this object definition is whole within an unordered whole/part decomposition relationship. An object definitions can be aggregated by several other objects (occurrences or parts). IFC4 CHANGE The inverse attribute datatype has been changed from the supertype <i>IfcRelDecomposes</i> to subtype <i>IfcRelAggregates</i> .	X
	Decomposes	IfcRelAggregates @RelatedObjects	S[0:1]	References to the decomposition relationship being an aggregation. It determines that this object definition is a part within an unordered whole/part decomposition relationship. An object definitions can only be part of a single decomposition (to allow hierarchical structures only). IFC4 CHANGE The inverse attribute datatype has been changed from the supertype <i>IfcRelDecomposes</i> to subtype <i>IfcRelAggregates</i> .	X
	HasAssociations	IfcRelAssociates @RelatedObjects	S[0:?]	Reference to the relationship objects, that associates external references or other resource definitions to the object. Examples are the association to library, documentation or classification.	X
<i>IfcObject</i>					
5	ObjectType	IfcLabel	?	The type denotes a particular type that indicates the object further. The use has to be established at the level of instantiable subtypes. In particular it holds the user defined type, if the enumeration of the attribute <i>PredefinedType</i> is set to USERDEFINED.	X
	IsDeclaredBy	IfcRelDefinesByObject @RelatedObjects	S[0:1]	Link to the relationship object pointing to the declaring object that provides the object definitions for this object occurrence. The declaring object has to be part of an object type decomposition. The associated IfcObject, or its subtypes, contains the specific information (as part of a type, or style, definition), that is common to all reflected instances of the declaring IfcObject, or its subtypes. IFC4 CHANGE New inverse relationship, change made with upward compatibility for file based exchange.	X
	Declares	IfcRelDefinesByObject @RelatingObject	S[0:?]	Link to the relationship object pointing to the reflected object(s) that receives the object definitions. The reflected object has to be part of an object occurrence decomposition. The associated IfcObject, or its subtypes, provides the specific information (as part of a type, or style, definition), that is common to all reflected instances of the declaring IfcObject, or its subtypes. IFC4 CHANGE New inverse relationship, change made with upward compatibility for file based exchange.	X
	IsTypedBy	IfcRelDefinesByType @RelatedObjects	S[0:1]	Set of relationships to the object type that provides the type definitions for this object occurrence. The then associated <i>IfcTypeObject</i> , or its subtypes, contains the specific information (or type, or style), that is common to all instances of IfcObject, or its subtypes, referring to the same type.	X

