

Dutch Building Hardware Association
VHS



VHS building hardware (BIM) standard

version 1.0

Part 2 - Recipes



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1 Terminology

BIM	Building Information Model: a technique for a conclusive and parametric building model. This technique is used in e.g. Revit and Tekla.
BMH protocol	An XML format defined by 'Bos Machine Handel' for the description of a 3D frame model for production. This protocol also contains the definitions for articles and operations, and is usable in a BIM environment
WHS protocol	A by 'DeltaPi Systems' defined XML format, based on the BMH protocol, for the definitions of articles and recipes in a BIM environment
XML format	A text format suitable for structured data.
Door/window frame	(In Dutch: kozijn) A frame with doors and/or windows and/or glass and/or panels
Geometry	The 3D shapes of an article and the applicable operations (pockets and drillholes)
Article	A hardware article that can be priced, ordered and applied in a frame
Placeholder	A temporary substitute for an end result. In this case the placeholder acts as a means to present options to the user to make a choice.
Options	Properties on an article which, while applying this article enables the user to make a choice. These properties can affect the shape or price
Recipe	A list of conditions on which an article is placed on a specific spot in a frame.
Cluster	A coherent combination of files for a specific hardware series
Supplier	The supplier and owner of the data: this can be the manufacturer or supplier of the hardware
Child frame	The window or door frame the recipe is applied upon
Parent frame	The main frame the door or window is placed in (Dutch: kozijn)
Operation	<ol style="list-style-type: none"> 1. The turning or sliding of a child frame 2. A shape, pocket or drillhole, needed for the placement of an article

2 Introduction

This document is about the recipes in the VHS building hardware (BIM) standard.

3 General

A recipe is a digital replacement of paper schemes to place articles in or around a frame like in figure 1 below.

The recipe defines the placement and conditions for that placement of each article.

The articles are defined in part 1 of the VHS building hardware (BIM) standard.

