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**TECHNICAL NOTE**  
**IFC4 IMPORT AND EXPORT**

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## Introduction

This document describes the import and export of Industry Foundation Classes IFC 4 files to and from ETABS 2013.1.2 or later and SAP2000 16.0.2 or later. Files written in IFC2x3, the previous release of IFC, can also be imported and exported but this older functionality is not described here.

IFC files are repositories of Building Information Modeling BIM data. Most of this data is not relevant to structural analysis and accordingly not imported by ETABS or SAP2000. Various types of IFC data are organized into subsets named “views” which gather data types relevant to various aspects of building design, construction, and maintenance. There are several such views, but only two views are relevant to ETABS and SAP2000: the “structural analysis view”, and the “architectural coordination view”.

The structural analysis view describes a building structure in terms of nodes, elements, and loads. Files containing a structural analysis view are the most suitable for import into ETABS and SAP2000, but are written by very few if any 3D building modeling programs. Such files are suitable for export to other structural software, such as steel and concrete detailing applications.

The architectural coordination view describes the components of a building in architectural terms. Files containing an architectural coordination view are quite prevalent. Only some of the entities in these files are relevant to ETABS or SAP2000, and whether these entities can be imported or not depends on how their geometry is described. For example, if the external faces of a beam or column are specified in the IFC file but its centerline is not, the beam or column cannot be imported. Furthermore, because the geometric extents of framing elements stop at the external faces of their supports, the user needs to systematically adjust end points after import. Architectural coordination view files are suitable for export to most building design software as they are generally well imported.

Whether it is a structural analysis view or architectural coordination view file, an IFC file contains, in addition to top level entities from these views, entities from shared supporting IFC schemas which complete the description of the top level entities and establish relationships between them.

This document includes seven sections:

1. Account of which structural analysis view entities can be imported.
2. Account of which architectural coordination view entities can be imported.
3. Account of which shared supporting schemas entities can be imported.
4. Procedure for importing an IFC file into ETABS or SAP2000.
5. Accounts of which ETABS and SAP2000 model components can be exported to a structural analysis view file.
6. Accounts of which ETABS and SAP2000 model components can be exported to an architectural view coordination file.
7. Describes the procedure for exporting an IFC file from ETABS or SAP2000.

## Structural Analysis View Import

### Structural Analysis Domain Entities

The table below indicates for each of the IFC entity types in the Structural Analysis domain whether it is imported into ETABS and SAP2000, and if it is imported, notes any restrictions:

IFC Entity	Imported	Restrictions
IfcRelConnectsStructuralActivity	Green	
IfcRelConnectsStructuralMember	Green	
IfcRelConnectsWithEccentricity	Yellow	Imported for ETABS frame objects and SAP2000 line objects
IfcStructuralAnalysisModel	Green	
IfcStructuralCurveAction	Yellow	Imported if connected to a structural item.
IfcStructuralCurveConnection	Red	
IfcStructuralCurveMember	Green	
IfcStructuralCurveMemberVarying	Red	Per the IFC 4 Specification, a curve member whose variation of profile properties can be sufficiently described by a start profile and an end profile (e.g. tapers) shall be modeled as a single direct instance of the supertype IfcStructuralCurveMember.
IfcStructuralCurveReaction	Red	
IfcStructuralLinearAction	Yellow	Imported if connected to a structural item.
IfcStructuralLoadCase	Green	
IfcStructuralLoadGroup	Green	
IfcStructuralPlanarAction	Yellow	Imported if connected to a structural item.
IfcStructuralPointAction	Yellow	Temperature loads not imported for point objects and shell objects, displacement loads not imported for frame objects and shell objects
IfcStructuralPointConnection	Green	
IfcStructuralPointReaction	Red	
IfcStructuralResultGroup	Red	
IfcStructuralSurfaceAction	Green	
IfcStructuralSurfaceConnection	Red	
IfcStructuralSurfaceMember	Green	
IfcStructuralSurfaceMemberVarying	Red	
IfcStructuralSurfaceReaction	Red	

### Structural Load Resource Entities

The table below indicates for each of the IFC entity types in the Structural Load Resource schema whether it is imported into ETABS and SAP2000, and if it is imported, notes any restrictions:

IFC Entity	Imported	Restrictions
IfcBoundaryEdgeCondition	Red	
IfcBoundaryFaceCondition	Red	
IfcBoundaryNodeCondition	Green	
IfcBoundaryNodeConditionWarping	Red	
IfcFailureConnectionCondition	Red	
IfcSlippageConnectionCondition	Red	
IfcStructuralLoadConfiguration	Green	
IfcStructuralLoadLinearForce	Green	
IfcStructuralLoadPlanarForce	Green	
IfcStructuralLoadSingleDisplacement	Yellow	Imported for point objects
IfcStructuralLoadSingleDisplacementDistortion	Red	
IfcStructuralLoadSingleForce	Green	
IfcStructuralLoadSingleForceWarping	Red	
IfcStructuralLoadTemperature	Yellow	Imported for frame objects
IfcSurfaceReinforcementArea	Red	

## Architectural Coordination View Import

### Shared Building Element Entities

The table below indicates for each of the IFC entity types in the Shared Building Element schema whether it is imported into ETABS and SAP2000, and if it is imported, notes any restrictions:

IFC Entity	Imported	Restrictions
IfcBeam	Yellow	Imported if it has a 'Body' shape representation with a 'SweptSolid' representation type and an IfcSweptAreaSolid; or if it has an 'Axis' shape with a 'Curve3D' representation type and an IfcBoundedCurve. The end points typically require adjustment by the user as they are at the face of the support – wall, column, or girder. Always imported as a straight line.
IfcBeamStandardCase	Green	
IfcBeamType	Green	
IfcBuildingElementProxy	Red	
IfcBuildingElementProxyType	Red	
IfcBuildingSystem	Red	
IfcChimney	Red	
IfcChimneyType	Red	
IfcColumn	Yellow	Imported if it has a 'Body' shape representation with a 'SweptSolid' representation type and an IfcSweptAreaSolid; or if it has an 'Axis' shape with a 'Curve3D' representation type and an IfcBoundedCurve. Always imported as a straight line.
IfcColumnStandardCase	Green	
IfcColumnType	Green	
IfcCovering	Red	
IfcCoveringType	Red	
IfcCurtainWall	Red	
IfcCurtainWallType	Red	
IfcDoor	Red	
IfcDoorStandardCase	Red	
IfcDoorType	Red	
IfcMember	Yellow	Imported if it has a 'Body' shape representation with a 'SweptSolid' representation type and an IfcSweptAreaSolid; or if it has an 'Axis' shape with a 'Curve3D' representation type and an IfcBoundedCurve. The end points typically require adjustment by the user as they are at the face of the support – wall, column, or girder. Always imported as a straight line.
IfcMemberStandardCase	Green	
IfcMemberType	Green	
IfcPlate	Red	

IfcPlateStandardCase	Red	
IfcPlateType	Red	
IfcRailing	Red	
IfcRailingType	Red	
IfcRamp	Red	
IfcRampFlight	Red	
IfcRampFlightType	Red	
IfcRampType	Red	
IfcRelConnectsPathElements	Red	
IfcRelCoversBldgElements	Red	
IfcRelCoversSpaces	Red	
IfcRoof	Red	
IfcRoofType	Red	
IfcShadingDevice	Red	
IfcShadingDeviceType	Red	
IfcSlab	Yellow	Imported if it has a 'Body' shape representation with a 'SweptSolid' representation type and an IfcSweptAreaSolid; or if it has an 'Axis' shape with a 'Curve3D' representation type and an IfcBoundedCurve. Always imported as a straight line
IfcSlabElementedCase	Red	
IfcSlabStandardCase	Green	
IfcSlabType	Green	
IfcStair	Red	
IfcStairFlight	Red	
IfcStairFlightType	Red	
IfcStairType	Red	
IfcWall	Red	
IfcWallElementedCase	Red	
IfcWallStandardCase	Green	
IfcWallType	Green	
IfcWindow	Red	
IfcWindowStandardCase	Red	
IfcWindowType	Red	

## Shared Schema Entity Import

### Core Data Entities

The table below indicates for each of the IFC entity types in the Core Data schema whether it is imported into ETABS and SAP2000, and if it is imported, notes any restrictions:

IFC Entity	Imported	Restrictions
IfcActor	Red	
IfcGroup	Yellow	Derived IfcStructuralLoadGroup entities imported
IfcProject	Green	
IfcPropertySet	Red	
IfcProxy	Red	
IfcRelAssignsToGroup	Green	
IfcRelAssignsToGroupByFactor	Green	
IfcRelAssignsToProduct	Red	
IfcRelDefinesByType	Green	
IfcTypeObject	Green	
IfcTypeProduct	Green	

### Geometric Constraint Resource Entities

The table below indicates for each of the IFC entity types in the Geometry Constraint Resource schema whether it is imported into ETABS and SAP2000, and if it is imported, notes any restrictions:

IFC Entity	Imported	Restrictions
IfcConnectionCurveGeometry	Red	
IfcConnectionPointEccentricity	Green	
IfcConnectionPointGeometry	Green	
IfcConnectionSurfaceGeometry	Red	
IfcConnectionVolumeGeometry	Red	
IfcGridAxis	Red	
IfcGridPlacement	Red	
IfcLocalPlacement	Green	
IfcVirtualGridIntersection	Red	

### Geometric Model Resource Entities

The table below indicates for each of the IFC entity types in the Geometry Model Resource schema whether it is imported into ETABS and SAP2000, and if it is imported, notes any restrictions:

IFC Entity	Imported	Restrictions
IfcAdvancedBrep	Yes	
IfcAdvancedBrepWithVoids	Yes	
IfcBlock	Yes	
IfcBooleanClippingResult	Yes	
IfcBooleanResult	Yes	
IfcBoundingBox	Yes	
IfcBoxedHalfSpace	Yes	
IfcCartesianPointList3D	Yes	
IfcCsgSolid	Yes	
IfcExtrudedAreaSolid	Yes	
IfcExtrudedAreaSolidTapered	Yes	
IfcFaceBasedSurfaceModel	Yes	
IfcFacetedBrep	Yes	
IfcFacetedBrepWithVoids	Yes	
IfcFixedReferenceSweptAreaSolid	Yes	
IfcHalfSpaceSolid	Yes	
IfcManifoldSolidBrep	Yes	
IfcPolygonalBoundedHalfSpace	Yes	
IfcRectangularPyramid	Yes	
IfcRevolvedAreaSolid	Yes	
IfcRevolvedAreaSolidTapered	Yes	
IfcRightCircularCone	Yes	
IfcRightCircularCylinder	Yes	
IfcShellBasedSurfaceModel	Yes	
IfcSphere	Yes	
IfcSurfaceCurveSweptAreaSolid	Yes	
IfcSweptAreaSolid	Yes	
IfcSweptDiskSolid	Yes	
IfcSweptDiskSolidPolygonal	Yes	
IfcTriangulatedFaceSet	Yes	