				IFC4 CHANGE New inverse relationship, the link to IfcRelDefinesByType had previously be included in the inverse relationship IfcRelDefines . Change made with upward compatibility for file based exchange.	
	<i>IsDefinedBy</i>	IfcRelDefinesByProperties @RelatedObjects	S[0:?]	Set of relationships to property set definitions attached to this object. Those statically or dynamically defined properties contain alphanumeric information content that further defines the object. IFC4 CHANGE The data type has been changed from IfcRelDefines to IfcRelDefinesByProperties with upward compatibility for file based exchange.	X
<i>IfcProduct</i>					
6	ObjectPlacement	IfcObjectPlacement	?	Placement of the product in space, the placement can either be absolute (relative to the world coordinate system), relative (relative to the object placement of another product), or constraint (e.g. relative to grid axes). It is determined by the various subtypes of IfcObjectPlacement , which includes the axis placement information to determine the transformation for the object coordinate system.	X
7	Representation	IfcProductRepresentation	?	Reference to the representations of the product, being either a representation (IfcProductRepresentation) or as a special case a shape representations (IfcProductDefinitionShape). The product definition shape provides for multiple geometric representations of the shape property of the object within the same object coordinate system, defined by the object placement.	X
	<i>ReferencedBy</i>	IfcRelAssignsToProduct @RelatingProduct	S[0:?]	Reference to the IfcRelAssignsToProduct relationship, by which other products, processes, controls, resources or actors (as subtypes of IfcObjectDefinition) can be related to this product.	X
<i>IfcElement</i>					
8	Tag	IfcIdentifier	?	The tag (or label) identifier at the particular instance of a product, e.g. the serial number, or the position number. It is the identifier at the occurrence level.	X
	<i>FillsVoids</i>	IfcRelFillsElement @RelatedBuildingElement	S[0:1]	Reference to the IfcRelFillsElement Relationship that puts the element as a filling into the opening created within another element.	X
	<i>ConnectedTo</i>	IfcRelConnectsElements @RelatingElement	S[0:?]	Reference to the element connection relationship. The relationship then refers to the other element to which this element is connected to.	X
	<i>IsInterferedByElements</i>	IfcRelInterferesElements @RelatedElement	S[0:?]	Reference to the interference relationship to indicate the element that is interfered. The relationship, if provided, indicates that this element has an interference with one or many other elements. NOTE There is no indication of precedence between <i>IsInterferedByElements</i> and <i>InterferesElements</i> . IFC4 CHANGE New inverse relationship.	X
	<i>InterferesElements</i>	IfcRelInterferesElements @RelatingElement	S[0:?]	Reference to the interference relationship to indicate the element that interferes. The relationship, if provided, indicates that this element has an interference with one or many other elements. NOTE There is no indication of precedence between <i>IsInterferedByElements</i> and <i>InterferesElements</i> . IFC4 CHANGE New inverse relationship.	X
	<i>HasProjections</i>	IfcRelProjectsElement @RelatingElement	S[0:?]	Projection relationship that adds a feature (using a Boolean union) to the IfcBuildingElement .	X
	<i>ReferencedInStructures</i>	IfcRelReferencedInSpatialStructure @RelatedElements	S[0:?]	Reference relationship to the spatial structure element, to which the element is additionally associated. This relationship may not be hierarchical, an element may be referenced by zero, one or many spatial structure elements. IFC2x3 CHANGE The inverse attribute has been added with upward compatibility for file based exchange.	X
	<i>HasOpenings</i>	IfcRelVoidsElement @RelatingBuildingElement	S[0:?]	Reference to the IfcRelVoidsElement relationship that creates an opening in an element. An element can incorporate zero-to-many openings. For each opening, that voids the element, a new relationship IfcRelVoidsElement is generated.	X
	<i>IsConnectionRealization</i>	IfcRelConnectsWithRealizingElements @RealizingElements	S[0:?]	Reference to the connection relationship with realizing element. The relationship, if provided, assigns this element as the realizing element to the connection, which provides the physical manifestation of the connection relationship.	X
	<i>ProvidesBoundaries</i>	IfcRelSpaceBoundary @RelatedBuildingElement	S[0:?]	Reference to space boundaries by virtue of the objectified relationship IfcRelSpaceBoundary . It defines the concept of an element bounding spaces.	X
	<i>ConnectedFrom</i>	IfcRelConnectsElements @RelatedElement	S[0:?]	Reference to the element connection relationship. The relationship then refers to the other element that is connected to this element.	X
	<i>ContainedInStructure</i>	IfcRelContainedInSpatialStructure @RelatedElements	S[0:1]	Containment relationship to the spatial structure element, to which the element is primarily associated. This containment relationship has to be hierarchical, i.e. an element may only be assigned directly to zero or one spatial structure.	X
	<i>HasCoverings</i>	IfcRelCoversBldgElements @RelatingBuildingElement	S[0:?]	Reference to IfcCovering by virtue of the objectified relationship IfcRelCoversBldgElement . It defines the concept of an element having coverings associated.	X
<i>IfcBuildingElement</i>					
<i>IfcWall</i>					
9	PredefinedType	IfcWallTypeEnum	?	Predefined generic type for a wall that is specified in an enumeration. There may be a property set given specifically for the predefined types. NOTE The <i>PredefinedType</i> shall only be used, if no IfcWallType is assigned, providing its own <i>IfcWallType.PredefinedType</i> . IFC4 CHANGE The attribute has been added at the end of the entity definition.	X

6.1.3.46.3 Definitions applying to General Usage

 Instance diagram

▼ Concept usage

Object Typing

The [Object Typing](#) concept template applies to this entity as shown in Table 175.

HasType	RelatingType
	IfcWallType

Table 175 — IfcWall Object Typing

Property Sets for Objects

The [Property Sets for Objects](#) concept template applies to this entity as shown in Table 176.