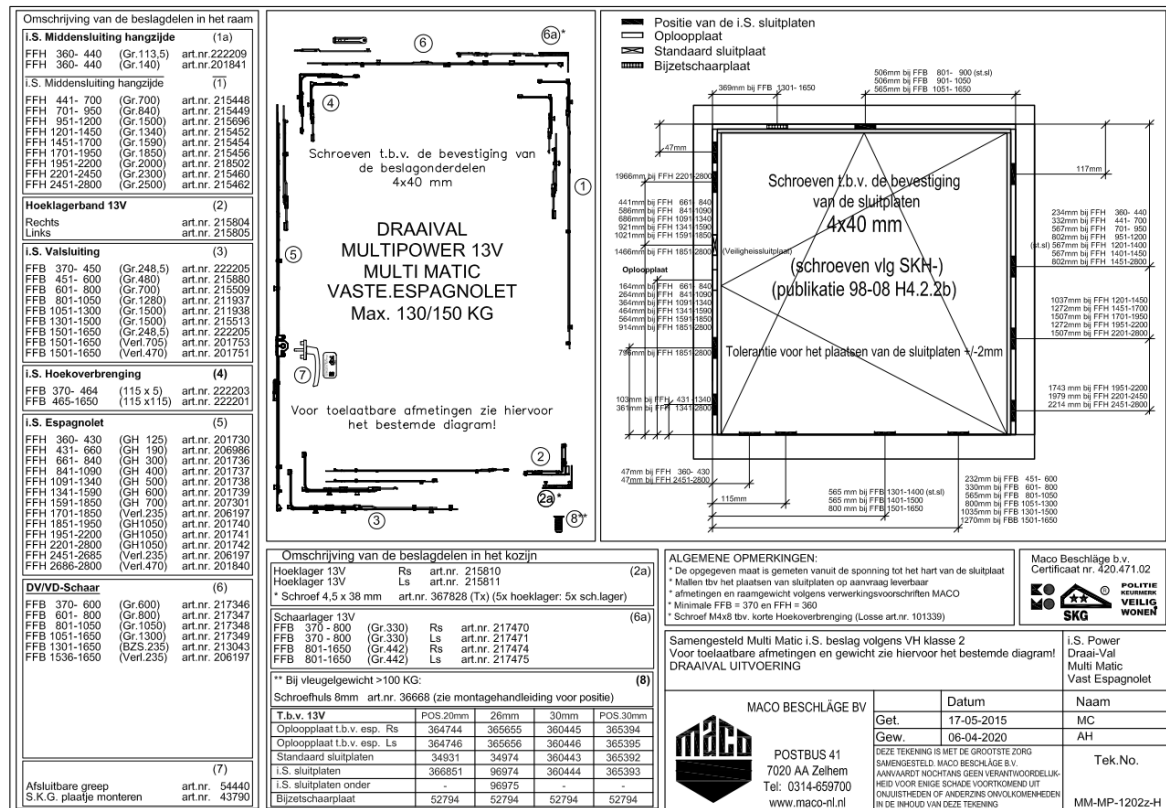


Figure 1

4 Recipe structure

A recipe consists of:

- A heading with general info
- A list of articles with:
 - Their placement related to alignment points in the frame and the profile
 - The transformation related to the alignment point
 - Conditions for the placement

A recipe is a separate XML file.

A recipe XML file has the extension 'recipe'.

Generally a recipe is provided with the articles it references. You cannot freely mix article and recipes from various suppliers

During the application of a recipe for each element in the article list is checked if the conditions are met, if this is the case, the article is placed with the defined transformation on the defined alignment point.

A recipe can be replaced by a tool from the supplier.

5 Recipe example with:

- The header
- Per placement: the article ID, alignment point, alignment frame, displacement and rotation, and conditions:

Description	MM-MP-1202z-H_20mm				
Supplier GLN	8714161999999				

Article	Anchor	Alignment	Offset	Rotation	Rule
201730	BottomLeft	ChildFrame	(0;0;0)	(0;0;0)	360<=height<=430,o
201730	BottomRight	ChildFrame	(0;0;0)	(0;180;0)	360<=height<=430,o
201736	BottomLeft	ChildFrame	(0;0;0)	(0;0;0)	661<=height<= 840,c
201736	BottomRight	ChildFrame	(0;0;0)	(0;180;0)	661<=height<=840,o
201737	BottomLeft	ChildFrame	(0;0;0)	(0;0;0)	841<=height<=1090,
201737	BottomRight	ChildFrame	(0;0;0)	(0;180;0)	841<=height<=1090,
201738	BottomLeft	ChildFrame	(0;0;0)	(0;0;0)	1091<=height<= 1340,
201738	BottomRight	ChildFrame	(0;0;0)	(0;180;0)	1091<=height<= 1340,
201739	BottomLeft	ChildFrame	(0;0;0)	(0;0;0)	1341<=height<= 1590,
201739	BottomRight	ChildFrame	(0;0;0)	(0;180;0)	1341<=height<= 1590,
201740	BottomLeft	ChildFrame	(0;0;0)	(0;0;0)	1851<=height<= 1950,
201740	BottomRight	ChildFrame	(0;0;0)	(0;180;0)	1851<=height<= 1950,
201741	BottomRight	ChildFrame	(0;0;0)	(0;180;0)	1951<=height<= 2200,
201741	BottomLeft	ChildFrame	(0;0;0)	(0;0;0)	1951<=height<= 2200,
201742	BottomRight	ChildFrame	(0;0;0)	(0;180;0)	2201<=height<= 2450,

Figure 2

6 Recipe header

In the header must be defined:

- A clear and recognizable name in the assortment of the supplier
- The version
- A universal unique code to define the supplier, the GLN code is preferred (Global Location Number)
- The operation type: L1, L3, R2 or R4. Omitting means Left, applicable for inside and outside
- Rebate
- The Coordinate system: Cartesian or Vector based