### Geometry Resource Entities

The table below indicates for each of the IFC entity types in the Geometry Resource schema whether it is imported into ETABS and SAP2000, and if it is imported, notes any restrictions:

IFC Entity	Imported	Restrictions
IfcAxis1Placement	Green	
IfcAxis2Placement2D	Green	
IfcAxis2Placement3D	Green	
IfcBoundaryCurve	Green	
IfcBSplineCurveWithKnots	Red	
IfcBSplineSurfaceWithKnots	Red	
IfcCartesianPoint	Green	
IfcCartesianTransformationOperator 2D	Green	
IfcCartesianTransformationOperator 2DnonUniform	Yellow	Imported as IfcCartesianTransformationOperator2D
IfcCartesianTransformationOperator 3D	Green	
IfcCartesianTransformationOperator 3DnonUniform	Yellow	Imported as IfcCartesianTransformationOperator3D
IfcCircle	Green	
IfcCompositeCurve	Green	
IfcCompositeCurveOnSurface	Green	
IfcCompositeCurveSegment	Green	
IfcCurveBoundedPlane	Red	
IfcCurveBoundedSurface	Red	
IfcCylindricalSurface	Red	
IfcDirection	Green	
IfcEllipse	Red	
IfcLine	Green	
IfcMappedItem	Green	
IfcOffsetCurve2D	Yellow	Imported only if BasisCurve is linear or circular
IfcOffsetCurve3D	Yellow	Imported only if BasisCurve is linear or circular
IfcOuterBoundaryCurve	Green	
IfcPcurve	Green	
IfcPlane	Green	
IfcPoint	Green	
IfcPointOnCurve	Green	
IfcPointOnSurface	Red	
IfcPolyline	Green	
IfcRationalBSplineCurveWithKnots	Red	
IfcRationalBSplineSurfaceWithKnots	Red	
IfcRectangularTrimmedSurface	Red	



IfcReparametrisedCompositeCurveSegment	Green	
IfcRepresentationMap	Green	
IfcSurfaceOfLinearExtrusion	Red	
IfcSurfaceOfRevolution	Red	
IfcTrimmedCurve	Green	
IfcVector	Green	

### Material Resource Entities

The table below indicates for each of the IFC entity types in the Material Resource schema whether it is imported into ETABS and SAP2000, and if it is imported, notes any restrictions:

IFC Entity	Imported	Restrictions
IfcMaterial	Green	
IfcMaterialConstituent	Red	
IfcMaterialConstituentSet	Red	
IfcMaterialLayer	Green	
IfcMaterialLayerSet	Green	
IfcMaterialLayerSetUsage	Green	
IfcMaterialLayerWithOffsets	Green	
IfcMaterialProfile	Green	
IfcMaterialProfileSet	Green	
IfcMaterialProfileSetUsage	Green	
IfcMaterialProfileSetUsageTapering	Green	
IfcMaterialProfileWithOffsets	Green	
IfcMaterialProperties	Yellow	Only the three following property sets are imported: common, mechanical, concrete, and steel.

### Measurement Resource Entities

The table below indicates for each of the IFC entity types in the Measurement Resource schema whether it is imported into ETABS and SAP2000, and if it is imported, notes any restrictions:

IFC Entity	Imported	Restrictions
IfcContextDependentUnit	Green	
IfcConversionBasedUnit	Green	
IfcConversionBasedUnitWithOffset	Green	
IfcDerivedUnit	Green	
IfcDerivedUnitElement	Green	
IfcDimensionalExponents	Green	
IfcMeasureWithUnit	Green	
IfcMonetaryUnit	Red	
IfcNamedUnit	Green	
IfcSIUnit	Green	
IfcUnitAssignment	Green	

### Product Extension Entities

The table below indicates for each of the IFC entity types in the Product Extension schema whether it is imported into ETABS and SAP2000, and if it is imported, notes any restrictions:

IFC Entity	Imported	Restrictions
IfcBuilding	Red	
IfcBuildingStorey	Yellow	Imported in ETABS only
IfcGrid	Red	
IfcOpeningElement	Red	
IfcOpeningStandardCase	Red	
IfcRelAssociatesMaterial	Green	
IfcRelConnectsElements	Red	
IfcRelContainedInSpatialStructure	Green	
IfcSite	Red	

### Profile Resource Entities

The table below indicates for each of the IFC entity types in the Profile Resource schema whether it is imported into ETABS and SAP2000, and if is imported, notes any restrictions:

IFC Entity	Imported	Restrictions
IfcArbitraryClosedProfileDef	Yellow	Imported if the ProfileName attribute matches a section name in the .PRO or .XML catalog file specified when the file is imported
IfcArbitraryOpenProfileDef	Yellow	
IfcArbitraryProfileDefWithVoids	Yellow	
IfcAsymmetricIShapeProfileDef	Green	
IfcCenterLineProfileDef	Red	
IfcCircleHollowProfileDef	Green	
IfcCircleProfileDef	Green	
IfcCompositeProfileDef	Yellow	Only double angle and double channel profiles are imported
IfcCShapeProfileDef	Green	
IfcEllipseProfileDef	Red	
IfcIShapeProfileDef	Green	
IfcLShapeProfileDef	Green	
IfcMirroredProfileDef	Green	
IfcProfileProperties	Green	
IfcRectangleHollowProfileDef	Green	
IfcRectangleProfileDef	Green	
IfcReinforcementBarProperties	Red	
IfcRoundedRectangleProfileDef	Red	
IfcSectionProperties	Green	
IfcSectionReinforcementProperties	Red	
IfcTrapeziumProfileDef	Red	
IfcTShapeProfileDef	Green	
IfcUShapeProfileDef	Green	
IfcZShapeProfileDef	Red	

### Property Resource Entities

The table below indicates for each of the IFC entity types in the Property Resource schema whether it is imported into ETABS and SAP2000, and if it is imported, notes any restrictions:

IFC Entity	Imported	Restrictions
IfcComplexProperty	Red	
IfcExtendedProperties	Red	
IfcPreDefinedProperties	Red	
IfcPropertyBoundedValue	Red	
IfcPropertyListValue	Red	
IfcPropertyReferenceValue	Red	
IfcPropertySingleValue	Green	
IfcPropertyTableValue	Red	

### Representation Resource Entities

The table below indicates for each of the IFC entity types in the Representation Resource schema whether it is imported into ETABS and SAP2000, and if it is imported, notes any restrictions:

IFC Entity	Imported	Restrictions
IfcGeometricRepresentationContext	Green	
IfcGeometricRepresentationSubContext	Red	
IfcProductDefinitionShape	Green	
IfcProductRepresentation	Green	
IfcShapeAspect	Green	
IfcShapeRepresentation	Green	
IfcTopologyRepresentation	Red	

### Topology Resource Entities

The table below indicates for each of the IFC entity types in the Representation Resource schema whether it is imported into ETABS and SAP2000, and if it is imported, notes any restrictions:

IFC Entity	Imported	Restrictions
IfcAdvancedFace	Green	
IfcClosedShell	Red	
IfcConnectedFaceSet	Green	
IfcEdge	Green	
IfcEdgeCurve	Green	
IfcEdgeLoop	Red	
IfcFace	Red	
IfcFaceBound	Red	
IfcFaceOuterBound	Red	
IfcFaceSurface	Red	
IfcOrientedEdge	Green	
IfcPath	Red	
IfcPolyLoop	Red	
IfcSubEdge	Green	
IfcVertex	Yellow	Derived IfcVertexPoint entities imported
IfcVertexLoop	Red	
IfcVertexPoint	Green	

### Utility Resource Entities

The table below indicates for each of the IFC entity types in the Utility Resource schema whether it is imported into ETABS and SAP2000, and if it is imported, notes any restrictions:

IFC Entity	Imported	Restrictions
IfcApplication	Red	
IfcOwnerHistory	Red	

## Import Procedure

### Importing into ETABS 2013

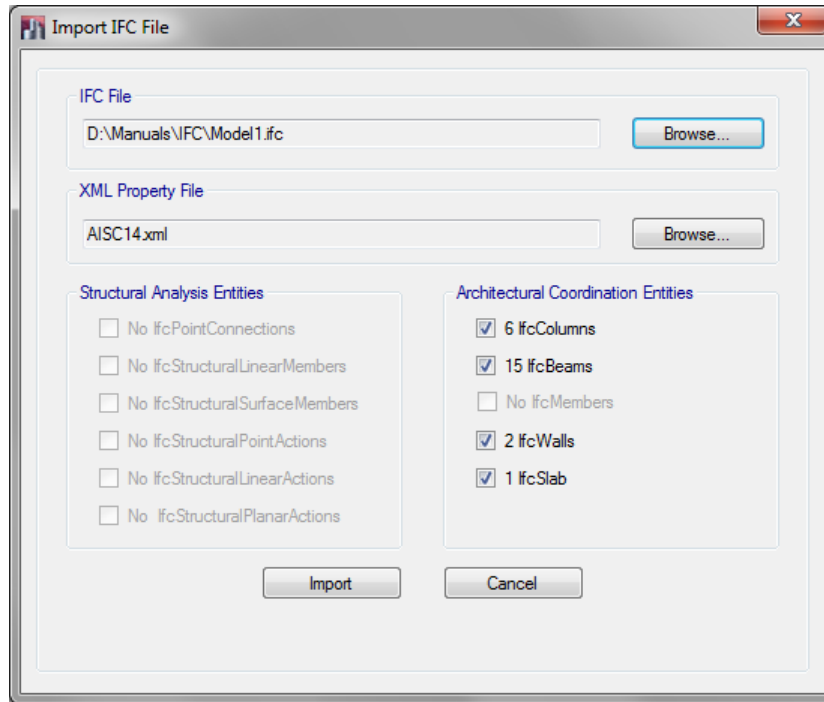
- From the start page of ETABS, choose Import > IFC File... under the File menu. The Import IFC File form is displayed:

The screenshot shows the 'Import IFC File' dialog box. It has a title bar with a close button. The main area is divided into several sections:

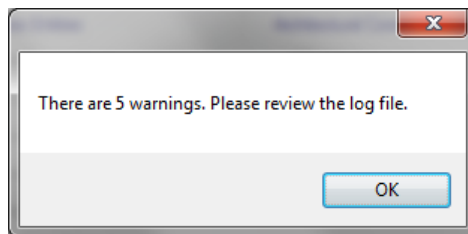
- IFC File:** A text input field with a 'Browse...' button to its right.
- XML Property File:** A text input field containing 'AISC14.xml' with a 'Browse...' button to its right.
- Structural Analysis Entities:** A list of six checkboxes, all unchecked:
  - No IfcStructuralPointConnections
  - No IfcStructuralCurveMembers
  - No IfcStructuralSurfaceMembers
  - No IfcStructuralPointActions
  - No IfcStructuralLinearActions
  - No IfcStructuralSurfaceActions
- Architectural Coordination Entities:** A list of five checkboxes, all unchecked:
  - No IfcColumns
  - No IfcBeams
  - No IfcMembers
  - No IfcWalls
  - No IfcSlabs

At the bottom of the dialog are two buttons: 'Import' and 'Cancel'.

- Pick the Browse... button. The Open form is displayed. Navigate to the folder containing the IFC file to import, and select it. ETABS parses the file, which may take a few seconds, and displays an account of its relevant content:



- To select a section catalog other than AISC14.xml, pick the Browse button and select a different .xml file in the Open form. ETABS imports most IFC profiles that are subtypes of IfcParameterizedProfileDef, with a few exceptions such as IfcEllipseProfileDef. However, many 3D building modeling programs do not export section profiles this way, and instead export them as IfcArbitraryClosedProfileDef entities which are defined by their outlines. Such profile entities are not directly useable for analysis and design. However, if their ProfileName attribute matches one of the section names in the section catalog you selected, these profile entities are imported as the corresponding ETABS section.
- Select the type of IFC entities to import. If the file includes both Structural Analysis view and Architectural Coordination view entities, you should choose one type or the other. If you import both, you may get duplicate members.
- Pick the Import button. After a few moments, ETABS displays the imported model. If there are error or warnings, a message box will be displayed to that effect. You should then review the log file. Its name and folder location are the same as those of the .IFC file you imported, with the extension changed to .ifcimp.log



### Importing into SAP2000

The procedure is identical. The differences are you access the Import > IFC File in the File menu from a blank SAP2000 model instead of the ETABS start page, and you specify a sections catalog file with a .pro file extension instead of .xml.

### Reviewing the Log File (.ifcimp.log)

A typical log file is listed below. It includes:

- The name of the imported file, its IFC version, the version of the importing program, the date and time
- Any relevant warning or error messages, if the file could not be imported. Each IFC entity is listed with its item number in the .IFC file, its name, and its coordinates if it has any
- A list of imported entities
- A list of entities not processed

File "D:\Manuals\IFC\Modell.ifc" 2x3 imported in ETABS 2013 at 2013-06-27T11:35:10

IfcMaterial imported as No design in ETABS 2013 for the following items:

92 named STEEL/A992  
245 named CONCRETE/3000  
408 named A615-60  
13292 named CONCRETE/1500  
13350 named STEEL/A500-GR.B

Imported entities:

3 of type IFCARBITRARYCLOSEDPROFILEDEF  
3 of type IFCAXIS2PLACEMENT2D  
160 of type IFCAXIS2PLACEMENT3D  
15 of type IFCBEAM  
6 of type IFCBEAMTYPE  
1 of type IFCBUILDINGSTOREY  
1192 of type IFCARTESIANPOINT  
1210 of type IFCARTESIANTRANSFORMATIONOPERATOR3D  
1 of type IFCCIRCLEPROFILEDEF  
6 of type IFCCOLUMN  
2 of type IFCCOLUMNTYPE  
28 of type IFCDIRECTION  
22 of type IFCEXTRUDEDAREASOLID  
1 of type IFCGEOMETRICREPRESENTATIONCONTEXT  
7 of type IFCISHAPEPROFILEDEF  
144 of type IFCLOCALPLACEMENT  
1 of type IFCLSHAPEPROFILEDEF  
1210 of type IFCMAPPEDITEM  
5 of type IFCMATERIAL  
2 of type IFCMATERIALLAYER  
2 of type IFCMATERIALLAYERSET  
3 of type IFCMATERIALLAYERSETUSAGE  
1 of type IFCOWNERHISTORY  
5 of type IFCPOLYLINE  
139 of type IFCPRODUCTDEFINITIONSHAPE  
1 of type IFCPROJECT  
4831 of type IFCPROPERTY SINGLEVALUE  
2 of type IFCRECTANGLEPROFILEDEF  
6 of type IFCRELASSOCIATESMATERIAL  
1 of type IFCRELCONTAINEDINSPATIALSTRUCTURE  
10 of type IFCRELDEFINESBYTYPE  
1210 of type IFCREPRESENTATIONMAP  
1351 of type IFCSHAPEREPRESENTATION  
9 of type IFCSIUNIT  
1 of type IFCSLAB  
1 of type IFCSLABTYPE  
38 of type IFCSTYLEDITEM  
1 of type IFCUNITASSIGNMENT  
2 of type IFCWALLSTANDARDCASE  
1 of type IFCWALLTYPE