PsetName	Properties																																																
Pset_WallCommon	<table><tr><th>Template</th><th>PropertyName</th><th>Value</th><th>Reference</th></tr><tr><td>Single Value</td><td>Reference</td><td>IfcIdentifier</td><td></td></tr><tr><td>Single Value</td><td>AcousticRating</td><td>IfcLabel</td><td></td></tr><tr><td>Single Value</td><td>FireRating</td><td>IfcLabel</td><td></td></tr><tr><td>Single Value</td><td>Combustible</td><td>IfcBoolean</td><td></td></tr><tr><td>Single Value</td><td>SurfaceSpreadOfFlame</td><td>IfcLabel</td><td></td></tr><tr><td>Single Value</td><td>ThermalTransmittance</td><td>IfcThermalTransmittanceMeasure</td><td></td></tr><tr><td>Single Value</td><td>IsExternal</td><td>IfcBoolean</td><td></td></tr><tr><td>Single Value</td><td>ExtendToStructure</td><td>IfcBoolean</td><td></td></tr><tr><td>Single Value</td><td>LoadBearing</td><td>IfcBoolean</td><td></td></tr><tr><td>Single Value</td><td>Compartmentation</td><td>IfcBoolean</td><td></td></tr><tr><td>Enumerated Value</td><td>Status</td><td>IfcLabel</td><td></td></tr></table>	Template	PropertyName	Value	Reference	Single Value	Reference	IfcIdentifier		Single Value	AcousticRating	IfcLabel		Single Value	FireRating	IfcLabel		Single Value	Combustible	IfcBoolean		Single Value	SurfaceSpreadOfFlame	IfcLabel		Single Value	ThermalTransmittance	IfcThermalTransmittanceMeasure		Single Value	IsExternal	IfcBoolean		Single Value	ExtendToStructure	IfcBoolean		Single Value	LoadBearing	IfcBoolean		Single Value	Compartmentation	IfcBoolean		Enumerated Value	Status	IfcLabel	
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Pset_EnvironmentalImpactIndicators	<table><tr><th>Template</th><th>PropertyName</th><th>Value</th><th>Reference</th></tr><tr><td>Single Value</td><td>Reference</td><td>IfcIdentifier</td><td></td></tr><tr><td>Single Value</td><td>FunctionalUnitReference</td><td>IfcLabel</td><td></td></tr><tr><td>Single Value</td><td>Unit</td><td>IfcText</td><td></td></tr><tr><td>Single Value</td><td>ExpectedServiceLife</td><td>IfcTimeMeasure</td><td></td></tr><tr><td>Single Value</td><td>TotalPrimaryEnergyConsumptionPerUnit</td><td>IfcEnergyMeasure</td><td></td></tr><tr><td>Single Value</td><td>WaterConsumptionPerUnit</td><td>IfcVolumeMeasure</td><td></td></tr><tr><td>Single Value</td><td>HazardousWastePerUnit</td><td>IfcMassMeasure</td><td></td></tr><tr><td>Single Value</td><td>NonHazardousWastePerUnit</td><td>IfcMassMeasure</td><td></td></tr><tr><td>Single Value</td><td>ClimateChangePerUnit</td><td>IfcMassMeasure</td><td></td></tr><tr><td>Single Value</td><td>AtmosphericAcidificationPerUnit</td><td>IfcMassMeasure</td><td></td></tr><tr><td>Single Value</td><td>RenewableEnergyConsumptionPerUnit</td><td>IfcEnergyMeasure</td><td></td></tr><tr><td>Single Value</td><td>NonRenewableEnergyConsumptionPerUnit</td><td>IfcEnergyMeasure</td><td></td></tr><tr><td>Single Value</td><td>ResourceDepletionPerUnit</td><td>IfcMassMeasure</td><td></td></tr><tr><td>Single Value</td><td>InertWastePerUnit</td><td>IfcMassMeasure</td><td></td></tr><tr><td>Single Value</td><td>RadioactiveWastePerUnit</td><td>IfcMassMeasure</td><td></td></tr><tr><td>Single Value</td><td>StratosphericOzoneLayerDestructionPerUnit</td><td>IfcMassMeasure</td><td></td></tr><tr><td>Single Value</td><td>PhotochemicalOzoneFormationPerUnit</td><td>IfcMassMeasure</td><td></td></tr><tr><td>Single Value</td><td>EutrophicationPerUnit</td><td>IfcMassMeasure</td><td></td></tr><tr><td>Enumerated Value</td><td>LifeCyclePhase</td><td>IfcLabel</td><td></td></tr></table>			Template	PropertyName	Value	Reference	Single Value	Reference	IfcIdentifier		Single Value	FunctionalUnitReference	IfcLabel		Single Value	Unit	IfcText		Single Value	ExpectedServiceLife	IfcTimeMeasure		Single Value	TotalPrimaryEnergyConsumptionPerUnit	IfcEnergyMeasure		Single Value	WaterConsumptionPerUnit	IfcVolumeMeasure		Single Value	HazardousWastePerUnit	IfcMassMeasure		Single Value	NonHazardousWastePerUnit	IfcMassMeasure		Single Value	ClimateChangePerUnit	IfcMassMeasure		Single Value	AtmosphericAcidificationPerUnit	IfcMassMeasure		Single Value	RenewableEnergyConsumptionPerUnit	IfcEnergyMeasure		Single Value	NonRenewableEnergyConsumptionPerUnit	IfcEnergyMeasure		Single Value	ResourceDepletionPerUnit	IfcMassMeasure		Single Value	InertWastePerUnit	IfcMassMeasure		Single Value	RadioactiveWastePerUnit	IfcMassMeasure		Single Value	StratosphericOzoneLayerDestructionPerUnit	IfcMassMeasure		Single Value	PhotochemicalOzoneFormationPerUnit	IfcMassMeasure		Single Value	EutrophicationPerUnit	IfcMassMeasure		Enumerated Value	LifeCyclePhase	IfcLabel	
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Single Value	LeadOutTime																																																																																		
Pset_Condition	<table><tr><th>Template</th><th>PropertyName</th><th>Value</th></tr><tr><td>Single Value</td><td>AssessmentDate</td><td>IfcDate</td></tr><tr><td>Single Value</td><td>AssessmentCondition</td><td>IfcLabel</td></tr><tr><td>Single Value</td><td>AssessmentDescription</td><td>IfcText</td></tr></table>			Template	PropertyName	Value	Single Value	AssessmentDate	IfcDate	Single Value	AssessmentCondition	IfcLabel	Single Value	AssessmentDescription	IfcText																																																																				
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Single Value	AssessmentDescription	IfcText																																																																																	