7 Recipe per article:

7.1 Article header

- Id: the article id within the assortment of the supplier
- The article file including its path, absolute or relative

7.2 Alignment point

- The anchor: the alignment point on the frame, dependent on the coordinate system:
 - Cartesian: TopRight, CenterRight, BottomRight, BottomCenter, BottomLeft, CenterLeft, TopLeft, TopCenter, Center
 - Vector: Bottom, Right, Top, Left, with an optional index number
- The alignment frame: Child, Parent. Default Child
- The assembly frame: Child, Parent, Both. Default Child
- The alignment Y-axis: Inside parent, Inside child, Hinge, Axis, Outside child, Outside parent
- The alignment X-axis: Free size, Outer axis, Outer child, Rebate
- The 3D transformation: rotation and displacement. If a vector coordinate system is used, the article moves and rotates with the reference line (straight or curved) on which it is placed.

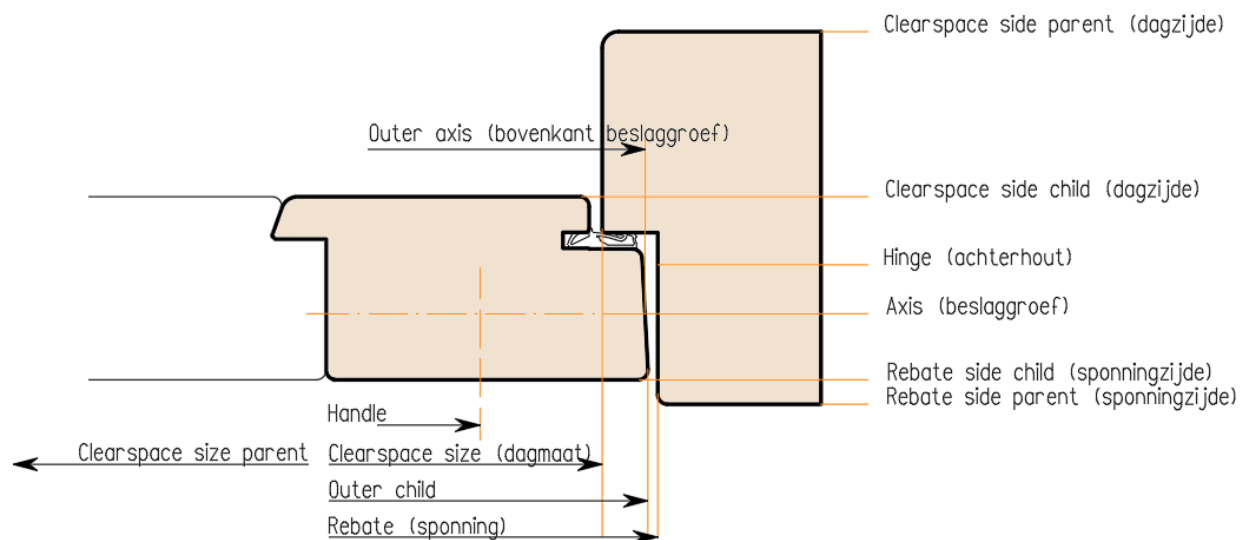


Figure 3

The alignment point is the intersection of a X- and Y-axis.

The 'clearspace size parent' can be referred to in a recipe to define e.g. the length of a slide door rail.

The 'Handle hole' axis line can be defined by another article, e.g. a lock with a certain PC size.

The 'rebate' and 'clearspace' sides are defined by the rebate in the parent frame. The rebate in the child frame itself is not relevant for this terminology..

The axis lines can be named/numbered like this

Rebate side parent	A
Rebate side child	B
Hinge	C
Axis	D
Clearspace side child	E
Clearspace side parent	F
Handle	1
Free size	2
Outer Axis	3
Outer child	4
Rebate	5

Table 1

So the alignment point in a recipe can be defined like D3 (Outer axis) or C5 (Hinge)

If the alignment point is defined by the axis intersection code, the alignment frame is redundant and can be skipped.