Other entities:

1 of type IFCAPPLICATION



1 of type IFCBUILDING  
22 of type IFCCLOSEDSHELL  
10 of type IFCCOLOURRGB  
2 of type IFCELEMENTASSEMBLY  
20 of type IFCELEMENTQUANTITY  
441 of type IFCFACE  
441 of type IFCFACEOUTERBOUND  
26 of type IFCFACETEDBREP  
3 of type IFCGEOMETRICREPRESENTATIONSUBCONTEXT  
10 of type IFCOPENINGELEMENT  
1 of type IFCORGANIZATION  
1 of type IFCPERSON  
1 of type IFCPERSONANDORGANIZATION  
441 of type IFCPOLYLOOP  
1 of type IFCPOSTALADDRESS  
5 of type IFCPRESENTATIONLAYERASSIGNMENT  
13 of type IFCPRESENTATIONSTYLEASSIGNMENT  
284 of type IFCPROPERTYSET  
19 of type IFCQUANTITYAREA  
20 of type IFCQUANTITYLENGTH  
20 of type IFCQUANTITYVOLUME  
20 of type IFCQUANTITYWEIGHT  
105 of type IFCREINFORCINGBAR  
5 of type IFCRELAGGREGATES  
304 of type IFCRELDEFINESBYPROPERTIES  
10 of type IFCRELVOIDSELEMENT  
1 of type IFCSITE  
13 of type IFCSURFACESTYLE  
10 of type IFCSURFACESTYLERENDERING

## Structural Analysis View Export

### Export from ETABS

The table below indicates for each of the ETABS model components whether it is exported to structural analysis view files, and if it is exported, the IFC entity written:

Model Element	Exported	IFC Entity
Project		
Project Information	Yes	IfcProject
Design Preferences	No	
Structure Layout		
Stories	Yes	IfcBuildingStorey
Grid Systems	No	
Properties		
Materials	Yes	IfcMaterial and IfcMaterialProperties. The mechanical properties of non-isotropic properties are not exported.
Frame Sections	Yes	Appropriate IfcParameterizedProfileDef subtype for basic profiles or IfcCompositeProfileDef in the case of double angle or double channels. Nonprismatic sections with two basic profiles of the same type at each end are exported as an IfcMaterialProfileSetUsageTapering; if the nonprismatic section has multiple segments, the internal sections are ignored and a single segment between the start and end section is assumed. Other sections are exported as an IfcProfileDef with an associated IfcProfileProperties describing the profile mechanical properties.
Insertion Point	Yes	IfcMaterialProfileSetUsage
Slab Sections	Yes	IfcStructuralSurfaceMember
Deck Sections	Yes	Exported as an IfcStructuralSurfaceMember with thickness equal to the concrete cover thickness
Wall Sections	Yes	IfcStructuralSurfaceMember
Reinforcing Bar Sizes	No	
Spring Properties	Yes	
Point Springs	Yes	IfcBoundaryCondition
Line Springs	No	
Area Springs	No	
Diaphragms	No	
Hinge Properties	No	
Panel Zones	No	
Structural Objects		
Joint Objects	Yes	IfcStructuralConnection at object ends. Intermediate joints on frame objects are not exported, and frame objects supported at intermediate joints are not connected.
Joint restraints	Yes	IfcBoundaryCondition
Columns	Yes	
Beams	Yes	One IfcStructuralCurveMember per frame object

Braces		One IfcStructuralCurveMember per frame object
Other Frame Objects		
Restrains		IfcBoundaryCondition
End Length Offsets		IfcRelConnectsWithEccentricity
Insertion Points		
Floors		IfcStructuralSurfaceMember
Walls		IfcStructuralSurfaceMember
Openings		
Other Shell Objects		
Link Objects		
Groups		
Loads		
Functions		
Load Patterns		IfcStructuralLoadGroup. Seismic and Wind Auto-lateral load patterns not exported.
Selfweight		
Modal Cases		
Static Load Cases		IfcStructuralLoadCase
Load Combinations		IfcStructuralLoadGroup
Shell Uniform Load Sets		
Joint Loads		IfcStructuralPointAction
Ground Displacement		
Force		
Temperature		
Frame Loads		
Point		IfcStructuralPointAction
Distributed		IfcStructuralCurveAction
Temperature		
Open Structure Wind Parameters		
Shell Loads		
Uniform Load Sets		
Uniform		IfcStructuralPlanarAction
Temperature		
Analysis Results		
Joint Displacement		
Support Reactions		
Frame Forces		
Shell Forces		

## Export from SAP2000

The table below indicates for each of the possible SAP2000 model components whether it is exported to structural analysis view files, and if it is exported, the IFC entity written:

Model Element	Exported	IFC Entity
Project		
Project Information	Green	IfcProject
Design Preferences	Red	
Structure Layout		
	Green	IfcBuildingStorey created for each point object z elevation in the model
Grid Systems	Red	
Properties		
Materials	Yellow	IfcMaterial and IfcMaterialProperties. The mechanical properties of non-isotropic properties are not exported.
Frame Sections	Green	Appropriate IfcParameterizedProfileDef subtype for basic profiles or IfcCompositeProfileDef in the case of double angle or double channels. Other sections are exported as an IfcProfileDef with an associated IfcProfileProperties describing the profile mechanical properties.
Insertion Point	Green	IfcMaterialProfileSetUsage
Area Sections	Green	IfcStructuralSurfaceMember
Restraints	Green	IfcBoundaryCondition
Spring Properties	Yellow	
Point Springs	Green	IfcBoundaryCondition
Line Springs	Red	
Area Springs	Red	
Structural Objects		
Joint Objects	Yellow	IfcStructuralConnection at object ends. Intermediate joints on frame objects are not connected to the supporting frame objects.
Joint restraints and local axes	Light Green	IfcBoundaryCondition
Joint Constraints	Red	
Frame Objects	Green	One IfcStructuralCurveMember per frame object
Restraints	Green	IfcBoundaryCondition
End Length Offsets	Green	IfcRelConnectsWithEccentricity
Joint Offsets	Green	
Cable Objects	Green	IfcStructuralCurveMember
Tendon Objects	Red	
Area Objects	Green	IfcStructuralSurfaceMember
Link Objects	Red	
Solid Objects	Red	
Groups	Red	
Loads		
Functions	Red	

Load Patterns	Yellow	IfcStructuralLoadGroup. Seismic and Wind Auto-lateral load patterns not exported.
Selfweight	Green	
Modal Cases	Red	
Static Load Cases	Green	IfcStructuralLoadCase
Load Combinations	Green	IfcStructuralLoadGroup
Joint Loads	Yellow	
Ground Displacement	Green	IfcStructuralPointAction
Force	Green	
Temperature	Red	
Frame Loads	Green	
Gravity	Green	IfcStructuralCurveAction
Point	Green	IfcStructuralPointAction
Distributed	Green	IfcStructuralCurveAction
Temperature	Red	
Strain	Red	
Deformation	Red	
Target Force	Red	
Auto Wave Loading Parameters	Red	
Open Structure Wind Parameters	Red	
Shell Loads	Green	
Gravity	Red	
Uniform	Green	IfcStructuralPlanarAction
Uniform to Frame	Red	
Surface Pressure	Red	
Temperature	Red	
Strain	Red	
Rotate	Red	
Wind Pressure	Red	
Solid Loads	Red	
Analysis Results		
Joint Displacements	Red	
Support Reactions	Red	
Frame Forces	Red	
Shell Forces	Red	
Solid Forces	Red	

## Architectural Coordination View Export

### Export from ETABS

The table below indicates for each of the possible ETABS model components whether it is exported to architectural coordination view files, and if it is exported, the IFC entity written:

Model Element	Exported	IFC Entity
Project		
Project Information	Yes	IfcProject
Structure Layout		
	Yes	IfcBuildingStorey created for each point object z elevation in the model
Grids	No	
Properties		
Materials	Yes	IfcMaterial and IfcMaterialProperties.
Frame Sections	Yes	Appropriate IfcParameterizedProfileDef subtype for basic profiles or IfcCompositeProfileDef in the case of double angle or double channels. Nonprismatic sections with two basic profiles of the same type at each end are exported as an IfcMaterialProfileSetUsageTapering; if the nonprismatic section has multiple segments, the internal sections are ignored and a single segment between the start and end section is assumed.
Insertion Point	Yes	IfcMaterialProfileSetUsage
Slab Sections	Yes	IfcMaterialLayerSetUsage
Deck Sections	Yes	Exported as an IfcMaterialLayerSetUsage with thickness equal to the deck total thickness
Wall Sections	Yes	IfcMaterialLayerSetUsage
Structural Objects		
Joint Objects	Yes	Frame and shell object locations are exported after adjusting for end length offsets and section insertion point
Columns	Yes	IfcColumnStandardCase or IfcColumn if the column has a nonprismatic section. Only exported if the section is a basic profile, a double angle, a double channel, or a nonprismatic section with two basic profiles of the same type at each end.
Beams	Yes	IfcBeamStandardCase or IfcBeam if the beam has a nonprismatic section. Only exported if the section is a basic profile, a double angle, a double channel, or a nonprismatic section with two basic profiles of the same type at each end.
Braces	Yes	IfcMemberStandardCase or IfcMember if the brace has a nonprismatic section. Only exported if the section is a basic profile, a double angle, a double channel, or a nonprismatic section with two basic profiles of the same type at each end.
Other Frame Objects	Yes	
End Length Offsets	Yes	
Joint Offsets	Yes	
Floors	Yes	IfcSlabStandardCase
Walls	Yes	Vertical walls exported as IfcWallStandardCase
Openings	No	
Other Shell Objects	No	

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Groups		
Loads		
Any Load Data		