Pset_ManufacturerOccurrence	Template	PropertyName	Value	Reference
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	Single Value	BarCode	IfcIdentifier	
	Single Value	SerialNumber	IfcIdentifier	
	Single Value	BatchReference	IfcIdentifier	
	Enumerated Value	AssemblyPlace	IfcLabel	
Pset_ManufacturerTypeInformation	Template	PropertyName	Value	Reference
	Single Value	GlobalTradeItemNumber	IfcIdentifier	
	Single Value	ArticleNumber	IfcIdentifier	
	Single Value	ModelReference	IfcLabel	
	Single Value	ModelLabel	IfcLabel	
	Single Value	Manufacturer	IfcLabel	
	Single Value	ProductionYear	IfcLabel	
	Enumerated Value	AssemblyPlace	IfcLabel	
Pset_ServiceLife	Template	PropertyName	Value	
	Single Value	MeanTimeBetweenFailure	IfcDuration	
	Bounded Value	ServiceLifeDuration	IfcDuration	
Pset_Warranty	Template	PropertyName	Value	
	Single Value	WarrantyIdentifier	IfcIdentifier	
	Single Value	WarrantyStartDate	IfcDate	
	Single Value	WarrantyEndDate	IfcDate	
	Single Value	IsExtendedWarranty	IfcBoolean	
	Single Value	WarrantyPeriod	IfcTimeMeasure	
	Single Value	WarrantyContent	IfcText	
	Single Value	Exclusions	IfcText	

Table 176 — IfcWall Property Sets for Objects

Quantity Sets

The Quantity Sets concept template applies to this entity as shown in Table 177.

QsetName	Quantities
Qto_WallBaseQuantities	

Table 177 — IfcWall Quantity Sets

Material Layer Set

The Material Layer Set concept applies to this entity.

The material information of the IfcWall is defined by IfcMaterialLayerSet, or as fallback by IfcMaterial, and it is attached either directly or at the IfcWallType. In this case, the material information does not allow to construct a shape by applying the layer definition to the axis representation, to enable this parametric definition, the IfcMaterialLayerSetUsage has to be used instead.

Material Layer Set Usage

The Material Layer Set Usage concept applies to this entity.

The material of IfcWall can be defined by IfcMaterialLayerSetUsage and attached by IfcRelAssociatesMaterial.RelatingMaterial. It is accessible by the inverse HasAssociations relationship. Multi-layer walls can be represented by referring to several IfcMaterialLayer's within the IfcMaterialLayerSet that is referenced from the IfcMaterialLayerSetUsage.

When assigning an IfcMaterialLayerSetUsage to IfcWall it shall imply that the IfcWallType should have a unique IfcMaterialLayerSet, that is referenced by IfcMaterialLayerSetUsage assigned to all occurrences of this IfcWallType.

EXAMPLE: Figure 277 illustrates assignment of IfcMaterialLayerSetUsage and IfcMaterialLayerSet to the wall type and the wall occurrence.

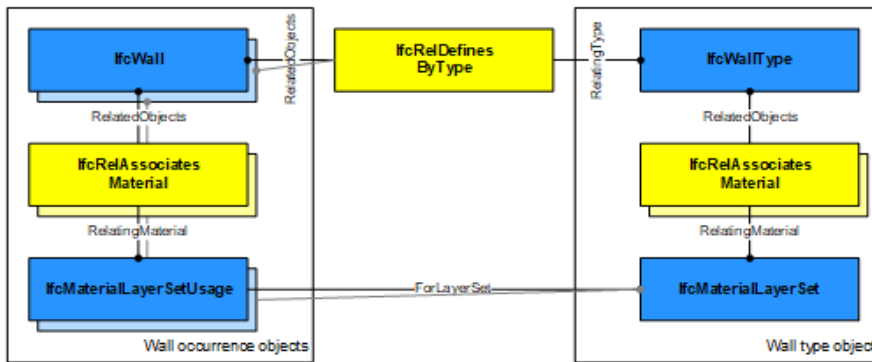


Figure 277 — Wall Standard Object Typing

Figure 278 illustrates material layer usage, where the following conventions shall be met:

- The reference coordinate system is the local coordinate system established by the *ObjectPlacement* of the *IfcWallStandardCase*.
- The reference axis is the axis defined by the *IfcShapeRepresentation* with *RepresentationType*='Axis' as one of the *Representations* of the *IfcWallStandardCase*.
- The *IfcMaterialLayerSetUsage.OffsetFromReferenceLine* is given as a distance from this axis.
- The *IfcMaterialLayerSetUsage.OffsetFromReferenceLine* is the distance parallel to the reference axis and always within the base (XY) plane of the reference coordinate system. A positive value of *IfcMaterialLayerSetUsage.OffsetFromReferenceLine* would then point into the positive y-axis of the reference coordinate system.
- The *IfcMaterialLayerSetUsage.DirectionSense* defines how the *IfcMaterialLayer*'s are assigned to the reference axis. POSITIVE means in direction to the positive y-axis of the reference coordinate system.
- The *Thickness* of each *IfcMaterialLayer* is provided starting from the *OffsetFromReferenceLine* and in the direction given by *DirectionSense*. It is applied without any gap or overlap between two consecutive layers. The *TotalThickness* of the *IfcMaterialLayerSet* is the sum of all layer thicknesses.
- The *IfcMaterialLayerSetUsage.LayerSetDirection* is always AXIS2.

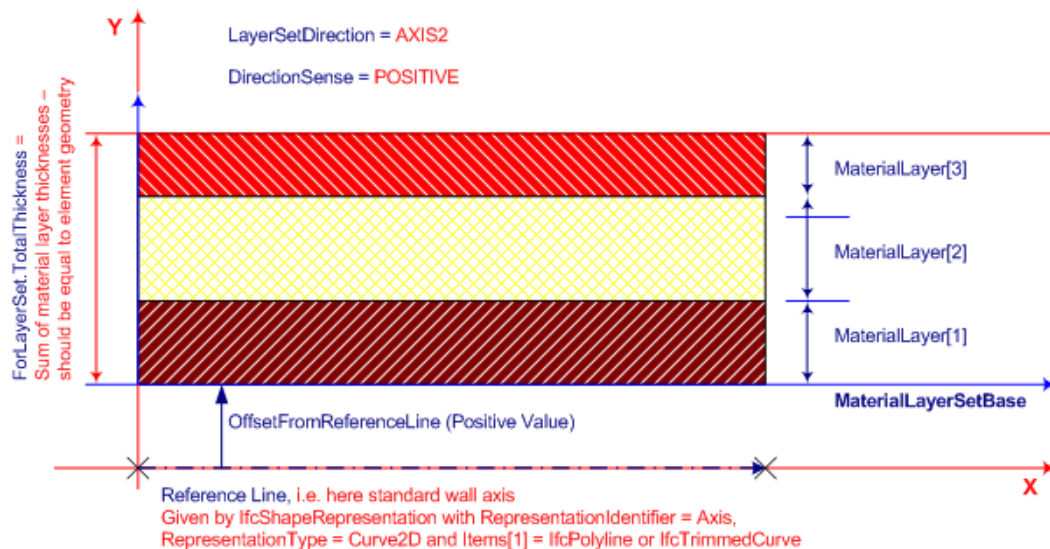


Figure 278 — Wall material layers

Path Connectivity

The *Path Connectivity* concept template applies to this entity as shown in Table 178.

Table 178 — IfcWall Path Connectivity

Spatial Containment

The *Spatial Containment* concept template applies to this entity as shown in Table 179.

RelatingStructure	Description
<i>IfcBuildingStorey</i>	Default spatial container
<i>IfcBuilding</i>	Spatial container for the element if it cannot be assigned to a building storey
<i>IfcSite</i>	Spatial container for the element in case that it is placed on site (outside of building)

Table 179 — IfcWall Spatial Containment

The IfcWall, as any subtype of IfcBuildingElement, may participate alternatively in one of the two different containment relationships:

- the Spatial Containment (defined here), or
- the Element Composition.

Axis 2D Geometry

The Axis 2D Geometry concept template applies to this entity as shown in Table 180.

Identifier	Type	Items	Description
Axis	Curve2D	IfcBoundedCurve	The wall axis of the wall.

Table 180 — IfcWall Axis 2D Geometry

The wall axis is represented by a two-dimensional open curve within a particular shape representation. The 'Axis' shape representation is only used to locate the material layer set along the axis, if the IfcMaterialLayerSetUsage is applied to the IfcWall. In this case, the wall axis is used to apply the material layer set usage parameter to the wall geometry.

- Axis
 - IfcPolyline having two Points, or IfcTrimmedCurve with BasisCurve of Type IfcLine for the 'SweptSolid' provided as IfcExtrudedAreaSolid. The axis curve lies on the x/y plane and is parallel to the x-axis of the object coordinate system.
 - IfcTrimmedCurve with BasisCurve of Type IfcCircle for 'SweptSolid' provided as IfcExtrudedAreaSolid. The axis curve lies on the x/y plane of the object coordinate system, the tangent at the start is along the positive x-axis.

