

**NORWEGIAN DOOR- AND WINDOW-CONTROL**

***NDVK-Rules***

**NDVK**

**NORWEGIAN DOOR- AND  
WINDOW-CONTROL**

**CERTIFIED**

**REQUIREMENTS FOR DOORS AND WINDOWS  
RULES FOR THE NDVK-MARKING**

*Updated: May 2012*

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## INTRODUCTION

This document, NDVK Rules, contains the regulations for the right to use the NDVK mark of approval, outlining the minimum requirements for windows and doors that must be met. NDVK rules also state manufacturer's quality control system requirements and rules for the certification of manufacturers' quality control systems. NDVK rules are founded on previous technical guidelines, approved EN standards (including current prEN; draft standards) and Norwegian building regulations.

The NDVK-Rules are divided into 5 sections:

**Part 0: GENERAL INFORMATION**

**Part 1: WINDOWS, BALCONY DOORS and SHUTTERS**

**Part 2: EXTERNAL DOORS**

**Part 3: WINDOWS AND EXTERNAL DOORS – BASE MATERIAL REQUIREMENTS FOR FINISHED PRODUCTS**

**Part 4: WINDOWS AND EXTERNAL DOORS – REQUIREMENTS FOR INCOMING COMPONENTS**

**Part 5: RULES FOR THE NDVK MARKING**

**The use of these rules without prior permission from NDVK is prohibited.**

## PART 0: GENERAL INFORMATION

### 0.1 Objective

NDVK-Rules form a foundation on which the principal characteristics of windows, patio doors and external doors are documented.

The rules comply with relevant Norwegian and European standards.

Longer term it is assumed that the NDVK rules will also be adapted to comply with future standards.

The rules are targeted at Norwegian manufacturers of windows, patio and external doors. Manufacturer's in this sense also includes those who purchase semi-finished products in order to conduct the final stages of the production process themselves. Membership of NDVK is voluntary.

### 0.2 Technical product requirements and testing methods

#### *0.2.1 Complying with standards*

As new relevant national and international standards come into force, these will normally replace the corresponding standards or rules that are stated in NDVK Rules. This is in accordance with a resolution from the NDVK's board.

#### *0.2.2 Product requirements and prototyping for installation-ready windows and external doors*

In order to be able to stamp a product with the "NDVK-mark", that product must fulfil the minimum requirements stated in the NDVK rules and relevant characteristics must be documented by prototyping in line with stated prototyping methods or by calculation according to stated calculation methods.

### 0.3 Rules for manufacturers quality control

In order to be recognised as an NDVK-certified manufacturer, a company's quality control system, must, in the eyes of an independent third party, comply with the requirements stated in the NDVK Rules for certification and factory control (part 2).

The quality control management standard required, is, to an essential degree, founded on the EN-ISO 9001 standard. This is limited to those areas deemed necessary in order to ensure production at the required quality level.

## PART 1: WINDOWS, BALCONY DOORS AND SHUTTERS

### 1.0 Conditions

The stated requirements govern completed products including any necessary operational control mechanisms and any window frame air valves. Control mechanisms and any air valves shall be mounted and closed during testing.

#### 1.0.1 Reference sizes

As reference sizes for the specification of different types of functional characteristics, such as air permeability, water, resistance to wind and thermal insulation, the given characteristics are related to products of standard module size.

Product	Module
Window	12x12*
Balcony door (single set)	9x21*
Balcony door (double set)	15x21*
Sliding door	20x21**
Ventilation sash	n/a

\*: Other approved sizes will be: -100% +50% (area)

\*\* : Other approved sizes will be:  $\pm 100\%$  (area)

Weight and size must not exceed fittings manufacturers' recommendations.

### 1.1 Functionality requirements and test methods

In order for a window or patio door to be approved, the product must fulfil all relevant minimum requirements.

#### 1.1.1 Mandatory minimum requirements (all products must fulfil this)

Characteristic	Classification/value				NDVK Req.
<b>1.1.1.1 Air permeability</b>					
Class	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>4</b>
Max. test pressure (Pa)	150	300	600	600	

Tests after: NS-EN 1026

Classification after: NS-EN 12207

Characteristic	Classification/value										NDVK Req.
<b>1.1.1.2 Watertightness</b>											
Class - Non-shielded (A)	<b>1 A</b>	<b>2 A</b>	<b>3 A</b>	<b>4 A</b>	<b>5 A</b>	<b>6 A</b>	<b>7 A</b>	<b>8 A</b>	<b>9 A</b>	<b>E</b>	<b>9A</b>
Test pressure (Pa)	(0)	(50)	(100)	(150)	(200)	(250)	(300)	(450)	(600)	(>600)	
Class - Shielded (B)	<b>1 B</b>	<b>2 B</b>	<b>3 B</b>	<b>4 B</b>	<b>5 B</b>	<b>6 B</b>	<b>7 B</b>				
Test pressure (Pa)	(0)	(50)	(100)	(150)	(200)	(250)	(300)				

Tests after: NS-EN 1027

Classification after: NS-EN 12208

#### 1.1.2 Additional requirements (recommended level)

Characteristic	Classification/value						NDVK Req.
<b>1.1.2.1 Resistance to wind</b>							
Class	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>E</b>	<b>3C</b>
Test pressure P1 (Pa)	(400)	(800)	(1200)	(1600)	(2000)	(> 2000)	
Class	<b>A</b>		<b>B</b>		<b>C</b>		
Frame deflection	$(\leq 1/150)$		$(\leq 1/200)$		$(\leq 1/300)$		

Tests after: NS-EN 12211

Classification after: NS-EN 12210

<b>Characteristic</b>	<b>Classification/value</b>	<b>NDVK Req.</b>
<b>1.1.2.2 Thermal resistance'</b> (U-value)	<i>Declared value</i>	-
$U_D (W/m^2 \times K)$		

The coefficient of thermal transmittance, the U-value, shall be declared for a window with module dimension 12 x 12, patio door with module dimension M9 x M21 and a sliding door with module dimension 20 x 21

The U-value can be documented by referring to the NDVK approved table, by either estimation or measurement.

The tables in the report "Documentation of U-values for wooden windows, patio and external doors" published by the Norwegian Joinery Association (NTL), are approved by the NDVK.

Estimates can also be done according to:

- "EN ISO 10077-1:2000 Thermal performance of windows, doors and shutters - Calculation of thermal transmittance - Part 1 Simplified method", or in accordance with a more a stringent EN- or ISO-standard.

Measurement of U-values can be carried out according to:

- "NS-EN ISO 12567-1 The thermal performance of doors and windows – The determination of the coefficient of thermal transmittance by heat flux device method – Part 1 Complete doors and windows" (ISO 12567-1:2000 (Hot box method))

<b>Characteristic</b>	<b>Classification/value</b>	<b>NDVK Req.</b>
<b>1.1.2.3 Child safety</b>	<i>In accordance with building regulations.</i>	-

<b>Characteristic</b>	<b>Classification/value</b>				<b>NDVK Req.</b>
<b>1.1.2.4 Mechanical strength</b>					2
<i>Class</i>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	
<i>Racking (N)</i>	200	400	600	800	
<i>Static torsion (N)</i>	200	250	300	350	

Tests after: NS-EN 947-1 Resistance to vertical load (racking)

NS EN 948 Resistance to static torsion

Classification after: NS-EN 113115

<b>Characteristic</b>	<b>Classification/value</b>				<b>NDVK Req.</b>
<b>1.1.2.5 Repeated opening and closing</b>					3* 4**
<i>Class</i>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	
<i>Number of cycles</i>	5 000	10 000	20 000	50 000	

Tests after: NS-EN 1191

Classification after: NS-EN 12400

\* Requirement for window.

\*\*\*) Requirement for windows-door (balcony-door).

<b>Characteristic</b>	<b>Classification/value</b>					<b>NDVK Req.</b>
<b>1.1.2.6 Impact resistance</b>						1
<i>Class</i>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	
<i>Drop height (mm)</i>	200	300	450	700	950	

Tests and classification after: NS-EN 13049

<i>Characteristic</i>	<i>Classification/value</i>		<i>NDVK Req.</i>
<b>1.1.2.7 Operating forces</b>			<b>1</b>
<i>Class</i>	<b>1</b>	<b>2</b>	
<i>a) Casement or sash</i>	100 N	30 M	
<i>b) Hardware</i>			
	100 N or 10 Nm	30 N or 5 Nm	
	50 N or 5 Nm	20 N og 2 Nm	

Tests after: NS-EN 12046-1  
 Classification after: NS-EN 13115

### **1.1.3 Mandatory requirements**

#### *1.1.3.1 General strength requirements*

The window construction must absorb all the impacting forces in the window pane and transport these to the building's supporting structure. The window's construction shall be such that it is not damaged during transport, warehousing or installation in the finished construction.

#### *1.1.3.2 Constructive wood protection*

Frame and case profiles shall be made so that rainwater can run off down the outer surface. Parts/surfaces on horizontal profiles that can be reached by precipitation must have a minimum tilt of 1:8.

#### *1.1.3.3 Basic handling*

Products must undergo a water repellent treatment which gives temporary protection so that they can withstand limited storage at the building site and short exposure to rain without this leading to harmful absorption of moisture.

#### *1.1.3.4 Handling and fitting instructions*

The product should come with written instructions. These should include the necessary information regarding transportation of the product, reception, storage, handling plus protection during construction as well as for mounting the window in a wall and necessary adjustments.

#### *1.1.3.5 Maintenance instructions*

Every delivery should include written instructions regarding maintenance of the window. The relevant model prepared by the Association of Norwegian Door and Window Manufacturers can be adopted.

## 1.2 Special requirements

### 1.2.1 Fire protection

Fire resistance: In accordance with building regulation requirements

### 1.2.2 Insulation against outdoor noise

Documentation on this can be found by referring to the Norwegian Building Research Institute's (Byggforsk) Handbook 47 1999 entitled "Insulation against outdoor noise", or by measuring or estimating in line with other equivalent methods.

<i>Characteristic</i>	<i>Classification/value</i>						<i>NDVK Req.</i>
<b>1.2.3 Burglar resistance</b>							
<i>Resistance class</i> <i>See ENV 1627 for the different req.</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	-

Tests after: - Resistance to static loading ENV 1628  
 - Resistance to dynamic loading ENV 1629  
 - Resistance to manual burglary attempts ENV 1630

Classification after: ENV 1627



## PART 2: EXTERNAL DOORS

### 2.0 Requirements

The requirements listed apply to finished products inclusive of any necessary operating fittings and any letterbox slots. Necessary operating fittings and any letterbox slots should be fitted in and closed during testing. Where skylights and sidelights are integrated into the doorframe, it is regarded as an external door.

#### 2.0.1 Reference sizes

As reference sizes for the specification of characteristics such as air permeability, watertightness, wind resistance and thermal resistance, the given characteristics apply to products with the following module measurements:

Product	Modul
External door, single door leaf	9x21
External door, double door leaf	15x21

Other approved sizes will be: -100% / +20% (area)

Weight and size must not exceed fittings manufacturer's recommendations.

#### 2.0.2 Functional requirements and test methods

In order for an external door to be approved, the product must fulfil all relevant minimum requirements.

### 2.1 Requirements

Characteristic	Classification/value				NDVK Req.
<b>2.1.1 Air permeability</b>					
Class	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>4</b>
Max. test pressure (Pa)	150	300	600	600	

Tests after: NS-EN 1026

Classification after: NS-EN 12207

Characteristic	Classification/value										NDVK Req.
<b>2.1.2 Watertightness</b>											
Class - Non-shielded (A)	<b>1 A</b>	<b>2 A</b>	<b>3 A</b>	<b>4 A</b>	<b>5 A</b>	<b>6 A</b>	<b>7 A</b>	<b>8 A</b>	<b>9 A</b>	<b>E</b>	<b>7A or 7B</b>
Test pressure (Pa)	(0)	(50)	(100)	(150)	(200)	(250)	(300)	(450)	(600)	(>600)	
Class - Shielded (B)	<b>1 B</b>	<b>2 B</b>	<b>3 B</b>	<b>4 B</b>	<b>5 B</b>	<b>6 B</b>	<b>7 B</b>				
Test pressure (Pa)	(0)	(50)	(100)	(150)	(200)	(250)	(300)				

Tests after: NS-EN 1027

Classification after: NS-EN 12208

Characteristic	Classification/value						NDVK Req.
<b>2.1.3 Resistance to wind</b>							
Class	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>E</b>	<b>1A</b>
Test pressure P1 (Pa)	(400)	(800)	(1200)	(1600)	(2000)	(> 2000)	
Class	<b>A</b>		<b>B</b>		<b>C</b>		
Frame deflection	(≤1/150)		(≤1/200)		(≤1/300)		

Tests after: NS-EN 12211

Classification after: NS-EN 12210

<i>Characteristic</i>	<i>Classification/value</i>	<i>NDVK Req.</i>
<b>Thermal resistance</b>		
U-value	<i>Declared value</i>	-

The coefficient of thermal transmittance, the U-value, shall be stated and declared for a door with module dimensions M10 x M21.

The U-value can be documented by referring to the NDVK approved table, by either estimation or measurement. The tables in the report "Documentation of U-values for wooden windows, balcony and external doors" published by the Norwegian Joinery Association (NTL), are approved by the NDVK.

Estimates can also be done according to:

- "EN ISO 10077-1:2000 Thermal performance of windows, doors and shutters - Calculation of thermal transmittance - Part 1 Simplified method", or in accordance with a more a stringent EN- or ISO-standard.

Measurement of U-values can be carried out according to:

- "NS-EN ISO 12567-1 The thermal performance of doors and windows – The determination of the coefficient of thermal transmittance by heat flux device method – Part 1 Complete doors and windows" (ISO 12567-1:2000 (Hot box method))

<i>Characteristic</i>	<i>Classification/value</i>			<i>NDVK Req.</i>
<b>2.1.5 Behaviour between different climates</b>				
<i>Class</i>	<b>1</b>	<b>2</b>	<b>3</b>	<b>2</b>
<i>Permissible deformation</i>	≤ 4 mm	≤ 4 mm	≤ 2 mm	
<i>Test climate</i>	(x)*	(x)*	(x)*	

Tests after: NS-EN 1121-1

Classification after: NS-EN 12219

\*: Test climate (a, b, c, d or e) shall be stated

<i>Characteristic</i>	<i>Classification/value</i>				<i>NDVK Req.</i>
<b>2.1.6 Mechanical strength</b>					
<i>Class</i>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>3</b>
<i>Vertical load (N)</i>	400	600	800	1000	
<i>Static torsion (N)</i>	200	250	300	350	
<i>Soft and heavy body impact (J)</i>	30	60	120	180	
<i>Hard body impact (J)</i>	1,5	3	5	8	

Tests after: - Resistance under vertical load NS EN 947

- Resistance to static torsion NS EN 948

- Resistance to soft and heavy body impact NS EN 949

- Resistance to hard body impact NS EN 950

Classification after: NS EN 1192

<i>Characteristic</i>	<i>Classification/value</i>				<i>NDVK Req.</i>
<b>2.1.7 Repeated opening and closing</b>					
<i>Class</i>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>4</b>
<i>Number of cycles</i>	5 000	10 000	20 000	50 000	

Tests after: NS-EN 1191

Classification after: NS-EN 12400

<i>Characteristic</i>	<i>Classification/value</i>				<i>NDVK Req.</i>
<b>2.1.8 Operating forces and torques</b>					<b>2</b>
<i>Class</i>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	
<i>Closing force of commence motion, maximum value (N)</i>	75	50	25	10	
<i>Hand operated hardware;</i>					
- <i>Maximum torque, (Nm)</i>	10	5	2,5	1	
- <i>Maximum force, (N)</i>	100	50	25	10	
<i>Finger operated hardware;</i>					
- <i>Maximum torque, (Nm)</i>	5	2,5	1,5	1	
- <i>Maximum force, (N)</i>	20	10	6	4	

Tests after: NS-EN 12046-2

Classification after: NS-EN 12217

### **2.1.9 Constructive wood protection**

Frame and case profiles must be made such that rainwater can run off down the external surface. Horizontal profiles on the surfaces of the door that are exposed to precipitation must have a minimum tilt of 1:8. An exception to this rule is glazing rebates in external doors by the simplified installation of a double-glazed unit. A condition of this is that the simplified installation is carried out in accordance with NBI Construction detail 533.202.

### **2.1.10 Basic handling**

Products must have undergone water repellent treatment giving them temporary protection, so that they can withstand limited storage at the construction site and a short exposure to rain without this leading to the harmful absorption of moisture.

- External doorframes can, under special circumstances, specified by the customer, be exempt from the above regulation, i.e. can be delivered completely untreated

### **2.1.11 Handling and assembly instructions**

The product should come with written instructions. These should include the necessary information regarding transportation, goods received, storage, handling plus protection during construction as well as for mounting the product in wall and necessary adjustments.

### **2.1.12 Maintenance instructions**

Every delivery should include written instructions regarding maintenance of the door.

## 2.2 Special requirements

### 2.2.1 Fire protection

Fire resistance: In accordance with building regulation requirements.