This also allows a software system to make special points as shortcuts for the alignment points in their profile definitions for often-used combinations like C5 or D3 and D5

7.3 Transformations

The transformations are described as translations and rotations:

Offset X	0
Offset Y	-120
Offset Z	0
Rotation X	0
Rotation Y	180
Rotation Z	0

Figure 4

This is equivalent to individual matrix transformations that are multiplied. So the coordinate system is moved and rotated along with each offset and rotation.

7.4 Conditions

- Height: the height of the child frame
- Width: the width of the child frame
- Weight: the weight of the child frame
- Free space: the free space in width of the parent frame
- Opening type: single, active, passive
- Operation: Left or Right, overrules the recipe header
- Rebate side: Inside, Outside, overrules the recipe header

The numeric conditions are applied with < > <= >= operations on minimum and maximum:

Conditions	
Min. height	<input checked="" type="checkbox"/>
Min. height (mm)	360
Max. height	<input checked="" type="checkbox"/>
Max. height (mm)	440
Min. width	<input checked="" type="checkbox"/>
Min. width (mm)	370
Max. width	<input checked="" type="checkbox"/>
Max. width (mm)	1650
Min. free space	<input type="checkbox"/>
Min. free space (mm)	0
Max. free space	<input type="checkbox"/>
Max. free space (mm)	0
Min. weight	<input type="checkbox"/>
Min. weight (kg)	0
Max. weight	<input type="checkbox"/>
Max. weight (kg)	0

Figure 5

All conditions are optional.

The article is only placed when all conditions are met.

In a recipe the same article can exist on multiple lines, each with its own placement/conditions combination.

7.5 Length formula

For the length of a hardware element (e.g. a strip) a formula can be used based on:

- H = Height of the child frame
- B = Width of the child frame (breedte)
- D = Free size (dagmaat) of parent frame: the area in which the child frame moves.

7.6 Width and Height determination

The width and height sizes of a child frame, together called the hardware size (*Dutch: beslagmaat*), are determined by the outer child alignment points in the profile sections.

8 Mirrored articles

An article is applied mirrored if needed, depending on the operation type and the frame it is executed upon. If the article has a 'Mirrored' reference, the referred article is placed unmirrored.

9 Relative placement

An article can be placed relative to another. This is now only valid for:

- Handle hole: for this an existing operation with the 'handle' property is needed. The intersection of the axis of this operation with e.g. the outside of the inside plane will define the placement of e.g. a furniture article.
- Lock hole. Likewise as above.

This article can only be placed if another article with an operation of type 'Handle hole' or 'Lock hole' exists. The relative article is then placed on the center point of the existing article on the given axis.

During the execution of recipes on a frame the relative articles must be placed last.

10 Locks and their properties

Backset and PC size can be included as article conditions. However, it is more efficient to use the article options for this.

11 Cut elements

For cutting or shortening extruded operations in articles three optional properties are used: Cut1, Cut2 and Move. The same formula elements can be used as in the determination of the length: H, B and D. (see above under *Length formula* and *Width and Height determination*). E.g. 830-B.

- When only Cut1 is filled: the extruded operations in the article are cut on the calculated length (distance to the origin).
 - If also Move is filled: the cut part farthest away from the origin is not deleted but moved over that distance on the vector of the extrusion.
- When both Cut1 and Cut2 are filled: the operations are cut twice on the two distances, the part between is removed.
 - When also Move is filled the part farthest away from the origin is moved over that distance on the vector of the extrusion.

The operations are cut in their extrusion direction. If the operations are too short to be cut they should be lengthened to be able to get the desired size.