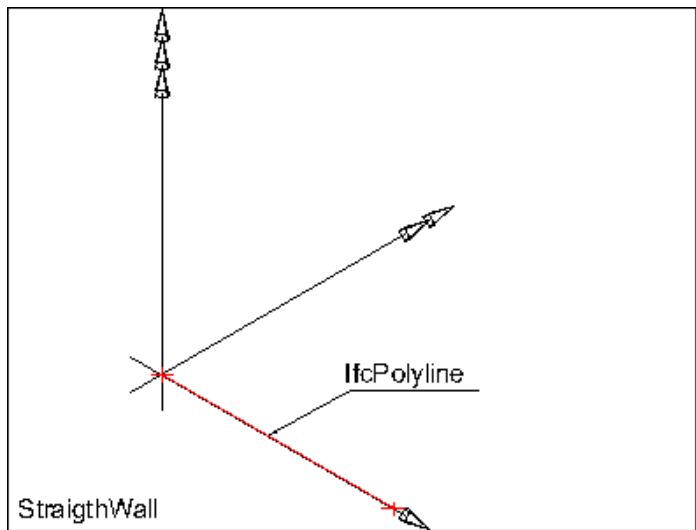


Figure 279 — Wall axis straight

EXAMPLE Figure 279 illustrates an axis representation for a straight wall. In case of a straight wall, the set of items shall include a single geometric representation item of type IfcPolyline or IfcTrimmedCurve with the BasisCurve being an IfcLine. The IfcPolyline or IfcTrimmedCurve shall be parallel (here in a special case co-linear) to the x-axis of the object coordinate system. The direction shall be identical to the direction of the x-axis.

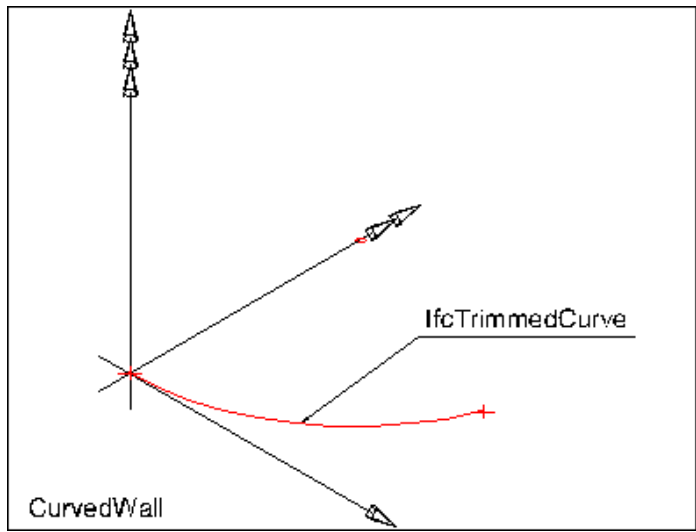


Figure 280 — Wall axis curved

EXAMPLE Figure 280 illustrates an axis representation for a curved wall. In case of a curved wall, the set of items shall include a single geometric representation item of type IfcTrimmedCurve. The curve shall have a BasisCurve of type IfcCircle. The tangent of the IfcTrimmedCurve shall be parallel at start to the x-axis of the object coordinate system. The direction shall be identical to the direction of the x-axis.

Surface Geometry

The Surface Geometry concept applies to this entity.

NOTE The 'Surface' can be used to define a surfacic model of the building (e.g. for analytical purposes, or for reduced Level of Detail representation).

Body SweptSolid Geometry

The **Body SweptSolid Geometry** concept applies to this entity.

The following additional constraints apply to the 'SweptSolid' representation:

- **Solid:** [IfcExtrudedAreaSolid](#) is required,
- **Profile:** [IfcArbitraryClosedProfileDef](#) is required.
- **Extrusion:** All extrusion directions shall be supported.

The following additional constraints apply to the 'SweptSolid' representation, when an [IfcMaterialLayerSetUsage](#) is assigned to the [IfcSlab](#):

- **Solid:** [IfcExtrudedAreaSolid](#) is required,
- **Profile:** [IfcArbitraryClosedProfileDef](#) and [IfcRectangleProfileDef](#) shall be supported.
- **Extrusion:** The profile shall be extruded vertically, i.e., in the direction of the z-axis of the co-ordinate system of the referred spatial structure element. It might be further constraint to be in the direction of the global z-axis in implementers agreements. The extrusion axis shall be perpendicular to the swept profile, i.e. pointing into the direction of the z-axis of the Position of the [IfcExtrudedAreaSolid](#).

The profile of a wall is described in the ground view and extruded vertically. The profile (also identical with the foot print of the wall) is defined by the [IfcArbitraryClosedProfileDef](#) (excluding its subtypes). The profile is given with all wall connections already resolved.

Figure 281 illustrates a body representation for a straight wall. In case of a straight wall, the two sides of the profile shall be parallel to the wall axis, that is, the wall has a single unchanged thickness.

Figure 282 illustrates a body representation for a curved wall. In case of a curved wall, the two sides of the profile shall be parallel (with defined offset) to the wall axis, that is, the wall has a single unchanged thickness.

