

Revision of ruleset

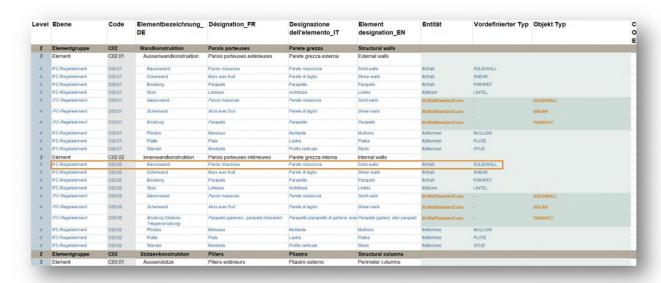
The ruleset for classification of the elements of an IFC model in terms of the Swiss Element-Based Cost Classification for Building Construction (eCC-BC) has been comprehensively revised and updated:

on the one hand, the building construction part of the IFC rulesets has been adapted in line with the revised eCC-BC 2020. On the other hand, due account has also been taken of various considerations regarding long-term mapping of the IFC data model during revision so as to pave the way for more detailed CRB catalogues and other applications.

Rule elements

The new ruleset, like the previous one, relates to levels 1 to 3 of the eCC-BC. Now, however, the allocations of the individual entities are listed separately as so-called "rule elements". Allowance can thus be made for the fact that, under the definition, several different occurrences of parts of works – sometimes differently modelled – are often possible for a single eCC-BC element.

The rule elements indicate the most important entities that can normally be allocated to an element. The fact that they are now clearly designated will ensure a greater degree of transparency.

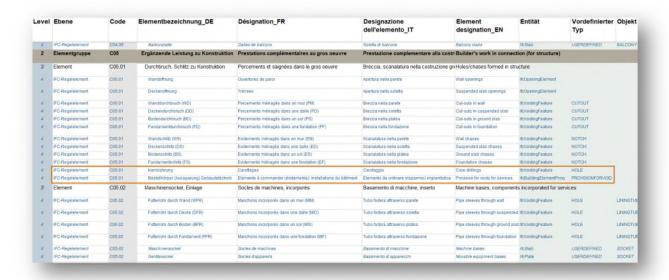




PROVISIONFORVOID and IfcVoidingFeature

Different model phases can sometimes be accommodated within a single element using different rule elements:

in Element C05.01 (Holes/chases formed in structure), for instance, "Provision for void for services" (IfcBuildingElementProxy/PROVISIONFORVOID) can be passed on to the building services model for co-ordination and subsequent documentation in the form of specific openings, holes, chases etc. (IfcVoidingFeature.xxxx) (see standard SIA 400) in the architectural and/or structural model.



Both options are listed as rule elements under the element so as to enable the ruleset to function independently of the project phase or agreements within the project team regarding the co-ordination of voids.

Relationship with systems (IfcBuiltSystem, IfcDistributionSystem)

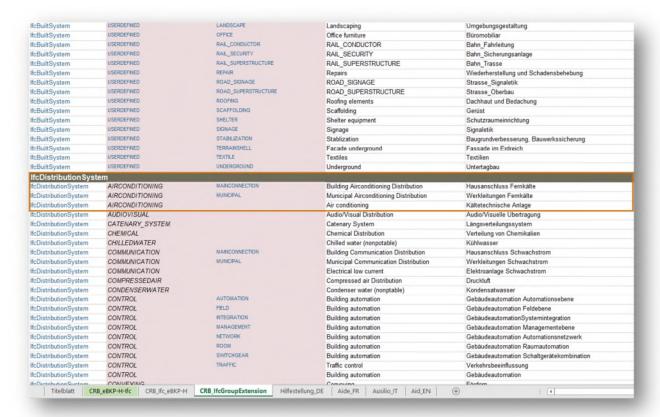
Even as early as 2000, with version IFC 2x1, it was possible to allocate parts of works to a system and thereby group them together by their role in the building. This is actively used, for example, to distinguish between different systems in building services models. This allocation to systems serves far more than the purposes of cost-based modelling considerations and should therefore be used more intensively.