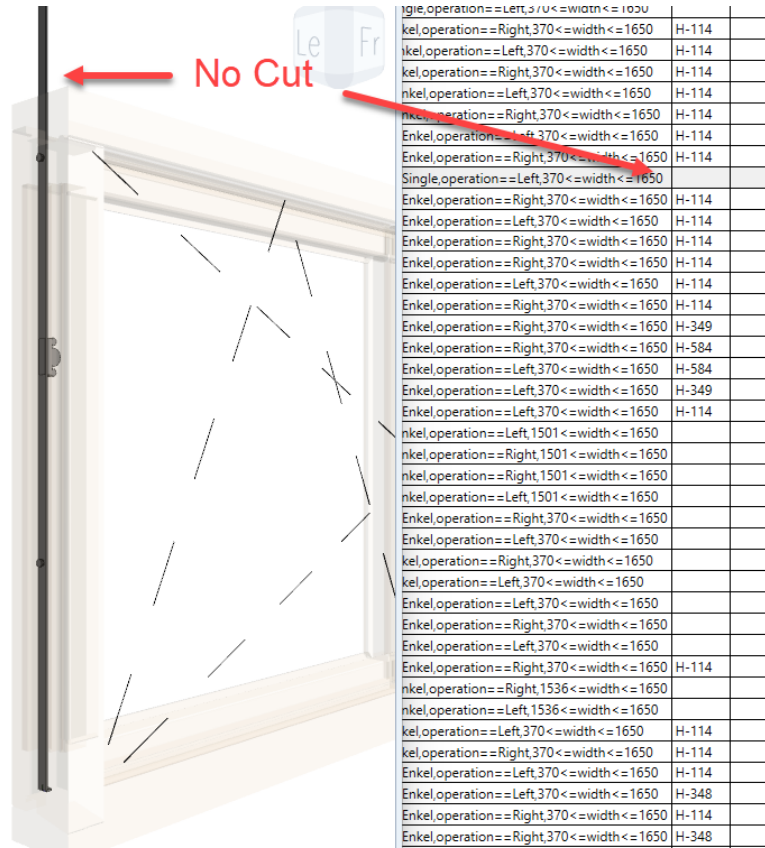


Figure 6

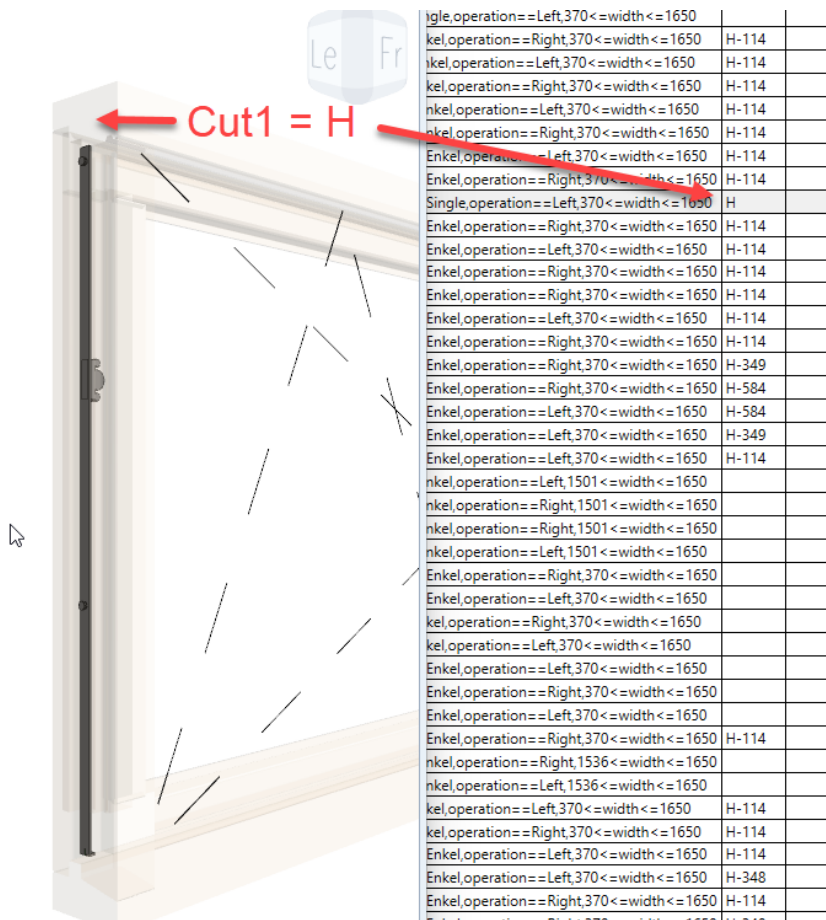


Figure 7

12 Vector placement

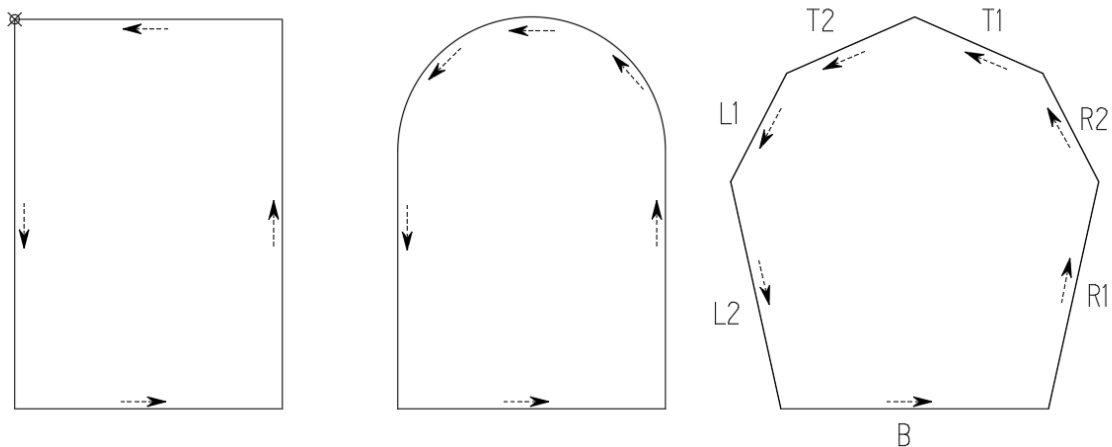


Figure 8

In addition to the Cartesian placement also allow a vector placement along a connection for the placement of articles. If we agree on the starting point per location and a clear alignment point on all the connections, we can define a vector along