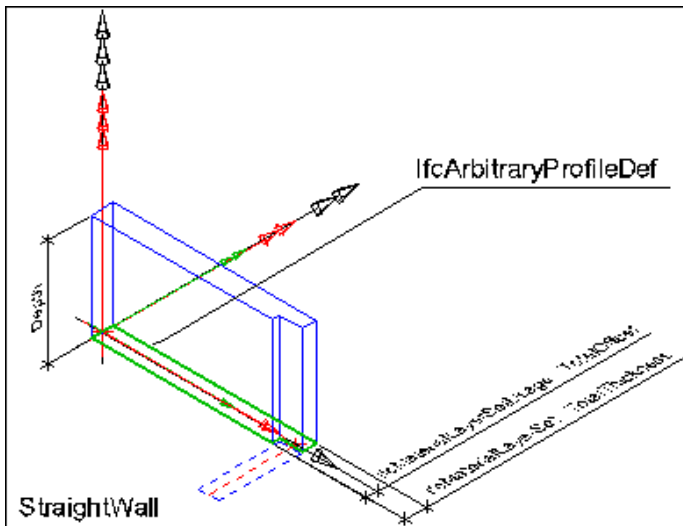


Figure 281 — Wall body extrusion straight

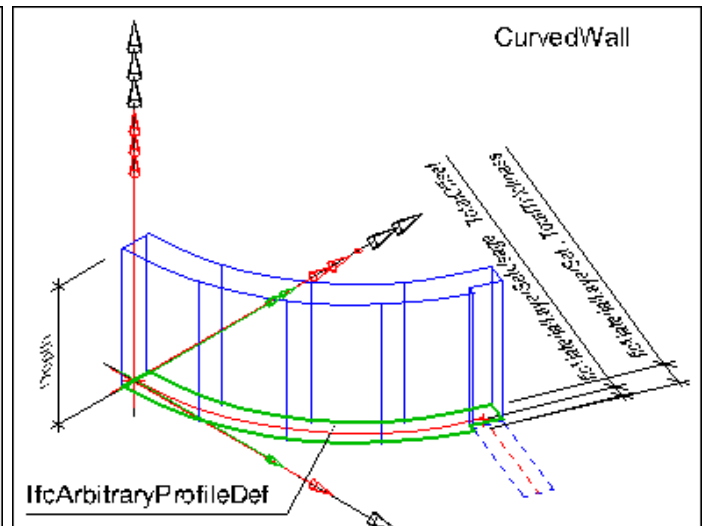


Figure 282 — Wall body extrusion curved

Body Clipping Geometry

The **Body Clipping Geometry** concept applies to this entity.

The following additional constraints apply to the 'SweptSolid' representation, when an [IfcMaterialLayerSetUsage](#) is assigned to the [IfcSlab](#):

- **Solid:** see standard geometric representation
- **Profile:** see standard geometric representation
- **Extrusion:** see standard geometric representation
- **Boolean result:** The [IfcBooleanClippingResult](#) shall be supported, allowing for Boolean differences between the swept solid (here [IfcExtrudedAreaSolid](#)) and one or several [IfcHalfSpaceSolid](#) (or subtypes).

Figure 283 illustrates a clipping for a straight wall using an [IfcPolygonalBoundedHalfSpace](#) as *SecondOperand* in the [IfcBooleanClippingResult](#).

Figure 284 illustrates a clipping for a curved wall using an [IfcHalfSpaceSolid](#) as *SecondOperand* in the [IfcBooleanClippingResult](#).

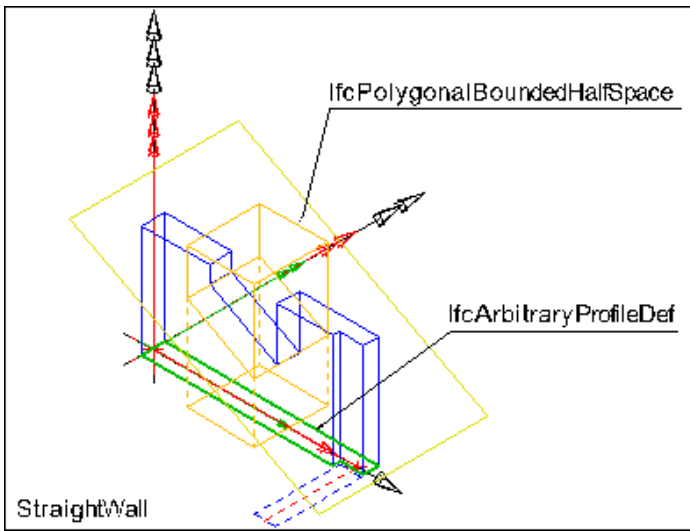


Figure 283 — Wall body clipping straight

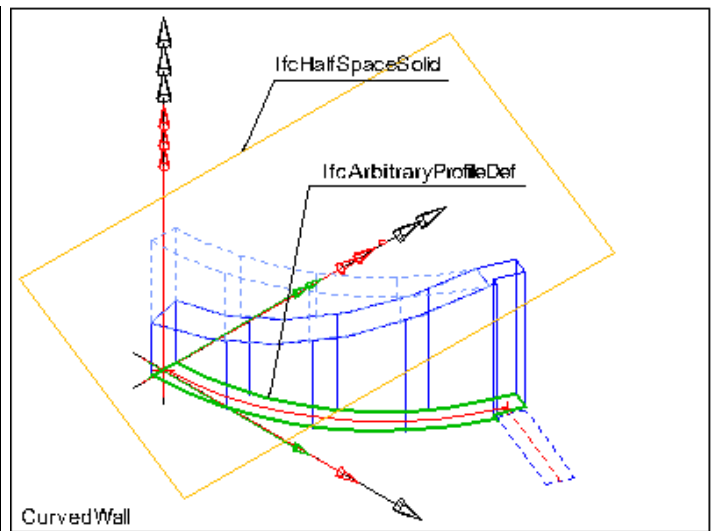


Figure 284 — Wall body clipping curved

▼ mvdXML Specification

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▼ Concept inheritance

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	Revision Control	Revision Control	General Usage
IfcObjectDefinition			
	Classification Association	Classification	General Usage
IfcObject			
	Object User Identity	Object User Identity	General Usage
	Object Predefined Type	Object Predefined Type	General Usage
	Property Sets with Override	Property Sets with Override	General Usage
IfcProduct			
	Product Placement	Product Placement	General Usage
	Product Geometric Representation	Product Geometric Representation	General Usage
IfcElement			
	Product Local Placement	Product Local Placement	General Usage
	CoG Geometry	CoG Geometry	General Usage
	Box Geometry	Box Geometry	General Usage
	FootPrint Geometry	FootPrint Geometry	General Usage
	Body SurfaceOrSolidModel Geometry	Body SurfaceOrSolidModel Geometry	General Usage
	Body SurfaceModel Geometry	Body SurfaceModel Geometry	General Usage
	Body Tessellation Geometry	Body Tessellation Geometry	General Usage
	Body Brep Geometry	Body Brep Geometry	General Usage
	Body AdvancedBrep Geometry	Body AdvancedBrep Geometry	General Usage
	Body CSG Geometry	Body CSG Geometry	General Usage
	Mapped Geometry	Mapped Geometry	General Usage
	Element Voiding	Element Voiding	General Usage
	Element Projecting	Element Projecting	General Usage
IfcBuildingElement			
	Product Assignment	Product Assignment	General Usage
	Surface 3D Geometry	Surface 3D Geometry	General Usage
IfcWall			
	Object Typing	Object Typing	General Usage
	Property Sets for Objects	Property Sets for Objects	General Usage
	Quantity Sets	Quantity Sets	General Usage
	Material Layer Set	Material Layer Set	General Usage
	Material Layer Set Usage	Material Layer Set Usage	General Usage

	Path Connectivity	Path Connectivity	General Usage
	Spatial Containment	Spatial Containment	General Usage
	Axis 2D Geometry	Axis 2D Geometry	General Usage
	Surface Geometry	Surface Geometry	General Usage
	Body SweptSolid Geometry	Body SweptSolid Geometry	General Usage
	Body Clipping Geometry	Body Clipping Geometry	General Usage

6.1.3.46.4 Examples

- Wall standard case
- Wall elemented case
- Wall with opening and window

6.1.3.46.5 Formal representations

▼ XML Specification

```
<xs:element name="IfcWall" type="ifc:IfcWall" substitutionGroup="ifc:IfcBuildingElement" nillable="true"/>
<xs:complexType name="IfcWall">
  <xs:complexContent>
    <xs:extension base="ifc:IfcBuildingElement">
      <xs:attribute name="PredefinedType" type="ifc:IfcWallTypeEnum" use="optional"/>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
```

▼ EXPRESS Specification

```
ENTITY IfcWall
  SUPERTYPE OF(ONEOF(IfcWallElementedCase, IfcWallStandardCase))
  SUBTYPE OF (IfcBuildingElement);
  PredefinedType : OPTIONAL IfcWallTypeEnum;
  WHERE
    CorrectPredefinedType : NOT(EXISTS(PredefinedType)) OR
    (PredefinedType <> IfcWallTypeEnum.USERDEFINED) OR
    ((PredefinedType = IfcWallTypeEnum.USERDEFINED) AND EXISTS (SELF\IfcObject.ObjectType));
    CorrectTypeAssigned : (SIZEOF(IsTypedBy) = 0) OR
    ('IFCSHAREDBLDGELEMENTS.IfctWallType' IN TYPEOF(SELF\IfcObject.IsTypedBy[1].RelatingType));
END_ENTITY;
EXPRESS-G diagram
```

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