The specific advantage of using systems consists in the resulting possibility of objects entering several different relationships with systems. This is the case, for example, with a door that is connected to the access control system and features in both the "INTERIOR" and the "SECURITY" systems.

In the IFC data model, parts of works are allocated to a built system (IfcBuildingSystem, as of IFC 4x3 IfcBuiltSystem) and building services elements to a distribution system or installation (IfcDistributionSystem). For both systems, the IFC data model already contains predefined enumerations (IfcBuiltSystemTypeEnum, IfcDistributionSystemEnum), which CRB, during revision of the eCC-BC, is complementing with its own consolidated concepts for Switzerland.



CRB_IfcGroupExtension



It should be mentioned at this point that similar provision is planned for spaces in the IFC data model. These can be allocated to zones or spatial zones (IfcZone, IfcSpatialZone). This, for example, allows the modelling of groups of spaces that form an apartment. This strategy is particularly useful for Main Group H as it allows simple specification (without any additional user-defined characteristics) of those spaces, for example, to be allocated to a "H02 Laboratory facilities" usable area and analysis of the associated reference parameter.

Standardized attributes of parts of works (PredefinedType and ObjectType)

In the IFC data model, the characteristics of elements undergo a further technical subdivision into attributes and properties. Properties are grouped together in sets (Pset) and can, in principle, be assigned to several parts of works. Attributes differ from these solely in that their occurrence (e.g. value range) has a specific significance for each particular part of works. The most typical attributes are:

Globalld Globally unique identifier
Name Designation/number
Explanatory statement

ObjectType* Designates a specific type that more closely defines the object

PredefinedType General type for a part of works that is predefined in an enumeration.

(* Contains the user-defined type where the enumeration of the PredefinedType attribute is set to USERDEFINED.)

Wherever possible, the values in the enumerations of the IFC data model were factored into the ruleset. Where these are inadequate, the PredefinedType is set to "USERDEFINED" and the ObjectType used for a closer definition. Here too, as part of the eCC-BC revision, CRB has added its own consolidated concepts for Switzerland to the ObjectType in order to guarantee continuity in allocation.



• CRB_ObjectTypeExtension

Ifc.Entity	PredefinedType	ObjectType	CRB- ObjectType Extension	Elementbezeichnung_DE	Désignation_FR	Designazione dell'elemento_IT	Element designation_EN	eBKP-H Code
lfcElectricAppliance							The Samuel Street	All and a second
fcElettricApplance				Schwachstromverbraucher	Récepteurs de courant faible	Fruitore di corrente detrole	Low-current-using equipment	D01,11
fcEiedricAppliance	DISHWASHER			Geschirrspühlmaschire	Lave-valuelle	Levestovigle	Dishwashers	G05.02
fotiechicApplance	ELECTRICCOOKER			Herd	Cuisinières	Cucina	Stoves	G05.02
fcElectricApplance	FREESTANDINGELECTRICH EATER			Elektroheizung	Chauffages électriques	Riscaldamento elettrico	Electric heaters	D01,06
fcElectricAppliance	FREESTANDINOFAN			Vertilator	Vertideurs	Vertilatore	Fans	J02.03
fctiectricApplance	PREESTANDINGWATERCO OLER:			Wasserkühlgerät	Hetrodisseurs à eau	Apparecchio di raffreddamento dell'acqua	Water coolers	J02.03
fcDectricApplance	FREESTANDINGWATERHE ATER			Wassererwärmer	Chauffe-esu	Scaldasoqua	Water heaters	D01,06
follectricApplance	PREEZER			Gefrerschrank	Congélateurs	Congelatore	Freezers	G05,02
fcElectricAppliance	FREIGE_FREEZER			Kunt-Gefrierschrankkombination	Rétrigérateurs-congélateurs	Frigorifero-congelatore combinata	Fridge-freezers	G05.02
fcElectricAppliance	HANDORYER			Handrickner	Séchaira	Asciugamani elettrici	Hand shera	J02.03
fcElectricAppliance	KOTCHERMACHINE			Küchermaschine	Robots de cuisire	Elettrodomestico da cucina	Kitchen machines	G05.02
fcEectnicAppliance	MICROWAVE			Microwelle	Micro-endes	Microende	Microwaves	G05.02
fcf.lectncApplance	PRINTER			Drucker	Imprimentes	Stampania	Printers	J02,03
tcElectricApplance	REFRIGERATOR			Kunischrank	Rétrigérateurs	Frigoritero	Retrigerators	G05.02
fcElectricAppliance	SCANNER			Scanner	Scanner	Scanner	Scarners	J02.03
foElectricAggiance.	TUMBLEDRYER			Waschetrockner	Séche-linge	Asclugatrice	Laundry driers	D01,06
fcEectricApplance	USERDEFINED	CLOCK	WAHR	Uhr	Horioges	Cirologio	Clocks	D01.11
fcf.lectncApplance	USERDEFINED	COFFEENACHNE	WAHP	Kaffeautomat	Machines à café	Marchina per catté	Coffee machines	J02.03
fcElectricApplance.	USERDEFINED	MULTIFUNCTIONALDEVICE	WAHE	Multifunktionagerät	Appereils multifunctions	Appareachio multifunzione	Multi-functional devices	J02.03
fcElectricApplance	USERDEFINED	OVEN	THAW	Offers	Poélez	Forno	Ovens	G05,02
fcElectricApplance	USERDEFINED	STEAVER:	WANT	Steamer	Fours à vapeur	Steamer	Steamers	G05.02
fcElectricAppliance	USERDEFNED	TMELOG	WAHE	Zeiterfassungastation	Station de sa/ale des temps	Stazione di rilevamento dei fempi	Time-logging stations	D01.11
fof:ectricApplance	USERDEFINED	VENDINGMACHINE	3HAWK	Verkaufsautomat	Distributeurs automatiques	Distributore automatico	Vending machines	J02.03
fcElectricAppliance	WASHINGHAOHNE			Waschmaschine	Lave-inge	Lavatrice	Washing machines	D01.06
fcElectricDistributionE	loard							
fcElectricDistributionEleard	DISTRIBUTIONEGARD			Brandmoldeverteiler	Tableaux de distribution de détection d'incendie	Distributore per rilevatore di incendio	Fire-starm control panels	D04.01
foElectricDistributionBoard	DISTRIBUTIONSCARD			Brandmeldeverteiler	Tableaux de distribution de détection d'incendie	Distributore per rilevatore di incendio	Fire-aterm control penels	D04,02
lfcElectricFlowStorage								
fcElectricFlowStorageDevice	BATTERY	SECURITYLIGHTING		Notichtanlage	Installations d'éclairage d'urgence	Implanto luce di emergenza	Security lighting systems	D01.09

The procedure for setting a PredefinedType varies depending on the authoring system (CAD software). This may, for example, be directly assigned under Style/Type/Family of the part of works or may only be set for the adopted instance of the part of works. All standard authoring systems, however, make provision for assigning the user's own values to parts of works. These values must then be mapped onto the correct property in the IFC data model. The resellers can provide the necessary support in this respect.

The considerations regarding the CRB ruleset were based on the latest IFC4.3 RC2, with due attention given at all times to maintaining downward compatibility with IFC 2x3. In particular cases (e.g. IfcDoor), there was no PredefinedType, only a ObjectType in IFC 2x3.

A similar situation exists with IfcWallStandardCase, which is mostly exported from IFC 2x3 authoring systems and is now exported as IfcWall in IFC4. The concept with "subentities" (...StandardCase or ...ElementedCase) was already rejected in IFC4 ADD2 TC1 (ISO 16739-1:2018).

Notes on built system (IfcBuiltSystem)

For allocation to the built system, IFC already has a standardized enumeration, which CRB has added to and consolidated for Switzerland. The ruleset makes use of the consolidated concepts in the enumeration *CRB_IfcGroupExtension*.

A distinction needs to be drawn between the "LOADBEARING" system and the actual "loadbearing" property for part of works (e.g. in Pset_WallCommon.LoadBearing). Allocation to the "LOADBEARING" system denotes a general affiliation to the "building structure" that in no way anticipates any particular structural concept. Such a statement can also be made by the architect in early phases in which the eCC-BC is adopted.

This means that the parts of works allocated to "LOADBEARING" under Main Group "C Building structure" may, for example, include non-structural masonry walls or elements with a purely stiffening function, i.e. all parts of works belonging to the building's structural fabric, whether loadbearing or not.



The "TERRAINSHELL" system has been added to the existing "OUTERSHELL" system, thereby allowing identification of the parts of works belonging to the above- and below-ground facade sections. This eliminates the need for laboriously assigning properties such as "underground", "buried" or "in contact with the ground" to parts of works. The use of a system for the relevant parts of works improves modelling efficiency.

The flexibility of the systems is particularly useful in the case of Main Groups G, I and J. These elements are often presented as furniture (IfcFurnishingElement), though should actually belong to various groups or indeed systems.

fc.Entity	PredefinedType	ObjectType	Elementbezeichnung_DE	Systemwahl	System.PredefinedType	System.ObjectType	IsExternal	IsBuiltIn	eBKP-H Code
fcFurniture									
fafamians			Schulmidel	HotsudSystem =	FURNISHING	OFFICE		Nen	J01.02
toFamiliare			Büranöbel	HoBuitSystem +	FURNISHING	EDUCATION		Neit	J01.02
tofumbre			Provincements Hobitar	HcDistributionSystem =					B03.05
toFamiliare	860		Det	HoBultSystem +	FURNISHING			Neit	J01,01
toFarmlane	CHAR		Sun	Hotbuild System +	FURNISHING			Nen	J01.01
toFurniture	CHAR		Shiri	ItoBuitSystem +	USERDEFINED	LANDSCAPE		Nen	106.01
tofumbare	CHAR		Salt	Hotbuil System +	USERDEPRIED	LANDSCAPE		Ja	106.02
toFumbre	DESK		Schreittsch	ItoBuitSystem =	FURNISHNO			Neit	J01.01
tof arritare	FLECABRET		Alderitorus	HattuitSystem =	FURNISHING			Ja	G05.01
toFamiliare.	FLECABNET		Akteniorgus	ItoBuitSystem «	FURNISHNO			Neit	J01.01
tofumbare	SHELF		Regal	HothultSystem +	FURNISHING			Ja	G05.01
tsFamiliare	SHELF		Regal	ttcBuitSystem =	FURNISHNO			Neit	J01.01
fofurniture	SOFA		Sofa	Hallada System +	FURNISHING			Nen	J01.01
toFumbare	TABLE		Tech	ItoBuitSystem +	FURNISHNO			Nen	J01.01
tofamiliare	TABLE		Tisch	HubuitDyslen -	USERDEPNED	LANDSCAPE		Nem	106.01
toFurniture	TABLE		Tisch	HoBuitSystem =	USERDEFINED	LANDSCAPE		Ja	106.02
foFamiliare	USERDEPRED	BASKET	Korb für Sallapiel	HoSultSystem =	USERDEFNED	LEGURE		Já	106.03
toFurniture	USERDEFINED	BENCH	Bank	ItoBuitSystem =	USERDEFINED	LAMOSCAPE		Nen	/06.01
fcParmiare	USERDEPNED	BENCH	Bank	HoBuitSystem =	USERDEPNED	LANDSCAPE		Ja	106.02
toFamiliare	USERDEFINED	BICYCLESTAND	Fahrradständer	ItcBuitSystem +	USERDEFINED	EQUIPEMENT	Nein	Ja	G05.07
foFamiliare	USERDEFINED	BOLLARD	Absperrpoller	HotbuildSystem =	USERDEFNED	LANDSCAPE		Ja	106.02
toFamiliare	USERDEFINED	CABNET	Forque	ItoBuitSystem =	FURNISHING			Nein	J01.01
fo?urniure	USERDEFINED	CLOTHESLINE	Machehappe	HotbuildSystem =	USERDEPNED	EQUIPEMENT	Nett	Ja	G05.07
toFurniture	USERDEFINED	CUPBOARD	Anrichte	ItoBultSystem =	FURNISHING			Neir	J01.01
foFurniture	USERDEFINED	FREPLACE	Chambre	HollultSystem +	USERDEFNED	WITERIORS		Ja	G05.06
toFumbure	USERDEFINED	FREPLACESTOVE	Schwedenofen	ItoBuitSystem =	USERDEFINED	WTERIORS		Ja	G05.06
tofumbare	USERDETNED	FLAGPOLE	Fahrenmasien	HoffultSystem =	USERDEFNED	LANDSCAPE		Ja	106.02
toFamiliare	USERDEFINED	FOUNTAIN	Brunner	HoBultSystem =	USERDEFNED	LANDSCAPE		Ja	106.02
toFurnitare	USERDEFNED	GASOVEN	Gastleckofen	HolluitSystem +	FURNISHING	клонен		Ja	G05.02
toFamiliare	USERDEFINED	GASSTOVE	Gasherd	ItoBuitSystem =	FURNISHNO	KITCHEN		Ja	G05.02
tot umture	USERDEPMED	GOAL	Tor Air Balispiel	HotbultSystem =	USERDEPNED	LEGURE		Ja	106.03

Notes on distribution system/installation (IfcDistributionSystem)

For allocation to distribution systems, IFC already has a standardized enumeration, which CRB has added to and consolidated for Switzerland. The ruleset makes use of the consolidated concepts in the enumeration *CRB_IfcGroupExtension*.

With building services, the same systems often feature in several different eCC-BC groups. Cold water pipes, for example, are found in the following groups:

B04.05 Water pipes

D08 Water installations

105.05 External sanitary installations

These all belong to the same building services system – in this case "water" – and are thus allocated to the same IfcDistributionSystem.PredefinedType, in this case "WATERSUPPLY". This, then, offers a means of maintaining the continuity of the system in design.

The necessary distinctions in the eCC-BC element system are drawn using the associated IfcDistributionSystem.ObjectType. Here, all pipes and systems in Element Group B04 (Utility services) are assigned the ObjectType "MUNICIPAL". All pipes and systems in Element Group I05 (External services installations) are assigned the ObjectType "LANDSCAPE". This allows analyses to be performed on the overall system "water" as well as on the basis of the element classification. The distinction between temporary and permanent utilities on the site (B03.02 / B04) is drawn using the status "TEMPORARY", which then needs to be assigned for the temporary utility services.



The distinction within the **eCC-BC element system** between generation (Dxx.01) and distribution (Dxx.04) is drawn using the relevant IfcDistributionSystem.ObjectType.

In this way, all pipes within the building belonging to generation (Dxx.01), e.g. cold water pipes, are additionally defined by "MAINCONNECTION".



IfcCostItem

For some elements (e.g. A01.01 Site acquisition ff.), the standard prescribes cash totals in Swiss francs as the reference parameter. Here, IfcCostItem is now proposed as an entity for posting budget amounts.

Trusses and struts (IfcMember)

Although a number of proposals have been made, no definitive review and allocation have yet been performed.

BuildingElementProxy

Wherever possible, the entity "BuildingElementProxy" should be avoided for the representation of building construction elements as it often cannot be used to extract any meaningful quantities. It is, however, possible that various IFC allocations are not (yet) supported by some of the software solutions. In such cases, of course, this entity can be adopted.