each connection while the axis of the article will be the axis of the connection. With this we allow slanted and curved connections: the article will be rotated along the axis of the connection.

For the placement of an article it then becomes: Location – Vector – Translation – Rotation (see figure 9)

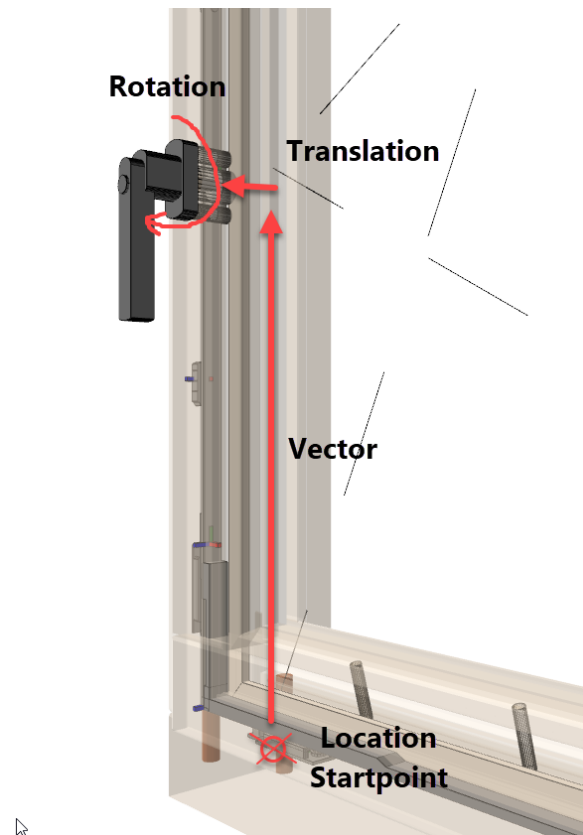


Figure 9

Location: Bottom, Right, Top, Left, Vertical Mid, Horizontal Mid.