## Export from SAP2000

The table below indicates for each of the possible SAP2000 model components whether it is exported to architectural coordination view files, and if it is exported, the IFC entity written:

Model Element	Exported	IFC Entity
Project		
Project Information	Yes	IfcProject
Structure Layout		
Stories	Yes	IfcBuildingStorey created for each point object z elevation in the model
Grids	No	
Properties		
Materials	Yes	IfcMaterial
Frame Sections	Yes	Appropriate IfcParameterizedProfileDef subtype
Insertion Point	Yes	IfcMaterialProfileSetUsage
Area Sections	Yes	IfcMaterialLayerSetUsage
Restraints	No	IfcBoundaryCondition
Spring Properties	No	
Diaphragms	No	
Hinge Properties	No	
Panel Zones	No	
Structural Objects		
Joint Objects	Yes	Locations exported for each frame or shell object after end length offsets and insertion point adjustments
Vertical Frame Objects	Yes	IfcColumnStandardCase or IfcColumn if the object has a nonprismatic section. Only exported if the profile is a basic profile or a double angle or double channel, or a nonprismatic section with two basic profiles of the same type at each end.
Horizontal Frame Objects	Yes	IfcBeamStandardCase or IfcBeam if the object has a nonprismatic section. Only exported if the profile is a basic profile or a double angle or double channel, or a nonprismatic section with two basic profiles of the same type at each end.
Other Frame Objects	Yes	IfcMemberStandardCase or IfcMember if the object has a nonprismatic section. Only exported if the profile is a basic profile or a double angle or double channel, or a nonprismatic section with two basic profiles of the same type at each end.
End Length Offsets	Yes	
Joint Offsets	Yes	
Cable Objects	Yes	
Tendon Objects	No	
Vertical Area Objects	Yes	IfcWallStandardCase
Other Area Objects	Yes	IfcSlabStandardCase
Solid Objects	No	
Other shell objects	No	
Groups	No	



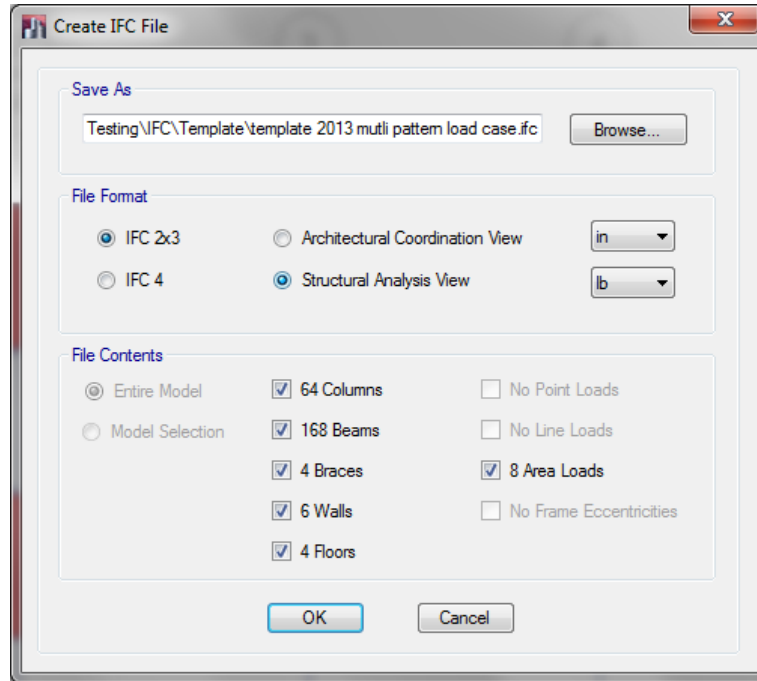
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Loads		
Any type of load data		

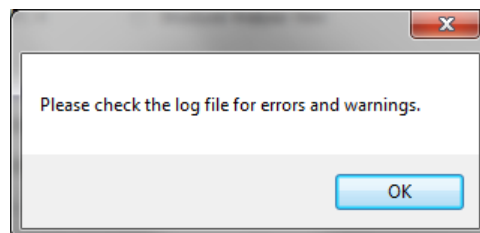
## Export Procedure

### Exporting from ETABS 2013

- Open an ETABS model to export.
- To export only selected objects from the model, make a selection. This option is helpful when a model has been previously exported to another application and you wish to update it. You can then export only those objects that need updating.
- Choose Export >IFC File... under the File menu. The Create IFC File form is displayed:



- To save the file under a different name or in a different folder location, click the Browse... button, and specify these in the Save As... form which is displayed.
- Make relevant file format selections: IFC2x3 or IFC4, Architectural Coordination view or Structural view, and the length and force units. Force units only apply if you are writing a Structural view file.
- Choose specific model contents to export by checking or unchecking the corresponding buttons and boxes. The button letting you choose between Entire Model and Model Selection is only active if there are selected objects. Loads can only be exported to a Structural View file.
- Click OK. ETABS writes the file. If there are warnings, a message box will be displayed to that effect. You should review the log file. Its name and folder location are the same as those of the model you exported, with the extension changed to .ifcexp.log



### Exporting from SAP2000

The procedure is identical. The difference is you open a SAP2000 model instead of an ETABS model, and the model contents to export are of slightly different types:

