

# **Madaster IFC Import Process**

Technical description of the processing of IFC files within the Madaster platform

Made for Madaster users Version 4.13

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# 1 Introduction

This document explains the processing of IFC files within Madaster and as such provides insight on how IFC files should be prepared for optimal use in the Madaster-platform. You'll find how the geometric properties, classification coding, construction phasing and material parameters are retrieved.

In general, the IFC Import Process in Madaster can be divided into two successive steps:

- 1. Reading/extracting the data fields from an IFC file.
- 2. Matching IFC elements by: (a.) Madaster Element Properties or (b.) Search Criteria.

These steps are shown in detail in the flowchart below and explained on the following pages.

## Process top elements

For each top element in the IFC the following process is used:



# Process sub elements

For each sub element in the IFC the following process is used:



# Process Search Match





# Order of matching on search criteria

# 2 Reading/extracting the data fields from an IFC file.

## 2.1 Madaster Property set (Pset\_Madaster)

If the property set with the name: Pset\_Madaster is present on an IFC element and the properties below are entered within this data set, then these values of the properties are prioritized within Madaster. Other properties are then ignored.

Property Name	Property Type	Madaster Element	Description
MaterialOrProductId	lfcText	MadasterId	Unique identifier of a material or product within a Madaster database.
externaldatabaseId	lfcText	externaldatabaseId	Unique identifier of a material or product in an external database also connected to Madaster.
GTIN	lfcText	GTIN	
ArticleNumberGLN	lfcText	ArticleNumberGLN	The articleNumber GLN combination.
MaterialOrProductName	lfcText	MaterialName	When filled, Madaster will use this material/product name to map to search criteria's (overrides the material information explained earlier).
Volume	IfcVolumeMeasur e	Volume	
Area	IfcAreaMeasure	Area	
Length	IfcLengthMeasure	Length	
Width	IfcLengthMeasure	Width	
Height	IfcLengthMeasure	Height	
Depth	IfcLengthMeasure	Depth	
Weight	IfcMassMeasure		Not used yet.
Classification	lfcText	Classification	Code of the used classification method.
Phase	lfcText	Phase	
DetachabilityConnectionType	lfcText	DetachabilityConnecti onType	See list of possible values in Detachability section 1

DetachabilityConnectionTypeDet ail	lfcText	DetachabilityConnecti onTypeDetail	See list of possible values in Detachability section 1
DetachabilityAccessibility	lfcText	DetachabilityAccessib ility	See list of possible values in Detachability section 2
DetachabilityIntersection	lfcText	DetachabilityIntersect ion	See list of possible values in Detachability section 3
DetachabilityProductEdge	lfcText	DetachabilityProduct Edge	See list of possible values in Detachability section 4

## 2.2 Detachability (disassembly)

The detachability indication in Madaster is based on the revised (2.0) version of the uniform measurement method for detachability, as described in the report '<u>Circular Buildings – a</u> <u>measurement methodology for disassembly potential 2.0</u>', which was developed and tested by a consortium of, among others, the Dutch Green Building Council, Netherlands Enterprise Agency and W/E Adviseurs on behalf of the Ministry of the Interior and the Transition Agenda Circular Building Economy.

DetachabilityConnectionType		DetachabilityConnectionTypeDetail	
Possible values	Explanation	Possible values	Explanation
DryConnection	Dry Connection	Unknown	
DryConnection	Dry Connection	None	None
DryConnection	Dry Connection	Click	Click connection
DryConnection	Dry Connection	Velcro	Velcro connection
DryConnection	Dry Connection	Magnetic	Magnetic connection
AddedConnectionConnection	Connection with added elements	Unknown	
AddedConnectionConnection	Connection with added elements	BoltAndNut	Bolt and Nut connection
AddedConnectionConnection	Connection with added elements	Spring	Spring connection
AddedConnectionConnection	Connection with added elements	Corner	Corner joints
AddedConnectionConnection	Connection with added elements	Screw	Screw joints
DirectConnection	Direct integral connection	Unknown	

# 1. Property **DetachabilityConnectionType** and **DetachabilityConnectionTypeDetail** are used to indicate the type of connection

DirectConnection	Direct integral connection	Peg	Peg
DirectConnection	Direct integral connection	Nail	Nailing
SoftChemicalConnection	Soft chemical compound	Unknown	
SoftChemicalConnection	Soft chemical compound	Sealant	Sealant
SoftChemicalConnection	Soft chemical compound	Foam	Foam joint (PUR)
HardChemicalConnection	Hard chemical compound	Unknown	
HardChemicalConnection	Hard chemical compound	Glue	Adhesive bonding
HardChemicalConnection	Hard chemical compound	Dump	Poured connection
HardChemicalConnection	Hard chemical compound	Weld	Weld joint
HardChemicalConnection	Hard chemical compound	Concrete	Cementitious bond
HardChemicalConnection	Hard chemical compound	ChemicalAnchor	Chemische anchors

## 2. Property **DetachabilityAccessibility**

Possible values	Explanation
Accessible	Freely accessible without additional actions
PartialNoDamage	Accessible with additional actions that do not cause damage
PartialWithRepairableDamage	Accessible with additional operations with fully repairable damage
PartialWithDamage	Accessible with additional operations with partially repairable damage
NotAccessible	Not accessible - irreparable damage to the product or surrounding products

## 3. Property **DetachabilityIntersection**.

Possible values	Explanation
None	No intersections - modular zoning of products or elements from
None	different layers
Incidental	Occasional intersections of products or elements from different
incluentat	layers
Complete	Full integration of products or elements from different layers

#### 4. Property **DetachabilityProductEdge**

Possible values	Explanation
Open	Open - no obstacle to the (intermediate) removal of products or elements
Overlapping	Overlap - partial obstruction to (intermediate) removal of products or elements
Closed	Closed - complete obstruction to (intermediate) removal of products or elements

## 2.3 Default data fields for GTIN of Article number

Some manufacturer databases available within the Madaster platform contain GTIN, ArticleNumber and/or GLN information.

As described in the flow charts (first section of this document), Madaster matches on these properties. If not defined in the PSet\_Madaster, these properties are retrieved from the default IFC properties as explained in the tables below, depending on the IFC version used (IFC2x3 or IFC4).

Property set	Property Name	Madaster Element	Explanation
Pset_ManufacturerTypeInfo rmation	ArticleNumber	ArticleNumberGLN	Field ArticleNumber GLN is specified as [ArticleNumber] [GLN]
		GTIN	When ArticleNumber is 8, 13 or 14 characters long.
Pset_ManufacturerTypeInfo rmation	Manufacturer	ArticleNumberGLN	GLN part of the field.
Pset_ManufacturerTypeInfo rmation	ModelReference	ArticleNumberGLN	When ArticleNumber is empty, this field is used as ArticleNumber in the part of the Madaster ArticlNumberGLN element.

#### IFCv4:

Property set	Property Name	Madaster Element	Explanation
Pset_ManufacturerTy peInformation	GlobalTradeItemNumb er	GTIN	Global Trade Item Number of the product.
Pset_ManufacturerTy peInformation	ArticleNumber	ArticleNumberGLN	Field ArticleNumber GLN is specified as [ArticleNumber] [GLN]
		GTIN	When GlobalTradeItemNumber property is empty and ArticleNumber is 8, 13 or 14 characters long.
Pset_ManufacturerTy peInformation	Manufacturer	ArticleNumberGLN	GLN part of ArticleNumberGLN
Pset_ManufacturerTy peInformation	ModelReference	ArticleNumberGLN	When ArticleNumber data field is empty: ArticleNumber part of ArticleNumberGLN

## 2.4 Classification

The Madaster platform supports all local classification codes and the international OmniClass table 21 classification code. See below paragraphs for details.

First, all references of the element are searched for the type: IfcClassificationReference or IfcExternalReference. If no value is found in the IfcClassificationReference or IfcExternalReference, Madaster looks at the layer of the ifcElement and tries to match it to the classification.

#### 2.4.1 The Netherlands

#### • NL/SFB classification code

When a property of this type is found, the system tries to match the value of this property against the 2-digit and / or 4-digit NL/SfB coding list.

Quantities Mate	erial Relations Classif	ication Hyperlinks
Source	Reference	Name
From IFC	Wand	
From IFC	16.12	FUNDATIE BALKEN
	Quantities Mate Source From IFC From IFC	QuantitiesMaterialRelationsClassifSourceReferenceFrom IFCWandFrom IFC16.12

Fig: Example of 4-digit NL/SfB coding on element.

#### 2.4.2 Germany

#### • DIN 276 classification code

When a property of this type is found, the system tries to match the value of this property against the 3-digit DIN276 coding list.

Identifikation Position Mengen Material	Beziehungen	Klassifikation	Hyperlinks	BaseQuantities	Pset_RailingCommon
Klassifikation	Quelle			Referen	z
DIN 276 Classification	Aus IFC			363	

Fig: Example of DIN 276 coding on element.

#### 2.4.3 Belgium

#### • **BB/SFB** classification code

When a property of this type is found, Madaster tries to match the value of this property against the 2-digit and/or 4-digit BB/SfB coding list.

Classification	Source	Reference	Name
BB/SfB	From IFC	21.3	NIET-DRAGENDE BUITE

**Fig:** Example of 4-digit BB/SfB coding on element. (Optional for Revit-users: change the name of your classification to BB-SfB in Revit if you want the naming 'Uniformat Classification' to change to 'BB-SfB')

#### • NL/SFB classification code

When a property of this type is found, the system tries to match the value of this property against the 2-digit and / or 4-digit NL/SfB coding list.

Quantities Mater	ial Relations Classifi	cation Hyperlinks
Source	Reference	Name
From IFC	Wand	
From IFC	16.12	FUNDATIE BALKEN
	Source From IFC From IFC	Source Reference From IFC Wand From IFC 16.12

Fig: Example of 4-digit NL/SfB coding on element.

#### 2.4.4 Switzerland

#### • **eBKP** classification code

When a property of this type is found, the system tries to match the value of this property against the eBKP coding list (1-letter followed by 4-digits, e.g., E 02.03).

Pset_Quantity	TakeOff	Pse	et_Reinforc	ementBarPit	tchOfWall	Pset_WallCon	nmon Q	uerschnittsd	lefinition	Sonstige	Tragwerk
BaseQuantities	Bemaß	ungen	Grafiken	ID-Daten	Konstruktion	Materialien	und Oberfläcł	nen Phase	en Pset_	ConcreteElem	entGeneral
Identifikation	Position	Menger	n Materia	al Profil	Beziehungen	Klassifikation	Hyperlinks	Abhängig	keiten A	nalytische Eig	enschaften
Klassifikation			Quelle			Referenz			Name		
<mark>eBKP-H C</mark> lassifica	tion		Aus IFC			E02.04			Wand		

Fig: Example of 4-digit eBKP coding on wall element.

#### 2.4.5 Norway

#### • NS 3451 classification code

When a property of this type is found, the system tries to match the value of this property against the 3- or 4-digit NS 3451 coding list.

IFC Element	IfcWall
Predefined Type	STANDARD
Tag	639196
GUID	0Gzm2x4df1LP7GRecSH9\$I
Uniformat Classification	231, Bærende yttervegger

Fig: Example of 3-digit NS 3451 code on element.

#### 2.4.6 International

#### • OmniClass table 21 classification code

When a property of this type is found, the system tries to match the value of this property against the 6 digit and/or 8 and/or 10-digit OmniClass table 21 coding list.

Identification Location Quantities Material Profil	e Relations Classification Hyperlinks BaseC	Quantities BaseQuantities_Ec
Classification	Source	Reference
Omniclass Classification	From IFC	21-02 10

Fig: Example of a 6-digit OmniClass coding on an element

## 2.5 Geometrical properties

#### 2.5.1 Volume

For each element the area first tries to read the IfcQuantityVolume named "NetVolume" from the collection of type: IfcElementQuantity. If no value can be found here, all property sets of the element will be searched for a property with the name: "NetVolume".

If there are multiple property sets of the type IfcElementQuantity with a property "NetVolume", then the first one, by order of appearance in the file, is chosen. If no property with this naming convention can be found, the same process is repeated for properties with the following naming convention and in the following order until a value can be found:

- NetVolume
- Volume
- GrossVolume

Depending on the material composition, the volume is calculated in some scenarios by multiplying the material thickness by the material surface. For more information see section "Material".

Analytical Properties	BaseQuantities	Constraints	Construction	Dimensions
Property		Value		
GrossFootprintArea		0.13 m2		
GrossSideArea		2.20 m2		
GrossVolume		0.220 m3		
Height		2,064.00 mm		
Length		1,330.00 mm		
Width		100.00 mm		

Fig: Example of volume property within BaseQuantities property set.

#### 2.5.2 Surface area

For each element, the area first tries to read the IfcQuantityAreaproperty named "NetArea" from the collection of type: IfcElementQuantity. If no value can be found, all property sets of the element will be searched for a property with the name: "NetArea".

If there are multiple property sets of the type IfcElementQuantity with a property "NetArea" then the first one, by order of appearance in the file, is chosen. If no property with this naming convention can be found, the same process is repeated for properties with the following naming convention and in the following order until a value can be found:

- NetArea
- NetSideArea
- NetSurfaceAre
- GrossSideArea
- TotalSurfaceArea
- GrossSurfaceArea
- OuterSurfaceArea
- CrossSectionArea
- TotalArea
- GrossArea

#### 2.5.3 Length

For each element, for the length, the area first tries to read the IfcQuantityLength property named "Length" from the collection of type: IfcElementQuantity. If no value can be found, all property sets of the element will be searched for a property with the name: "Length".

When there are multiple property sets of the type IfcElementQuantity or multiple properties with the name "Length", the first property is chosen.

#### 2.5.4 Width

For each element, for the length, it first tries to read the IfcQuantityLength property named "Width" from the collection of type: IfcElementQuantity. If no value can be found for this, all property sets of the element will be searched for a property with the name: "Width".

When there are multiple property sets of the type IfcElementQuantity or multiple properties with the name "Width", the first property is chosen.

#### 2.5.5 Height

For each element, the length first tries to read the IfcQuantityLength property named "Height" from the collection of type: IfcElementQuantity. If no value can be found for this, all property sets of the element will be searched for a property with the name: "Height".

If there are multiple property sets of the type IfcElementQuantity or multiple properties with the name "Height", the first property is chosen.

#### 2.5.6 Depth

For each element, for the length, it first tries to read the IfcQuantityLength property named "Depth" from the collection of type: IfcElementQuantity. If no value can be found for this, all property sets of the element will be searched for a property with the name: "Depth".

If there are multiple property sets of the type IfcElementQuantity or multiple properties with the name "Depth", the first property is chosen.

#### 2.5.7 Weight

For each element, for the length, it first tries to read the IfcQuantityWeight property from the collection of type: IfcElementQuantity.

When there are multiple property sets of the type IfcElementQuantity or multiple properties of the type "IfcQuantityWeight", the first property is chosen.

#### 2.5.8 Geometrical properties nested families

Madaster can read out nested families if they are properly inserted in a BIM file. This is what the IFC file should look like and how Madaster reads it out:

#### In the IFC (see pic):

- 1. Define base quantity (m2/m3) of the entire element
- 2. Define Thickness for each layer

#### In Madaster (see pic)

1. Area read out in Madaster as defined in the respective property set e.g., here Qto\_BaseQuantities 2. With the Thickness shown in the IFC file, Madaster can derive the volume for the specific material layer e.g., 6,46 x 0.07 = 0.45m<sup>3</sup>

#### IFC file:

		-		
DINEO	< • > • 🤏 🗇 🗇 🗖			
Suspended Colling.2.1.1				
Pret_CoveringCommon Pret_Environ Identification Location Quantities	mentalinpochraicator <u>Oto CoveringReseQuantities</u> Material Peolite Relations Classification Hyperinks	-		
ane	Thidress	Identification Location Quar	ntities Material Profile Relations	Classification Hyperlinks
Generisch_boliatie	125 mm	Paet CoveringCommon P	set EnvironmentalImpactIndicators	Qto_CoveringBaseQuantities
Generisch, Aluminium ophangstructuur	2 70 mm			
A discussion in the standard and a dealers a	20 mm	Property	Value	
A oenersch (Haan werker ectered				

#### Grouped elements/nested families:

- 1. Define base quantity (m<sup>2</sup>/m<sup>3</sup> of the entire element)
- 2. Define Thickness for each layer

The number of layers is not limited. You just need to make sure that each layer in your element has a defined thickness.

#### Madaster (enrichment view):

		<ul> <li>Composited College AN, 40, Planeted variation planterior planteratoribal 230 (12), 75 (20):653(980)</li> </ul>	IA_benerisch_isolatie; M_Generisch_isteninism sphangetretzer; IA_Generisch_Plasimaierisal interlear		3/3	
		Detent	M(sec)/s	Product) insteriol	Quinet (1)	
		··· Al-Sinetsch, solide	Al, Generisch, Isolidie	Here the Polycost she that	4/1	8
		+++ Al, Gine isch, Aumitiani ophangibraituur	Ai_Generisch_Kleminiumophongstruetwar	we Abrirall	k/1.	2
		++ Al_Greetch/Rastrutarizatioderieu	Al, Gitterlich, Plattristerlial interieur	++= fibre censini	1/1	0
		+++ Compound Colling AM, 45, Platanel verlanget exteriour projetmictorigal (2011)22/15.2014(150)8	M., Senirkih, Johlin, M., Similah, Alamidan Johingtraibar; M., Senirkih, Zarthatirkih etterkiz		3/2	
		AA_3(_XistFast(4480)	M_bealer_Mt		.0/1	0
		+++ AA,21,X10E5(e8)44(85)	ia_benier_idt		0/3	
	4	HI AN, N., KIRCHARDHEIDT	AA, kenler, Mt		0/1	80
	þ		SA_Realise_NR		9/1	8
		444(27)(26)(8)(8)(8)(6)(7)(44)	IA, Reviler, Wit		8/1	0
1		designs on a single state of the last state of the second state of the				

# Example detailed information per material layer:

A_GENERISCH_ALUMINIUM OPHANGSTRUCTUUR: 3FLTIDTJN3LFEWKQRDM2GK-1					
ld:	3FLtSDrjin3IfEwKqrDmZGk-1				
Volume: 2	0.45 m <sup>3</sup>				
Area:	6.46 m <sup>3</sup>				
-	Source: Qts_CoveringBaseQuantities - NetAras				
Length:	0 m				
Width:	0 m				
Height:	0 m				
Type:	Compound Ceiling:AA_45_Plafond verlaagd exterieur plaatmateriaal 210/120.70.20				
Building phase:	Casco				
Classification methods:	Finishing of ceilings				
Layers of brand:	Stuff				
Materials:	AA_Generisch_Aluminium ophangstructuur				
GTIN:	-				

<u>NOTE for Archicad users</u>: If you want to create a nested family for a door or window in IFC with Archicad you can't use this workflow. Archicad considers a door and window as one element. Therefor you need to draw the door and window in 3D in Archicad and add the different layers to the window/door by hand. Then IFC recognizes the door/window as a nested family with the different layers.

#### 2.5.8.1 If thickness is not defined

- 1. If Thickness of a layer is not defined, the layers will appear as one element in Madaster.
- 2. Due to the double naming, e.g., *glass & Aluminum*, Madaster is unable to identify a unique corresponding material, hence no match can be found.

#### IFC file:

		<	▼ > ▼ <	) 🕀 🖨 🖨 🗖
⊞ Window.0.165.1				
Pset_EnvironmentalImpactIndicators	Pset_Window	Common	Qto_Window8	BaseQuantities
Identification Location Quantities	Material Relations	Classification	Hyperlinks	Ifc Dimensions
Name	Thickn	ess		
AA_Schrijnwerk_Doorzichtig glas	0 mm			
AA_Schrijnwerk_Aluminium	0 mm			

#### Madaster (enrichment view):

+++ Curtain WaltAA_31_Ream buiten profisien aluminium 80/80 3	ı		8/9	
Elevent	Notoriula	Product / material	Quartity	
AA_31_CW_Roomgeheel_Room Draal-kip 80x80x4033211	1 M_Schrijnwerk_Doordchtiggies,W_Schrijnwerk_Auminium	2	0/1	
System Fareb A4_31_Doorzichtige beglacing \$105218	AA_Schrijnwerk_Doordchtiggies	···· Transparent glass	1/1	8
+++ Bectangular NullionsAX_80x80 aluminium 4108212	A&,Schrijtwerk,Aluminium	*** Aluminum	1/1	S
Rectangular Nullions/V_80x80 aluminium: 4109218	M_Schrijnwerk_Aluminium	Auminum	1/1	S
···· Rectangular NullionsAv_80.680 aluminium 4109214	AA_Schrijnwerk_Aluminium	Aluminum	1/1	S
ere Bettangelar Nullienske 80480 aluminium 4100215	AA Schrijnwerk Aluminium	Abarinam	1/1	8
+++ Boctangular Nullio ns20_80x80 aluminium 4108219	AA_Schrijnwark_Aluminium	+++ Aluminum	1/1	S
Rectangular Nullions/V_80x80 aluminium: 4109220	M_Schrijnwerk_Aluminium	Auminum	1/1	S
Rectangular NullionsA-30400 aluminium4108221	AA_Schrijtwerk_Aluminium	Aluminum	1/1	T

#### 2.6 Material

For each element, the material is retrieved via the IfcMaterialSelect relationship. And depending on the characterization of the related material property, different scenarios are handled for the following characterizations:

### 2.6.1 IfcMaterialLayerSetUsage

If the material property is of type IfcMaterialLayerSetUsage then an attempt is made to get IIfcMaterialLayerSet. And here it is checked whether this list contains multiple elements and whether the thickness (Thickness) property has been entered. If this is the case and the value of the property Thickness is greater than 0 mm, the element is split into the number of materials in the layerset.

Identification	Location	Quantities	Material	Profile	Relations	Classification	Hyperlinks
Name			Т	hickness			
Steen - Baksteen			10	0.00 mm			
Lucht			40	).00 mm			
Isolatie - Kunststo	f hard		10	0.00 mm			
Steen - Kalkzandst	een C		10	0.00 mm			

Fig: Example of a material specification with layerSet

The volume of these materials is then calculated as follows:

Volume = Area \* Thickness of layer.

If the property Thickness is 0 or not filled in, then multiple materials are specified on the element and the volume remains from the volume proportions as specified above. The field "Name" of the property is used for naming the material.

#### 2.6.2 IfcMaterialLayerSet

If the material property is of type IfcMaterialLayerSet, then it is checked whether the list contains multiple layers. And whether the "Thickness" property has been entered. If this is the case and the value of the property Thickness is greater than 0 mm, the element is split into the number of materials in the layerset.

The volume of these materials is then calculated as follows:

Volume = Area \* Thickness of layer.

If the property Thickness is 0 or not filled. Then multiple materials are specified on the element and the volume remains from the volume proportions as specified above. The field "Name" of the property is used for naming the material.

#### 2.6.3 IfcMaterialList

If the material property is of type IfcMaterialList, multiple materials are specified on the element and the volume remains from the volume proportions specified above. The field "Name" of the property is used for naming the material.

#### 2.6.4 IfcMaterial

If the material property is of type "IfcMaterial" then the property is taken from the field "Name" of the property.

Identification	Location	Quantities	Material	Profile	Relations	Classification	Hyperlinks
Name							
Beton gewapend	orefab						

Fig: Example material specification without file set.

#### 2.6.5 Material naming of nested families

For materials to be matched correctly with a database in Madaster all layers should have a clear material name e.g., generic\_insulation, generic\_alumimium, generic\_Plate material.

#### IFC file:

		-	
@ INFO	(*) * 50000		
Superded Colleg 2.1.1			
Pat ConsigConnas Pat Deisona	talispatistates Date for single stands		
Identification Location Quantities Ma	well Netle Relations Classification Hyperfields		
New 3.1	Trickness		
M, Breish, Solatie	121 mm		
	31 mm		
M, Serench, Aluminium sphengdructuur			

For all Elements:

3.1: Give a clear Material Name in all Layers

#### Madaster (enrichment view):

~	Compound Colling2A, 45, Folion tracking Exteriour plantmeteriae 2011;20:70.32.44(2000)	18, Seveniush, Indialis, M., Generisch, Maminian ophangsinarisor; 18, Seveniush, Plastinutariaal exteriour		3,3	
	BUILD	waterian	Products instantist	Quantity.	
	M.Scolate	Al_Sevenie h_induite	- P2 Polyundhara foan	4,16	0
	<ul> <li>M_Interlich_NetWorksphargstration</li> </ul>	ALSonarisch, Alsoninium sphangetrottuur	Aluminum	1.1.	.0
	co. M. Jererish, Nazrabelal elector	All, Senaria S., Paulinuteriaal exteriour	us. Record	11	3
~	<ul> <li>Compound/Goling/AL45_Platient volvogt estariest pluomotorial (2012) PL294(15) 00</li> </ul>	Mi, Ganenulti, Nutatini, M., Serverkolti, Aluminium ophangstructuum Mi, Sanenulti, Photomateriaul exterieur		3.3	
	+++ IN, N. Aug No. 54002	Al (Ander, MI		0.0	10
	+++ 10,71,8187410344959	Multerder, MI		6.1	10
	W_N_SARAHIMAN	AkulienderWI		- 61	102
	an 10,70,500/600/20133	AA, Marchat, MD		0.1	100
	+++ 486_30_8000000000152444	Adjander, 20		0,1	$\sim$

# **3.1:** A clear material name is necessary for Madaster to match corresponding material information from the database.

It is possible to create a product in your own database on Madaster to get a match without having to change the "material name" you use at your company. Take the Type Name (3.2) as shown in the picture:

#### IFC file:

) INFO	く 🕶 > 👻 🖄 🗇 🗇		
Curtain Wall 3.37			
dentification Location Occarition	Relations Classification How	aliais	
Cocarden Opentides	Reactions Classification Hype	anna	
sporty	Value		
iel	275.02_CM_Architecture_AA_Medaster v1 (1)	^	
cipline	Architectural		
	Curtain WalkAA_31_Ream buiten profielen aluminiu	m 80	
3.2	AA_31_Baam buten proheien aluminium 80/80 1 ve	rdel	
pe Name	Curtain WaltAA_31_Ream buiten profielen aluminiu	m 80	
defined Type	NOTDERNED		
at Type	Curtain WalkAA_31_Ream buiten proficien aluminiu	m 80	
ent Type		STUMMENT	
cription		Hartforders Londers Countilies	Relations Classification Handbillion
tenal		Part, CurtainWallCommon	Part_Environmentellimpactinalization
yer	A-DOOROTUN	Propety	Value
stem		bäxternol	True (Salad)
ildino Envelope	True	Beformer	AA_31_Room buiten profieten oluminium 80/801 verdelin

For all Elements:

**3.2:** Use the Name of the entire element, which is indicated as Type Name, and set up a corresponding "product" on Madaster yourself containing the material information of different layers.

You can then copy this Type name and add a product in your database. Give a name to the product, add the materials of the product, and add the Type name in the search criteria for matching in Madaster on the Type level also tick the checkbox "Criterion valid for ifcElement typename". (More on how to create a product in your database you can find on docs.madaster.com):

#### Linking an element in Madaster by adding a product:

DATABASE	USERS			
EDIT OVERBUILE PRO	orunas 🖌		410 MATERIA 🛞	A88 78086CT 🛞
Search		Q		
			Karre	

**3.2:** Set up your own product in your database containing the different material layers: Aluminium Frame, Glazing etc.

Setting the search criteria to be the same as the name of the element, Madaster is able to match the information.

-----

CONTAIN WALLIAN_31_REAM BUILTEN PROPIELEN ALU	HIN OH \$5,50 I VERDELING SCHUIPDEUREN SOSIEITE 200PTOKIDHVOVIBPELHTI
10	201/pDukeeD4yv47/5rf 80+71
Valume:	0 m <sup>2</sup>
Area:	0 m²
Longth:	0 m
midth:	0 m
Height:	0 m
Туря:	Curtain Wall:AA_31_Ream builten profielen aluminium I0/80 1 verdeling scho
Duilding phase:	Casto
Classification methods:	Secondary elements of exterior walls
Layers of brand:	Skin
Materials:	
GTIN	

#### 2.7 Building phase

For each element, the build stage is taken from the property with one of the following naming conventions (this is case sensitive):

- Phase Created
- Renovation Status
- Phase

AC_Pset_RenovationAndPhasing	ArchiCADProperties	ArchiCADQuantities	BaseQuantities
Property	Value		
Renovation Status	Existing		
<b>Fig:</b> Example of phase in Archicad CAD- <i>a</i>	opplication		

Graphics	Identity Data	Other	Phasing	Pset_WallCommon	Structural
Property			Value		
Phase Created			Nieuw		
	Less to De trans				

Fig: Example of phase in Revit CAD-application

Then the values from these properties are matched as follows:

- Demolition
  - Demolition
  - To be demolished
  - o Sloop
  - Rückbau
  - o Riving

#### - New

- o Nieuw,
- o New,
- Nieuwe materialen,
- Neue materialien,
- Virgin materials,
- Jomfruelige materialer,
- o Nye,
- o Einbau,
- o Ny
- Casco
  - o Casco,
  - o Leeg,
  - o Existing,
  - o Bestaand,
  - Rohbau,
  - o Råbygg,
  - Zwischenstand,
  - Mellomstatus

The matching is performed on the entire sentence / word and is not case sensitive. If there is no matching with the categories above, the element will be mapped to "Casco".

The construction phase "Existing" and "Final" are calculated using the above phase according to the following calculation:

- Existing = Demolition + Casco
- Final = Casco + New

## 2.8 Building number ("split building" feature)

The "split buildings" function offers the possibility in Madaster to draw up individual building files and passports based on a prepared IFC file with several buildings/homes. This makes it superfluous to prepare IFC models per object in IFC prior to being entered in Madaster, to subsequently prepare a building file (including materials passport) for this.

To make use of this function, a property set and name must be defined in the IFC file per element (is flexible) in which an individual construction number is recorded (e.g., A02).

It is also possible to assign several construction numbers (separated by a comma) to one IFC element. For example: A02, A03, A04, A05. Based on the number of construction numbers, the Madaster system will assign them proportionally in percentages. In the image below there is 1 IFC element, which is assigned to 4 construction number, because of which these construction numbers in Madaster are assigned "(25%)".

FLOOR:NLRS_43_FL_CEMENTDEKVLOER_50_MIX:1705081: 2E5R42J4965PWD7TOMVQQC			
ld:	2e5r42J4965PWd7T0MvQqC		
Volume:	0,96 m² Bron: BaseQuantities - NetVolume		
Oppendakte:	19,12 m² Bron: BaseQuantibles - GrossArea		
Lengte:	0 m		
Breedte:	0,05 m Bron: BaseQuantities - Width		
Hoogte:	0 m		
Type:	Floor:NLRS_43_FL_cementdekvloer_50_MIX		
Bouwfase:	Nieuwe materialen		
Classificatiemethodes:	vloerafwerkingen; niet verhoogd, afwerklagen		
Gebouwlagen:	wwoeth		
Materialen:	NLRS_f2_zandcement dekvloer_mix		
GTIN:	-		
Artikelcode:	-		
Madaster Id:			
Gebouwnummer:	A02 (25%), A03 (25%), A04 (25%), A05 (25%)		

<u>Note</u>: it is not (yet) possible to read out a deviating percentage per construction number in Madaster (e.g., 1 IFC element with assignment to 2 construction numbers according to ratio: 70% vs. 30%).

#### 2.9 Matching elements on search criteria

If materials are specified per element, they are automatically validated during data upload in Madaster against (linked with) materials and products that are known within the selected Madaster database(s). These can be found in the Madaster navigation menu under "Databases & suppliers". If available, company account specific databases can also be selected during this import process. Each material and/or product can be provided with search criteria per language:

#### ABS POLYMERS

MATERIAALINFORMATIE	ZOEKCRITERIA DOSSIER FINAL	NCIEEL		
CRITERIUM TOEVOEGEN 🕀				
Zoekcriterium		Matchingstype	Taal	
ABS		is gelijk aan	Alle talen	10
ABS Polimeri		Bevat	Alle talen	/ 百
ABS polymeren		Bevat	Nederlands	/ 百
ABS polymers		Bevat	Alletalen	/ 百
ABS-Polymere		Bevat	Alle talen	/ 百
polymères ABS		Bevat	Frans	1 1

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Fig: Example of search criteria in material/product in Madaster

When importing an IFC file, the materials of each element are matched against these search criteria(s). This involves checking whether the material of an element matches one of the search criteria at product/material level in the selected languages.

Search criteria on product/material level can be configured in several ways:

- Equals the search criterion (Case sensitive)
- Equals the search criterion
- Starts with the search criterion
- Contains exact word<sup>1</sup>
- Contains the search criterion
- Contains the search criterion (Case sensitive)
- Ends with the search criterion

(Also, a search criterion can be matched against TypeName of an IFC element when the checkbox "Criterion valid for ifcElement typename" is ticked.)

And runs sequentially as long as no match is found:

- 1. Against the "Equals" criteria (case sensitive)
- 2. Against the "Equals" criteria
- 3. Against the "Starts with" criteria
- 4. Against the "Contains exact word" criteria
- 5. Against the "Contains" criteria contained (case sensitive)
- 6. Against the "Contains" criteria
- 7. Against the "Ends with" criteria

If multiple matches are found in step 3, 5, 6 or 7, the longest match (largest number of matching characters) will be used.

When multiple materials are added to an IFC element without a thickness (Thickness) then the matching of this element will be done by matching the concatenation of the material names against search criteria which are valid for ifcElement typename (if the checkbox "Criterion valid for ifcElement typename" is ticked on the search criteria).

If no products and/or materials are linked, they can be manually linked to the element via the enrichment screen in Madaster. Any new materials and/or products can also be created here. (More on how to create a product in your database you can find on docs.madaster.com)

 $<sup>^{\</sup>rm 1}$  The material name/typename to be matched is split on spaces and tabs and the following characters:, ;()-\_

if one of the resulting words is equal to the criterion (case sensitive), there is a match.