

Surface treatment of door elements

For wood and wood-based materials outdoors

No. 002/1

Annex 1 – Interior doors

Technical data sheet

Introduction

The surfaces of interior doors have to be able to withstand the most diverse demands. Normal room doors in residential buildings are mainly stressed by everyday use in the area of the door handle. Interior doors used to delineate closures or ends and room doors in public buildings, hospitals, schools and administrative buildings also have other roles to fulfil with regard to noise and crime prevention. The construction and structural design of these kind of components are based on complex and sophisticated systems. High demands are placed on their durability and resistance to physical forces as well as against the impact of different climates in the room. These elements are available on the market as individual parts (blank door panels, steel frames, seals, etc.) as industrial products. They are, on the one hand, bought and assembled by the manufacturer as a finished door element, but on the other hand, there are also door elements on the market that are completely built by the manufacturer. The treatment of the surface is therefore divided according to the various finished products and sub-divided into new paint and renovation paint work. In addition, we also refer to the standard SIA 257 painting work.

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1. Door panel surfaces from the factory

The door panel blanks are delivered by the industrial door panel manufacturers to the construction site or workshop of the subsequent processor with only machine-sanded door panel surfaces, without any kind of pre-treatment. There is a distinction made between the following surfaces for further treatment:

- a) covering pigmented paint
- b) natural treatment, no colour
- c) glazing paint
- d) for staining and varnishing

(please also refer to standard SIA 257, General terminology/ Types of coating material/Types of application).

All doors supplied ex-works are sanded with a grain size of 80 -100.

2. Intermediate storage

According to the Technical Data Sheet 001 "Delivery and installation conditions for doors, frames and door elements" (Art. 9 Door panels)

3. Functions of the surface treatment

3.1 Door panels and linings made from wood and wood-based materials

The area of the pore edges in wood types with coarse pores such as oak and ash, can only be effectively covered with a greater amount of effort. Brushing them out ensures that the pores are not just passed over with the paint.

Sharp edges that are not rounded do not receive sufficient coverage when painted, as the coating material pulls back from the edge.

When compared with solid wood, wood-based materials (depending on the type of process of course) have a better dimensional stability parallel to the plate surface. Some wood-based materials tend to swell greatly with the absorption of water, especially chipboard and fibreboard.

The wood-joining elements can lead to adverse effects on the paint (reduce the strength of the adhesion, inhibit properties). In these cases it is possible to rectify the situation with the use of insulating paint materials. Only sanding has the opposite effect in the case of inhibiting substances.

3.2 Steel frames, steel doors, aluminium surfaces

On zinc surfaces, a stable oxide layer forms in a normal atmosphere. In densely populated and industrial areas, water-soluble zinc salts form on the zinc surface as a result of the acid combustion gasses. Zinc is also attacked by the effect of alkalis (cement, lime, waste lye, and also by water).

In normal atmospheres, aluminium, in a similar way to zinc, also forms a thin, stable protective layer. However, just as it is true for zinc, one must note its resistance to acidic and alkaline media. Copper and brass may corrode as a result of the effects of alkalis and acids. The discolouring effects of copper ions is also of significant importance. The surfaces of metal components are mostly heavily polluted by oil, grease and perspiration released from the hand. It must be ensured that the ambient temperature and the temperature of the property are correspondingly suitable when painting metal frames. In certain circumstances,

different ambient and property temperatures can result in damage to the paint as a result of insufficient film build-up, tarnishing, impaired adhesion, etc. The technical data sheets of the paint manufacturers must be observed.

4. New painting

4.1 Glazing systems

Lightening and bleaching

Mainly used in native wood types as a pre-treatment before any staining or clear-coat finishes. Thin veneers can loosen off the substrate as a result of the effects of water and chemicals. In such cases, the veneer layer must be restored to its correct laminated and bonded state before progressing with any further processing.

In order to prevent subsequent oxidation damage, it is necessary to wash the surface several times with water (depending on the chemicals used) before continuing with the processing.

4.1.2 Wood glazes

Tab. 4.1.2-1 Clear primer for interior doors (solid and veneered)			
Methods of application	paint	spray	
Intermediate sanding	light	light	
Can be painted over after	according to the data sheet	according to the data sheet	
Diluting	according to the data sheet	according to the data sheet	
Capacity to penetrate into the wood	n/a	n/a	
Follow-up treatment	2x covering glaze	2x covering glaze	

Tab. 4.1.2-2 Partially transparent intermediate /top coat for interior doors (glaze coating)			
Type of glaze	thin layer	thick layer	can be diluted in water
Suitable colour tones	all	all	all
Methods of application	paint, spray	paint, spray	paint, spray
Block resistance	good	good	moderate
Sanding properties	moderate	moderate	poor
Can be painted over after	according to the data sheet	according to the data sheet	according to the data sheet
Diluting	according to the data sheet	according to the data sheet	according to the data sheet
Renovation interval	depending on use and requirements		
Follow-up treatments	sanding, recoating		
Overall thickness of the coating μm	30	60	60
	In practice, depending on the product system, this corresponds to a 2 to/or 3-layer coating buildup		

4.1.3 Stains

Enhancing or changing the natural tone of the wood the main function of the Stain is to deliberately change or enhance the colour of the wood's existing tone.

The choice of the staining system depends on the type of wood and the desired staining effect. Whether water, chemical or solvent-based stains are used, the expert makes the selection based on the results expected by the customer. Chemical and semi-chemical-based stains are aqueous solutions that react with the contents of the wood and consequently create the positive stain colour.

The other stains (dyes), aqueous or solvent-based, are solutions of colourants that stain the fibre of the wood. In each case, the choice of wood and veneer must be given the utmost attention before any staining takes place. Only surfaces that comply with the statements made under paragraph 1 should be used.

4.1.4 Clear coats

If the doors are to be stained, special attention must be given to the groundwood pulp and any areas where the glue may have penetrated. The drying times between the staining and applying the first clear coat must be adhered to in accordance with the instructions of the stain manufacturer.

Tab. 4.1.4-1 Clear coats for interior doors (solid and veneered)			
Type of coating	2x1 K-SH coating	2x2 K-PUR coating	2x1 K-PUR alkyd
Unsuitable coatings		nitrocellulose lacquer, wax, wax lacquer	
Methods of application	spray	spray	paint/spray
Block resistance	good	good	good
Sanding properties	good	good	good
Can be painted over after	according to the data sheet	according to the data sheet	according to the data sheet
Diluting	according to the data sheet	according to the data sheet	according to the data sheet
Renovation interval	depending on the mechanical stress		
Follow-up treatments	sand, paint over		
Overall thickness of the coating μm	>30	>30	>50
	In practice, depending on the product system, this corresponds to a 2 to/or 3-layer coating buildup		

4.2 Covering systems

Tab. 4.2-1 White primer for interior doors (solid and veneered)			
	Alkyd resins, solvent	Alkyd resins, water	Alkyd resins, water
Methods of application	paint, roll, spray	paint, roll, spray	paint, roll, spray
Wood fibres rise up	negligible	noticeably	noticeably
Block resistance	good	good	moderate - good
Sanding properties	good after 24 h	good after min. 20 h	after 5 h moderate - good
Intermediate sanding	after priming	after priming avoid sanding	after priming avoid sanding
Can be painted over after	24 h	min. 15 h	min. 5 h
Moisture permeability	negligible	negligible	negligible
Dilute with	solvent	water	water
Capacity to penetrate into the wood	low	low	low
Insulating properties	good	low	low

Tab. 4.2-2 White primer for interior doors on wood-based panels			
	Alkyd resins, solvent	Alkyd resins, water	Alkyd resins, water
Methods of application	paint, roll, spray, dip	paint, roll, spray, dip	paint, roll, spray, dip
Wood fibres rise up	low	noticeably	noticeably
Block resistance	good	good	moderate - good
Sanding properties	after 24 h good	after min. 20 h good	after 5 h moderate - good
Intermediate sanding	after priming	after priming avoid sanding	after priming avoid sanding
Can be painted over after	24 h	min. 15 h	min. 5 h
Moisture permeability	negligible	negligible	negligible
Dilute with	solvent	water	water
Capacity to penetrate into the wood	low	low	low
Insulating properties	good	low	low

Tab. 4.2-3 Covering pigmented intermediate and top coats for interior doors (solid and veneered)			
	Alkyd resins, solvent	Alkyd resins, water	Acrylic resins, PU acrylate, water
Methods of application	paint, roll, spray	paint, roll, spray	paint, roll, spray
Wood fibres rise up	negligible	moderate - negligible	moderate - negligible
Block resistance	good	good	moderate
Sanding properties	good after 24 h	good after 24 h Sandpaper K 400	average after 15 h Sandpaper K 400
Can be painted over after	24 h	24 h	min. 15 h
Moisture permeability	negligible	negligible	negligible
Dilute with	solvent	water	water
Yellowing	yes	yes	yes
Renovation interval	8 - 10 years	8 - 10 years	8 - 10 years
Paint contamination	negligible	negligible	moderate
Mech. resistance	good	good	moderate - good
Insulating properties	good	negligible	negligible

Tab. 4.2-4 Covering pigmented intermediate and to coat on wood-based panels			
	Alkyd resins, solvent	Alkyd resins, water	Acrylic resins, PU acrylate, water
Methods of application	paint, roll, spray	paint, roll, spray	paint, roll, spray
Wood fibres rise up	negligible	moderate - negligible	moderate - negligible
Block resistance	good	good	moderate - good
Sanding properties	after 24 h good	after 24 h good Sandpaper K 400	average after 15 h Sandpaper K 400
Can be painted over after	24 h	24 h	min. 15 h
Moisture permeability	negligible	negligible	negligible
Dilute with	solvent	water	water
Yellowing	yes	yes	no
Renovation interval	8 - 10 years	8 - 10 years	8 - 10 years
Paint contamination	negligible	negligible	moderate - negligible
Mech. resistance	good	good	moderate - good
Insulating properties	good	negligible	negligible

5. New painting of steel door frames

Steel frames are usually made from IZ-galvanised sheet steel. The IZ-galvanizing process involves applying an approx. 12-14 µm hot-dip galvanised layer to the band. Visible welding joints are filled, sanded and protected with a 1-component primer to protect against corrosion for a limited time. The coating system needs to be adapted to these materials.

- a) This local anti-corrosion primer is usually compatible with all the 1-component adhesive base and top coat systems listed in the following tables 5-1 and 5-2.
- b) Nonetheless, before applying the 2-component adhesive base and top coat systems, it is imperative to verify its compatibility with the local anti-corrosion primer. However, as a rule, it can be assumed that after it has completely dried out, i.e. at least after two to three weeks, no more reactions are to be expected with the application of 2-component adhesive base and top coat systems.
- c) Steel frames made from IZ-galvanised sheet steel usually have a double coating system.
- d) Climatic conditions. Steel frames can store very low temperatures for a long period of time during cold spells. When the temperature rises again, this may then result in condensation (note the dew point). This fact should be taken into account before the paint is applied.

The overall thickness of the layer applied to metal parts can be checked and/or controlled with a "dry film thickness gauge".

- e) Hot-dipped galvanised steel frames with a primer applied in an electrophoretic coating process and steel frames with an annealed primer with a layer thickness of at least 20 µm can, usually, be given a top coat after the surface has been roughened.

Tab. 5-1 Covering pigmented adhesive primer on steel door frames			
	1-comp. adhesive primer, solvent	1-comp. adhesive primer, water	2-comp. adhesive primer, water
Preparatory work	degrease, sand local anti-corrosion primers, clean		
Methods of application	paint, roll, spray	paint, roll, spray	paint, roll, spray
Sanding properties	after min. 15 h good	after min. 15 h good Sandpaper K 400	after min. 15 h good Sandpaper K 400
Can be painted over after	after 15 h good	after 15 h good	after 15 h good
Dilute with	solvent	water	water
Adhesion	good	good	very good

Tab. 5-2 Covering pigmented intermediate and top coat on steel door frames				
	Alkyd resins, solvent	Alkyd resins, water	Acrylic resins, PU acrylate, water	2-comp. DD lacquer, solvent
Methods of application	paint, roll, spray	paint, roll, spray	paint, roll, spray	spray
Sanding properties	after 15 h good	after min. 15 h good Sandpaper K 400	after 15 h good Sandpaper K 400	after 15 h good
Can be painted over after	15 h good	15 h good	15 h good	15 h good
Dilute with	solvent	water	water	solvent
Yellowing	yes	yes	no	no
Renovation interval	8 - 10 years	8 - 10 years	8 - 15 years	10 - 15 years
Paint contamination	negligible	negligible	moderate - negligible	negligible
Mech. resistance	good	good	good	very good

6. Renovation painting

6.1 With glazing paint systems

6.1.1 Preparatory work

Depending on the condition of the old paint, it must be completely removed or cleaned and sanded matt.

Thin veneers can loosen off the substrate as a result of the effects of water and chemicals. In such cases, the veneer layer should be correctly laminated and bonded before any further processing.

6.1.2 Lightening and bleaching

Mainly used in native wood types as a pre-treatment before any staining or clear-coat finishes on leached surfaces.

- Lightening the natural tone of the wood
- Lightening after the paint has been removed with alkaline agents
- Removal of stains

After the wood has been lightening, the respectively sufficient drying times must be observed. This in particular applies to when the wood has been treated with hydrogen peroxide or oxalic acid. If the hydrogen peroxide has not been completely removed, this will result in oxidative damage.

6.2 Wood glazes

Methods of application	paint	spray	
Intermediate sanding	light	light	
Can be painted over after	according to the data sheet	according to the data sheet	
Dilute with	according to the data sheet	according to the data sheet	
Capacity to penetrate into the wood	n/a	n/a	
Follow-up treatment	2 x glaze	2 x glaze	

Type of glaze	thin layer	thick layer	can be diluted in water
Suitable colour tones	all	all	all
Methods of application	paint, spray	paint, spray	paint, spray
Block resistance	good	good	good
Sanding properties	moderate	moderate	moderate
Can be painted over after	according to the data sheet	according to the data sheet	according to the data sheet
Dilute with	according to the data sheet	according to the data sheet	according to the data sheet
Renovation interval	depending on use and requirements		
Follow-up treatment	sand, paint over		
Overall thickness of the coating μm	30	60	60
	In practice, depending on the product system, this corresponds to a 2 to/or 3-layer coating buildup		

6.3 Clear coats

Tab. 6.3-1 Clear coats for interior doors (solid and veneered)			
Type of coating	2x1 K-SH coating	2x1 K-PUR coating	2x1 K-PUR alkyd
Unsuitable coatings			
Methods of application	paint, spray	spray	paint, spray
Block resistance	good	good	good
Sanding properties	good	good	good
Can be painted over after	according to the data sheet	according to the data sheet	according to the data sheet
Dilute with	according to the data sheet	according to the data sheet	according to the data sheet
Renovation interval	depending on the mechanical stress		
Follow-up treatment	sand, paint over		
Overall thickness of the coating μm	>30	>30	>50
	With the requirements these represent minimum values		

6.4 With covering paint systems

Tab. 6.4-1 Covering pigmented intermediate and top coats for interior doors (solid and veneered)			
	Alkyd resins, solvent	Alkyd resins, water	Acrylic resins, PU acrylate, water
Preparation of the surface	wash, sand, leach, prime exposed areas, prime exposed areas.	wash, sand K 400, prime exposed areas, spot fill with spatula if nec.	wash, sand K 400, prime exposed areas, spot fill with spatula if nec.
Methods of application	paint, roll, spray	paint, roll, spray	paint, roll, spray
Wood fibres rise up	negligible	moderate - negligible	moderate - negligible
Block resistance	good	good	moderate
Sanding properties	good after 24 h	good after 24 h Sandpaper K 400	average after 15 h Sandpaper K 400
Can be painted over after	24 h	24 h	min. 15 h
Moisture permeability	negligible	negligible	negligible
Dilute with	solvent	water	water
Yellowing	yes	yes	no
Renovation interval	8 - 10 years	8 - 10 years	8 - 10 years
Paint contamination	negligible	negligible	moderate - negligible
Mech. resistance	good	good	moderate - good
Insulating properties	good	negligible	negligible

Tab. 6.4-2 Covering pigmented intermediate and to coat on wood-based panels			
	Alkyd resins, solvent	Alkyd resins, water	Acrylic resins, PU acrylate, water
Methods of application	paint, roll, spray	paint, roll, spray	paint, roll, spray
Wood fibres rise up	negligible	moderate - negligible	moderate - negligible
Block resistance	good	good	moderate - good
Sanding properties	good after 24 h	good after 24 h Sandpaper K 400	average after 15 h Sandpaper K 400
Can be painted over after	24 h	24 h	min. 15 h
Moisture permeability	negligible	negligible	negligible
Dilute with	solvent	water	water
Yellowing	yes	yes	no
Renovation interval	8 - 10 years	8 - 10 years	8 - 10 years
Paint contamination	negligible	negligible	moderate - negligible
Mech. resistance	good	good	moderate - good
Insulating properties	good	negligible	negligible

Tab. 6.4-3 Covering pigmented paint on steel frames				
	Alkyd resins, solvent	Alkyd resins, water	Acrylic resins, PU acrylate, water	2-comp. DD lacquer, solvent
Preparation of the surface	wash, sand, leach, prime exposed areas, spot fill with spatula if nec.	wash, sand, leach, prime exposed areas, spot fill with spatula if nec.	wash, sand, leach, prime exposed areas, spot fill with spatula if nec.	wash, sand, leach, prime exposed areas, spot fill with spatula if nec.
Methods of application	paint, roll, spray	paint, roll, spray	paint, roll, spray	spray
Sanding properties	good after 15 h	good after 15 h Sandpaper K 400	good after 15 h Sandpaper K 400	good after 15 h
Can be painted over after	15 h good	15 h good	15 h good	15 h good
Dilute with	solvent	water	water	solvent
Yellowing	yes	yes	no	no
Renovation interval	8 - 10 years	8 - 10 years	8 - 15 years	10 - 15 years
Paint contamination	negligible	negligible	moderate - negligible	negligible
Mech. resistance	good	good	moderate - good	very good

7. Tips and information for specific use

Leaching agents with an alkaline effect can be used with saponifiable binders (oil paints, air-drying alkyd paints).

If the paint is removed with alkalis (lye), then the substrate must be neutralised and washed thoroughly. (Exception: diluted ammonia). Eyes, hands and other parts of the body must be protected against the effects of the alkalis with the appropriate measures and equipment.

Door seals

The seals for doors can be made from various materials. Depending on the system used, the door seal or paint material may cause adhesions, e.g. soft PVC or nitrocellulose lacquer (migration of plasticizers). In order to provide doors with the ideal treatment, the seals and paint system must be coordinated.

8. Ecological aspects

The rules and regulations governing the protection of the environment and water pollution must be respected. Precautionary measures must be taken, depending on the product's properties (toxicity, flammability), with regard to health protection, water pollution protection and environmental regulations. The manufacturer's technical data sheets must be observed.

Particular attention must be given to the provisions concerning health protection, water pollution protection and environmental regulations when brushing and sanding off old paint. The individuals carrying out the work must be protected by means of suitable measures (dust mask and safety goggles) depending on the work method and type of paint to be removed.

Reference has been made to the following data sheets in particular:

VSSM/GBI/chb	Data Sheet on stains, paints and solvents Health protection measures when treating surfaces
SMGV	Information leaflets
VSLF	Safety Data Sheets
FFF/EMPA/SZFF	Disposal and Recycling of Windows and Doors
SIA	Standard 257/Declaration Raster Coatings
BFS/SMGV	Technical Guidelines Data Sheet No. 18

This data sheet was compiled together with the following associations:

VSLF	Swiss Association of Paint and Coatings Manufacturers
SMGV	Swiss Association of Painters and Plasterers
VSSM	Swiss Association of Master Carpenters and furniture Manufacturers

This data sheet is based on the present level of technology, provides knowledge and experience and should also help promote the mutual understanding of the parties involved in the process.

Further data sheets can be found on www.vst.ch

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