(Starting point: vertical profiles: bottom point, horizontal profiles: left point).

Vector: a distance along the path of the connection.

Translation: the relative translation on that point compared to the axis of the connection.

Rotation: the relative rotation on that point compared to the axis of the connection (So if the Rotation == 0, the article gets the rotation of the connection on that point).

The translation and rotation can be combined in a 3x3 matrix, but that should always be multiplied with the matrix of the placement and rotation of the point on the connection.

The Location Startpoint must be known, based on the alignment point in the profiles (the point that can be considered the axis of placement).

If there are more connection with the same Location, the order is used (Right1, Right2, Top1, Top2 etc.).

13 Looking and turning directions

There are 4 combinations direction/side:

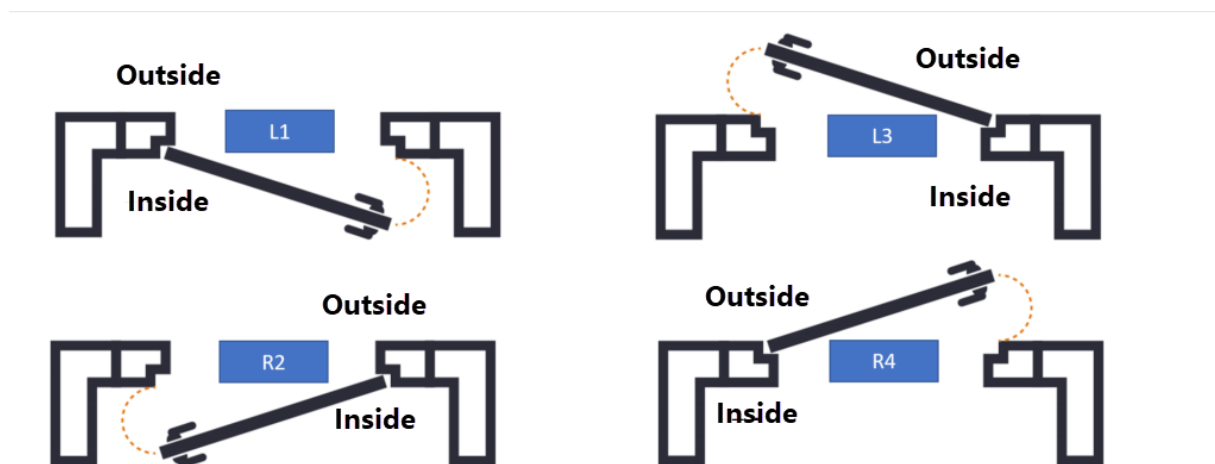


Figure 10

Key	
L1	Left Inside
L3	Left Outside
R2	Right Inside
R4	Right Outside

Operation direction:

Left: the door/window closes CCW (Counter Clock Wise).

Right: the door/window closes CW (Clock Wise).

A sliding element is Left when the handle is on the right side, is Right when the handle is on the left side. This is consistent with the handle placement of turning elements.

L1 is default. Omitting the operation type will mean a Left operation usable for inside and outside rebates (e.g. general applicable hinges).

Defining an operation type restricts the use for inside or outside rebates: an L1 recipe cannot be applied to an outside rebate.

The looking direction of a recipe is always inside the rebate, so the turning or sliding element is towards the viewer.

A sliding element is always on the inside, so always L1 or R2.