### 2.2.2 Insulation against outdoor noise

Documentation on this can be found by referring to Norwegian Building Research Institute's (Byggforsk) Handbook 47 1999 entitled "Insulation against outdoor noise", or by measuring or estimating in line with other equivalent methods.

<i>Characteristic</i>	<i>Classification/value</i>						<i>NDVK Req.</i>
<b>2.2.3 Burglar re-sistance</b>							
<i>Resistance class</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	-

Tests after: - Resistance to static loading ENV 1628

- Resistance to dynamic loading ENV 1629

- Resistance to manual burglary attempts ENV 1630

Classification after: ENV 1627

## PART 3: WINDOWS, BALCONY DOORS AND EXTERNAL DOORS – REQUIREMENTS FOR BASE MATERIALS USED IN FINISHED PRODUCTS.

### 3.1 Timber

#### 3.1.1 Information

These regulations include the fundamental requirements of wood components and timber used in manufactured windows, patio doors, shutters and external doors. Included with windows and doors are also metal-clad products and other metal combinations. The requirements are based on prEN 13307 and are primarily applied to spruce and pine but under certain circumstances can also be applied to other types of timber.

#### 3.1.2 Objectives

Having been made into a finished profile, the timber must have good resistance against rot, mould and fungal discolouration as well as being mechanically sound.

#### 3.1.3 Definitions

-

**Concealed face:** Face of a joinery part which, after installation of the joinery is completed, is permanently concealed by other parts of the joinery product, or by other parts or by other elements including materials such as veneer, plastic or metal.  
NOTE: These faces may be visible before the product is installed.

- **Semi concealed face:** Visible face of a joinery part which cannot be viewed when the product is in the closed position.

- **Visible face** Face of a joinery part which, after installation of the joinery is completed, is not permanently concealed or semi-concealed.  
NOTE 1: An opaque finish, does not constitute concealment.  
NOTE 2: Faces which are visible when moving parts (e.g. shutters) are open are classified as semi-concealed.

#### Wood faults, sort definitions etc.:

Please refer to the book: **"Nordic quality definitions for the timber industry"- conifers**" (In English version)

#### 3.1.4 Requirements for sawn timber

Immediately after being sawn, timber must be dried to a humidity of ca. 20% and ideally, dried further to a final humidity of  $12\% \pm 3\%$ , cf. Goods-in control.

- Cf. measuring regulations in **"Nordic quality definitions for the timber industry - conifers"** (exists in English)

#### 3.1.5 Requirements for timber in finished products

The requirements for timber in finished windows, patio doors, shutters and external doors are listed in table 3.1.

Table 3.1 Requirements for timber in finished windows, balcony doors, shutters and external doors

Type of defects	Explanations/requirements
<b>Cross grain</b>	Max: 1:10
<b>Rate of growth</b>	Mean value $\leq 4,0$ mm calculated at the greatest part of a cross section taken across the rings. If the pith is visible then the innermost rings should not be included. In laminated constructions permitted deviation in the middle lamina is: $\leq 5,0$ mm.

Type of defects	Explanations/requirements
<b>Moisture content</b>	12% $\pm$ 3% in spruce and pine with a corresponding humidity for other types of timber. Humidity levels must be the same in all parts of the window/door. 95% of measurements of samples taken must not deviate more than the permitted $\pm$ 3%. Under no circumstances should humidity lie at under 9% or over 16% for pine and spruce.
<b>Spring</b>	Maximum 2 mm/m
<b>Twist</b>	Maximum 2 mm/dm/m
<b>Non-permitted material faults</b>	See table 3.2
<b>Fissures</b>	See table 3.3
<b>Knots</b>	Permitted size and number in accordance with: Table 4a: Windows, balcony doors and shutters Table 4b: External doors

**Table 3.2 Non-permitted material faults**

Blue stain: Can be allowed to a certain degree: - Untreated: Sides not visible - Treated: Full surface treatment
Mould
Rot
Insect damage
Sap stain on visible and concealed parts (Not permitted on visible parts; maximum length $\leq$ 150 mm. Must not extend to, or touch on out-facing corners/mortise joints)
Water damage
Resin pockets on visible and concealed parts: Acceptable in glazing rebate and on a wall side, provided it doesn't weaken the construction or cause leakages.
Resinous pinewood
Waterline: can be permitted as long as it is not visible when the product is wall mounted

**Table 3.3 Restrictions regarding cracks and fissures in timber**

Product part	Requirement
Concealed aspects of casing (wall side)	Not deeper than half the thickness of the profile. Can be accepted along the casing length but not consecutively
Surfaces exposed to weather *)	Only microcracks allowed **)
Concealed parts and glazing rebate of casing and frame *)	200 mm/< 2 mm width 300 mm/< 1,5 mm width
Visible sides of casing, door leaf, the inside of a window frame	Only microcracks allowed **)

\*) : Window exposed surfaces means all parts of the window that hard rain can reach the surface of the profile (usual 15mm from the outer side of the construction), as well as glazing rebates and glazing beads in outer frames.

\*\*): Microcracks are difficult to spot prior to surface finish treatments.

**Table 3.4a Knots in windows, balcony doors and air vents. Permitted size and number**

	Casing	Frame/ Post/transom	Mullions and glass beading	Threshold	Panel surface
Max. Knot diameter- (in relation to the component's side dimensions)	50 % of visible parts (after NS-EN 942)		-	-	-
40 mm	1	-	-	-	-
30 mm	1	1	-	-	-
20 mm	2	2	-	-	-

	Casing	Frame/ Post/transom	Mullions and glass beading	Threshold	Panel surface
10 mm	5	5	-	2	unlimited
Pin knots	unlimited	unlimited	2	2	unlimited
Of the above, the following amount of solid, dry knots are allowed	6 /10 mm	Pin knots are permitted in unlimited number	-	-	-
NB!				Arris knots are not permitted in visible corners	Arris knots and leaf knots are not permitted

**Table 3.4b Knots in external doors. Permitted sizes and number**

	Casing	Door frame	Mullions and glass beading	Threshold	Door leaf
Max knot diameter (in relation to the component's side dimensions)	50 % of visible parts (after: NS-EN 942)	50 %	-	-	(amount and size can be unlimited in veneers)
40 mm	1	-	-	-	-
30 mm	1	1	-	-	-
20 mm	2	2	-		
10 mm	5	5	-	2	unlimited
Pin knots	unlimited	unlimited	2	2	unlimited
NB.		Arris knots and Spike knots not permitted	Arris knots not permitted	Arris knots are not permitted in visible corners	

**Supplementary requirements to tables 3.4a and 3.4b:**

The minimum distance between knots is twice the knot diameter.  
Loose, dry knots are not permitted.

**3.1.6 Plugging/Repair of material faults**

Wood plugs are regarded as knots. In place of plugs a NDVK approved repair mass or hot melt adhesive can be used.

Plugging must not occur on weather-exposed surfaces of the frame or sash's bottom parts that are exposed to weather, or up to 300 mm up the lower part of vertical parts.

The following applies when plugging surfaces:

The grain must be parallel with the wood profile. The diameter of a round wooden plug must not be more than 30 mm. Wooden plugs must be glued with a class D4 adhesive in accordance with EN 204. The moisture content of the plug must not vary from that of the wood profile by more than +0 -2%. The drilling depth must be more than 5mm at the finished profile surface. Repair substances for plugging of weather-exposed surfaces must be weather-resistant and have high solid matter content.

2/3 of the plug's diameter must be fixed firm once worked in.

2 or more plugs into each other are not allowed.

Boat plugs <sup>1)</sup> can be used, as these are not considered as reparation. Several boat plugs into each other are not allowed.

**1): Notes:**

Several types of boat plugs exist, both in terms of length and breadth (with either two or three "profiles"). It is important to use special equipment designed for the purpose for cutting, gluing and pressing in order to get a good result.

**3.1.7 Glued materials/components**

Components may be produced of solid or laminated wood. Finger jointing is permitted.

For glued /semi-manufactured components, purchased from other manufacturers, the same requirements relating to glue and workmanship apply as stated in part 4.5, and in the "Control advice for laminated mate-

rials report 1.1.93, Laminated materials for windows and external doors – Nordic agreement for production and control”, or prEN 13307-2.

### 3.1.8 Fibreboard

The requirements for fibreboard for use in external doors are stated in table 3.5 and table 3.6 below. The quality of the product depends greatly on the quality of the glue used.

**Table 3.5 Requirements for external boards - HDF (high density fibreboard)**

Test standard	Characteristic	Unit	Product requirement	
			Min/max. value	Margin
EN 323	Density	kg/m <sup>3</sup>	Min 850	+ 5 %
EN 317	Swelling in thickness (24t)	%	Max 14	
EN 318	Dimensional changes, length / width	%	Max 0,4	
EN 318	Dimensional changes, thickness	%	Max 6	
EN 319	Tensile/perpendicular strength	N/mm <sup>2</sup>	Min 1,5	
EN 1087-1	Tensile strength after boiling test V100	N/mm <sup>2</sup>	Min 0,15	
--	Moisture content at goods-in	%	Max 8	
NS-EN 120	Formaldehyde vaporisation	mg/100g	Must comply with "E1" standard	

**Table 3.6 Requirements for interior boards 8 – 19 mm MDF (medium density fibreboard)**

Test standard	Characteristic	Unit	Product requirement	
			Min/max. value	Margin
EN 323	Density	kg/m <sup>3</sup>	Min 650	+ 5 %
EN 317	Swelling in thickness (24t)	%	Max 10	
EN 318	Dimensional changes, length/width	%	Max 0,4	
EN 318	Dimensional changes, thickness	%	Max 7	
EN 319	Tensile/perpendicular strength	N/mm <sup>2</sup>	Min 1,5	
EN 1087-1	Tensile strength after boiling test V100	N/mm <sup>2</sup>	Min 0,15	
NS-EN 120	Formaldehyde vaporisation	mg/100g	Must comply with E1 standard	

### 3.1.9 Measuring requirements and definitions

In accordance with *"Nordic quality definitions for the forestry industry – conifers"* (exists in English)

## 3.2 Metals

This aspect will be included at a later date (as needs dictate).

## 3.3. WINDOWS AND DOORS OF PLASTIC (PVC-u profiles)

### 3.3.1 Dimensioning and securing

Large opening windows can have a risk of functional problems. Opening windows with an area larger than 1.7 m<sup>2</sup> should not be produced and the largest edge length should not exceed 1.5 m. If these targets are exceeded there should be special consideration to factors such as frame size, mounting brackets, hinge function and number of locking points. For side hung windows the relationship/ratio between the width and height must be considered in more detail.

When the product size is determined, the plastic material's movements due to temperature has to be taken account of. This is especially important for products that have dark colours are wide, or where multiple products are built together side by side.

Where climatic, or other, conditions dictate the need for documentation of resistance to wind loads this must be documented in the form of testing according to NS-EN 12211. Classification should be set according to NS-EN 12210.



*NDVK recommendation for classification of normal Norwegian climate conditions;*

Class 3C for windows, balcony doors and sliding doors (see section 1.1.2.1).  
Class 1A for exterior doors (see section 2.1.2.1).

Tightness tests of windows and doors in plastic must be carried out according to NS-EN 1027 for water tightness and NS-EN 1026 for air permeability. Classification must be according to NS-EN 12208 for water tightness and NS-EN 12207 for air permeability.

*NDVK requirements for classification of normal Norwegian climate conditions;*

Water tightness Class 9A for windows, window doors and patio doors (see section 1.1.1.2).  
Water tightness Class 7A or 7B for exterior doors (see section 2.1.1.1).

Air permeability class 4 for windows, window doors, patio doors and exterior doors (see sections 1.1.1.1 and 2.1.1.1).

NDVK requirements and recommendations for classification of products are assessed by the normal Norwegian climate. It is recommended that requirements for the performance assessed are in relation to the actual application of these, including the geographic location.

### **3.3.2 Requirements for profile material**

Profiles in PVC for the manufacture of doors and windows must meet the requirements of NS-EN 12608 Profiles of polyvinyl chloride without softener (PVC-u) for the production of doors and windows. Classification requirements and test methods. The profiles must satisfy the requirements for climate class M - moderate climate.

All materials in profiles shall also comply with current Norwegian environmental legislation.

*Table 3.7 Requirements for PVC profiles for the production of doors and windows*

Property	Test standard	Requirements
Impact resistance	NS-EN 12608	Class 1: Falling mass 1000 g and falling height 100mm
Dimensional stability in heat	NS-EN 479	Dimensional change $\pm 2$ %
Dimensional stability after heating to 150 ° C	NS-EN 478	No defects
Weather resistance	NS-EN 513	Requirements for the maximum change of impact strength and colour given in NS-EN 12608
Resistance to falling loads	NS-EN 477	Damage to the wall for only one of the test objects
Weld ability	NS-EN 514	Minimum voltage level given in EN 12608

The manufacturer of the profiles shall be able to document, that the production quality is monitored under a system in accordance with ISO 9000 series.

As a minimum requirement for documentation, windows -/doors manufacturers, shall provide the data sheet from the manufacturer of the profile.

***On the basis of a more subjective evaluation the following additional requirements also apply;***

- When the profiles are viewed at a distance of 1.5 m or more, the impression must not be disturbed by scratches, extrusion markings or other visual surface defects.

- Hinges, or other fittings with such loadings, shall be attached with screws which have penetration through a minimum of 2 layers. That means 2 layers of plastic or one plastic layer and 1 layer of metal reinforcing. Other fixing methods which have proven to be equally stable may also be used (e.g. screw thread).
- Units manufactured from through-coloured white or light grey profiles must be reinforced in accordance with the profile supplier's instructions as well as where additionally required for the fitting of hardware or the installation of the unit in the building.  
Where it is approved/prescribed by a profile provider, the reinforcement/strengthening of the frame and / or sash can be replaced by "structurally gluing" the insulating glass to the frame or sash according to the profile supplier's instructions.
- Units manufactured from through-coloured dark profiles, must have reinforcement irrespective of size of product. Units from profiles with a dark external surface must be reinforced in accordance with the manufacturer's instructions.

### **3.3.3 Requirements for work performance**

#### *3.3.3.1 Processing of profiles*

Visible surfaces, edges and corners must not show unintentional marks or other traces from tools nor traces from handling during manufacture and storage.

Outward opening casement corners which users may come into contact with must not be pointed or sharp enough to be unpleasant to touch.

Rebate of sash which shall press towards weather gasket, shall not have any height deviation exceeding 0.5 mm.

If, during manufacturing of the product, fixing holes for installation of product into the wall are drilled, distance between holes must be in accordance with profile manufacturer's instructions. Installation instructions and details must accompany all deliveries.

Dimension tolerances (at 15 ° C)

- Overall frame size:  $\pm 2\text{mm}$  at nominal dimension  $\leq 2\text{ m}$   
 $\pm 3\text{ mm}$  at the nominal dimension  $> 2\text{ m}$   
Sash size: (Frame size inside rebate - (2 \* specified clearance))  $\pm 2\text{ mm}$

#### *3.3.3.2 Corner joints*

Frame and casement corner joints must be welded. Transom and mullion may be scribed together and fixed with a bracket developed for the profile system. The joints must be completely air and watertight.

The manufacturer's product data sheets must contain a short description of method used for the assembly of the corner joints. The information to be provided for welding must include guidelines for temperature, time and pressure during contact with the welding mirror as well as time and pressure for the compression prescribed by the profile supplier for the material and profile in question.

At each ordinary inspection visit a documented check must be carried out to ascertain that welding mirror temperature as well as time and pressure during contact with the welding mirror agree with instrument readings and profile supplier instructions.

*The manufacturer should be able to provide evidence of the strength of the welded corner joints. The force shall be documented by testing according to the method of pressure-/bend test specified in EN 514*

*For corner connections/joints the fracture load (F) will be a minimum of 2.5 kN.*

If regular documented testing of casement corner joint strength is conducted by the manufacturer himself or somebody appointed by him, an external accredited test must be conducted each second year.

If the manufacturer does not conduct tests as stipulated, external testing producing satisfactory results must be conducted at each ordinary inspection visit.

At the place of manufacture, sufficient drainage holes must be incorporated into sills and casement bottom rails to ensure that any rainwater or condensation water is led into the open. The minimum size of drainage holes is  $\varnothing 8$  mm or a 5 x 20 mm gap. Holes must be located to ensure the removal of all water. Drainage holes must not be connected to cavities containing (metal) reinforcement anywhere.

Reinforcement profiles shall either have a tight fit inside the PVCu profile or be retained using hidden screws at a distance not exceeding 250 mm with a max distance of 60 mm from the ends. If the profile supplier prescribes different distances, screws must be fitted accordingly.

### *3.3.3.3 Bonding*

Added profiles such as drip grooves etc. may be bonded on using an adhesive recommended by the profile supplier.

### *3.3.3.4 Surface treatment*

The use of painted profiles is permitted, provided the coat is applied in suitable industrial plant machinery. However, it is an express condition that the buyer is being notified in any case about the fact that the profiles are painted.

PVCu profile surfaces visible from the inside or outside must have a uniform sheen or matt finish.

The manufacturer's maintenance manual must contain information about how to clean the surface, how often to clean the surface and which cleaning agents to use. It must also be clearly stated in the user manual that the use of solvents for cleaning the surface is not permitted.

## **PART 4: WINDOWS, BALCONY AND EXTERNAL DOORS – REQUIREMENTS FOR COMPONENTS USED**

### **4.1 Information**

These regulations include the fundamental requirements for supplementary materials, semi-fabricated products and components used for control marked windows, balcony doors, air vents and external doors

### **4.2 Minimum requirements**

NDVK assumes that certified manufacturers of windows and external doors only use materials and components that are NDVK-approved.

### **4.3 Double-glazed windows**

Double-glazed windows must be approved in accordance with the **"NBI Technical Approval"** or NS EN 1279-6 (and/or 1279-1)

Specialist glass solutions, e.g. fire resistant glass, is exempt from these regulations

In the case of external doors a simplified means of installing glass can be accepted, carried out in compliance with **"Byggetaljblad 533.202"** (only in Norwegian)

### **4.4 Fittings**

#### **4.4.1 General**

Only fittings that fulfil the demands of NDVK`s control order for fittings for use in windows and doors may be used.

This control order for fittings is described in more detail in the document "Rules for the control of fittings for windows and doors with respect to corrosion protection".

### **4.5 Glue and gluing:**

#### **4.5.1 General**

In terms of all gluing, the manufacturer`s instructions regarding mixing, shelf life, temperature exposure, pressure and pressing time must be followed.

#### **4.5.2 Requirements for glues:**

For gluing either where the fibres are parallel or where they intersect, only glue that is water resistant and complies with class D4 of the NS-EN 204 standard can be used. This must be documented and presented. Where the wooden parts to be glued are impregnated, it must be clear from the glue manufacturer`s printed material that it is suited for this purpose.

#### **4.5.3 Gluing parallel to the direction of the grain:**

The glue must fill the entire space between the parts to be glued.

In the case of soft woods it will normally be sufficient to glue on one side only

In the case of hard woods, which are difficult to moisten, glue must be used on both two sides.

#### **4.5.4 Gluing of corner joints:**

The glue must fill the entire space between the two parts to be glued, in order to fulfil watertightness requirements

## **4.5.5 Gluing in connection with plugging**

The glue can be applied on one side, but must be applied both in the base and on the sides in adequate amounts so that the space between the plug and the walls of the hole contains sufficient glue.

## **4.6 Gaskets and glazing seals**

Only seal gaskets and glazing seals, which have received "**NBI Technical Approval**", or its equivalent, and which are included on the NDVK list of approved products, may be used and done so in accordance with the supplier's instructions.

## **4.7 Putty, mastic and glazing seals**

Putty, mastic and glazing seals must be on the NDVK approved list and used in accordance with the supplier's instructions.

## **4.8 Ventilator**

Ventilator must be on the NDVK approved list and be used in accordance with the supplier's instructions. Permitted leakage in a closed position is a maximum of 2.4 m<sup>3</sup>/h with gauge pressure of 600 Pa.

## **4.9 PVC/synthetic profiles**

PVC/synthetic profiles on the NDVK approved list shall be used and used in accordance with the supplier's instructions.

(This chapter will be written as needed/requested by members and will be based on the respective EN standards).

## **4.10 Outside cladding, metal profiles**

Metal profiles and respective securing elements must be made of anti-corrosive or corrosion resistant materials. Any steel details must be stainless or aluminium insulated to avoid the risk of contact corrosion. The distance between the metal profile and the wood must be at least 5mm in order to ensure sufficient ventilation between the profile and the wood. The space between the metal profile and the wood must be ventilated outwards in such a way that, as far as possible, rainwater is prevented from penetrating parts that are not intended to be wet. All profiles must be formed in such a way as to ensure drainage. In the case of horizontal surfaces that can be reached by precipitation and for construction elements where condensation can collect, the requirements stated in point 1.1.12 and/or 2.1.13.

For windows ENV 13420 test methods for different climates.

## **4.11 Surface treatment**

### **4.11.1. Minimum treatment/priming**

The NDVK does not require products to have surface finishes applied by the manufacturer, apart from a water-resistance treatment giving temporary protection, enabling products to be able to withstand limited storage at a building site and short exposure to rain without the risk of the moisture content of the wood exceeding 18 %. In practice this means that a dip/flow coat treatment will be sufficient. The NDVK does recommend, however, that comprehensive surface finish is applied before the product is delivered to the building site. Heartwood does not require priming. If this treatment can create restrictions in terms of later finishing treatments, this needs to be pointed out in the manufacturer's installation and maintenance instructions.

### **4.11.2. Technical requirements for finishing**

Where the manufacturer supplies products that have already had a surface finish applied, the requirements stated in this chapter apply.

All surfaces must have a surface finish applied. In particular end grain wood requires a proper finish to prevent it absorbing moisture. The outer parts of concealed glazing rebate, at a minimum of 15 mm inside the

external edge of the glazing bead must be treated. External glazing beads made of wood must be of treated end grain. The requirements for surface finishes do not apply to the wall side of the frame.

The surface finish should be applied as soon as possible after machining in order to achieve satisfactory bonding with the base. Visible signs of the wood grain through a coating of surface finish can be permitted. Knots, which are not permitted, should be removed in various ways. Cf. table 3.4.a and b, and part 3.1.6 Surface finishes on the outer side must be diffusion open in order to enable the wood to dry out properly. In order to limit functional problems caused by moisture movements in external doors, the door leaf should normally have a damp course in order to prevent moisture seeping from the warm, damp side to the cold side. For most of the year the transport can be done from in to out, but during the summer this can be reversed.

**Table 4.1 Surface finishes for windows, balcony doors and external door frames**

Characteristic	Within the weather stripping		External	
	Transparent Surface finish	Stain finish	Exposed surfaces, incl. bottom frame <sup>1)</sup>	Non-exposed surfaces
<b>Knot discolouration</b>	n/a	Knot sealant should be used <sup>2)</sup> Please refer to manufacturer's guarantee description		
<b>Fillers and hot melt adhesives</b>	Hot melt adhesives permitted providing good colour match	Only permitted where visible as a smooth finish. Must be polished		
<b>Visible grain structure</b>	Permitted	Can be accepted. Grain pattern best visible through dark colours.		
<b>Colour differences</b>	---	---	Permitted to a certain degree.	Permitted.
<b>Surface roughness</b>	Minimal roughness permitted as long as tree structure/grain can be felt		Some roughness is permitted. A rougher finish than on interior is recommended	
<b>Orange peel surface</b>	Not permitted			
<b>Seeping</b>	Not permitted		Permitted in one place only	Permitted
<b>Stickyness Sticky (?)</b>	Not permitted			
<b>Colour bleeding</b>	Strong colours will bleed where a diffusion open stain is used			

1) Also applies to the door frame on the lock side of doors

2) Doorframes can be finished without prior use of knot sealant

**Table 4.2 Surface finishes for door leaves (external doors). Surface finish applied the same both on the inside and outside**

Characteristic	HDF/MDF	Plywood/veneer		Solid wood, framing timber and panelling	
		Transparent	Stain	Transparent	Stain
<b>Knot</b>	-	See table 3.4b knots in external doors			
<b>Knot discolouration</b>	-	Knot sealant should be used. See manufacturer's guarantee			
<b>Plugs</b>	-	Not allowed.			
<b>Fillers and hot melt adhesives</b>	Only permitted as a flat surface. Must be polished smooth	Accepted with good colour matching.	Only permitted as a flat surface. Must be polished smooth.	Accepted with good colour matching.	Only permitted with as a flat surface. Must be polished smooth
<b>Visible grain structure</b>	Panelling, decorative mouldings and fancy profiles can have a different structure	Permitted	Can be accepted. Grain structure is best seen through dark colours.	Permitted	Can be accepted. Grain structure is best seen through dark colours
<b>Colour variations</b>		n/a		n/a	

Characteristic	HDF/MDF	Plywood/veneer		Solid wood, framing timber and panelling	
		Transparent	Stain	Transparent	Stain
<b>Surface roughness</b>	Smooth	Oiled: <sup>1)</sup> as an untreated surface Lacquered: smooth	Smooth		
<b>Orange peel surface</b>	Not permitted.				
<b>Seeping</b>	Not permitted				
<b>Sticky</b>	Not permitted				
<b>Colour bleeding</b>	Strong colours will bleed with the use of a diffusion open stain				

1) Oiling is a temporary treatment. The product must have a final finish applied as soon as it is mounted in the wall

### 4.11.3. Claims

This should happen in accordance with individual manufacturer’s guidelines, based on NS 3409.

## PART 5: RULES FOR MARKING

### 5.1 Product marking

The following must be in place:

- NDVK-mark/-logo
- Manufacturer’s name
- Product identification (optional)

Where required, the characteristics of the product should be documented and available separately

**NB!** Special (customer specified) product shall not be marked.



### 5.2 Brochure material, offer

The NDVK-Mark/-logo is to be used with the following text underneath:  
 “The company’s manufacturing process meets with NDVK certification requirements”

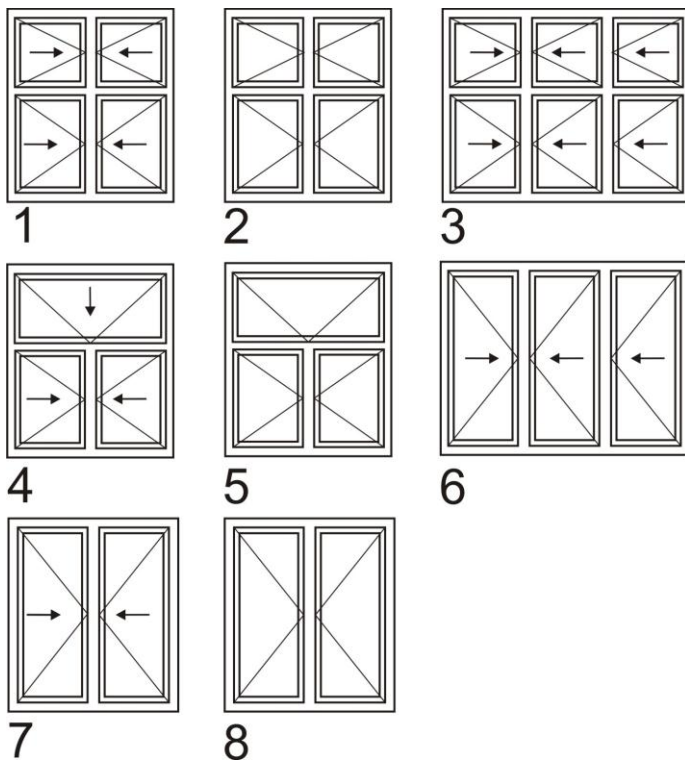
## ENCL 1: GRAPHICS FOR MULTISASH WINDOWS

### Informative

These sketches are in accordance with NS 3420 fig R3

The sketches are according to (NS-) EN 12519 Windows and pedestrian doors - Terminology

Multisash windows (these sketches are seen from external facade)



Tegnforklaring	
<b>1</b>	4 sash window, outward opening vertical side swing
<b>2</b>	4 sash window, outward opening side hung
<b>3</b>	6 sash window, outward opening vertical side swing
<b>4</b>	3 sash "T" window. Lower sashes outward opening vertical side swing, top sash outward opening top swing reversible window
<b>5</b>	3 sash "T" window. Lower sashes outward opening side hung, top sash outward opening top hung window
<b>6</b>	3 sash window outward opening vertical side swing
<b>7</b>	2 sash outward opening vertical side swing.
<b>8</b>	2 sash window, outward opening side hung.

Principle sketches for different multisash windows. (Proportions and size of sashes will be variable)