



**Hesse Lignal**  
inspiring you

# Manual – Stains and Proterra mixing systems



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# Intro- duction

Formulations for previously configured BMS stains can be requested from your respective customer account manager.

The Hesse stain mixing system (named BMS) was conceived for our local distributors. It should enable them to respond quickly to demand from carpentry and joinery shops, interior finishing specialists, etc. for stains beyond the relatively small range of card tones.

Not only can (virtually) all standard Hesse stain tones can be produced using the stain mixing system, such as those listed in the stain cards, but it is also possible to produce configured colour tones using different colour tone collections, like for instance RAL, NCS, Sikkens or third party stain cards. The range of stains that can be produced using the stain mixing system is constantly growing and will be regularly extended. Customers can use the Paint Express system available via our website [www.hesse-lignal.com](http://www.hesse-lignal.com) to obtain the formulations of all stains already configured for the stain mixing system.

## **Routine customer requirements and the corresponding stain configuration are usually as follows:**

- The customer chooses a colour tone from a stain card
- The associated formulation is accessed in the Paint Express programme
- A suggested formulation can be obtained after entering the required amount
- The stain is mixed as per this formulation
- A trial staining is performed to check the colour tone

## **The following options are available if there is no matching configuration for the desired colour tone:**

- A similar stain can be approximated using suitable colour concentrates and/or by mixing with a different stain in the same system or
- The colour tone can be simulated based on this manual or
- The colour sample, sufficient quantities of the original bare wood and details like application parameters and coating requirements can be sent to Hesse for colour tone adjustment. The adjustment will take around three working days after receipt in the Hesse laboratory, depending on colour tone.

## **Important information for users:**

Not all components can be mixed together and/or be combined with each other in arbitrary quantities. Some formulation configurations require careful observance of our recommended formulation. Mixtures that deviate can negatively impact shelf life, light resistance, subsequent coating and other aspects. The same applies to the omission of important components from basic formulations.

Formulations for previously configured BMS stains can be requested from your respective customer account manager.

Our product information and technical recommendations for use are designed to support and assist professional users. The use of our products may on occasion require careful review of all circumstances. Our specialist advisers will be happy to support you based on our experience.

Our products are manufactured according to the latest insights from science and practice; new insights may result in technical modifications that deviate from this manual.

# Updates

Hesse is committed to relying on solvent-free lacquers and stains as of 2030

As a family-run company with intergenerational history, we feel compelled to assume responsibility for subsequent generations. We have therefore decided to restructure our product range: by 2030 we will have replaced all solventbased products in our product range with sustainable alternatives and will be making greater use of regenerative raw materials. Our goals are to reduce the emission of volatile organic compounds (VOCs) and to achieve maximum resource conservation. This will enable us to make an active contribution to preserving a world worth living in for future generations, and to meet future market requirements.

The restructuring of our product range will result in some changes for our customers: We will be removing our nitrocellulose lacquers, solvent-based stains and solvent-based, acid-hardening lacquers from our product range by the end of 2023. Hesse Lignal will therefore no longer be offering such products from January 2024. A further step involves us replacing all other solvent-based lacquers with sustainable alternatives by 2030.

## **HYDRO Rustic stain WUR-FT replaced by WRB-ct**

Our previous HYDRO Rustic stain WUR has been revised and optimised in line with the transformation tasks. Its rustic effect and brilliance potential have been improved; the ability to recoat it using suitable HYDRO lacquers has been ensured.

## **White paste BP 3570 NEU**

Our White paste BP 3570 that has been in use for long time has been fully redeveloped. Its settling behaviour and stirring properties in particular have been significantly improved. This new quality has been tested by renown coating specialists at home and abroad and unanimously found to be highly recommendable. We have therefore decided to initially offer it under product number BP 3570 NEU in parallel to the old type BP 3570.

This means that users can until further notice use the old or the new quality in their BMS formulations. This should make it possible to use up any old stocks.

## **BF 1110 / BF 1120 and BF 1020-5**

We have decided to remove our previous Dyestuff concentrates BF 1110 (yellow) and BF 1120 (orange) from the BMS system to ensure that the components can be used as universally as possible. The existing formulations will be adapted in the near future.

Formulations that were adjusted using BF 1110/1120 can still be produced; the dyestuffs can still be obtained!

The already established BF 1010 (yellow) and the new type BF 1020-5 (orange) serve as substitutes. A positive side effect is an associated improvement in the affected products light fastness. The products are not comparable in terms of colour.

## **Outlook**

Hesse submits all its systems to a continuous improvement process. The switch from solvent-based to water-based systems is particularly based on the desire to achieve technical optimisations and further developments.



## 1 Basic principles for stain adjustment

The fundamental properties of the respective base components must be considered when formulating HYDRO stains. The individual components must be matched to both the carrier material as well as the intended use, processing and other envisaged properties. Unsuitable composition of a stain and selection of the incorrect stain system can result in stain-related issues, but also in damage that only emerges after a lengthy period.

### 1.1 Components

**Dyestuffs** are saline products that truly dissolve in water (or respectively in solvents). They exhibit a notable transparency and luminosity. The structure or texture of the wood is not covered, resulting in a good depth effect. Their light fastness improves with increasing colour strength or colour tone depth and can have quite good values.

**Pigments** are finely ground colouring agents that do not dissolve in water or solvents. The particle size is within the micro- to nanometre range and is therefore many times greater than that of dyestuff molecules. Corresponding properties can be derived from this physical difference. Pigments can better cover and thus equalize the substrate. They are unrivaled in their light fastness, yet show less brilliance than dyestuffs. Our Pigment concentrates for stains have been selected for maximum possible transparency, whereby they have significantly larger particles and provide better coverage compared with the pigments for coloured lacquers.

**Binders** have various functions within a stain formulation. They primarily fix the pigment particles to the surface of the wood for instance, but they can also strongly influence the stain effect. This mostly results in a stronger emphasis of the pores and the stain therefore appears to be more rustic – depending on the respective type of binder and amount added. The subsequent coating equally has improved filling power, since the initial basecoat cannot be so strongly absorbed into the wood.

**Solvents** are the volatile components in a stain. They should evaporate as quickly and completely as possible after application. Solvents can be used in a waterbased stain to attain specific properties, including substrate wetting or retarded drying. Hesse will no longer supply pure solvent stains as of 2024 for ecological reasons.

**Thickeners** increase the viscosity of stains. Only a little thickener is used in spray and brushing stains, however, since these stains need to be applied with low viscosity. Although in HYDRO stains they improve the application properties. Here they have an impact on the “open” time and delay initial drying for as long as it takes to enable optimum wiping distribution.

**Preservatives** are required in an aqueous product to assure adequate shelf life. Many stain components create an ideal breeding ground for microorganisms, thus facilitating premature deterioration of HYDRO stains unless sufficient preservative is added.

**Waxes** are used in specific gloss stains that are not recoated after drying, but only brushed. They are not suitable for recoating with the usual systems.

### 1.2 Spatial and technical requirements for colour tone simulation

Colour tones should ideally be simulated in daylight. It is advantageous to have a bright workplace with sufficiently large (non-tinted) windows. Daylight fluorescent lamps can be used as an additional light source. Fluorescent lamps such as those with type designation TLD 18W/965 or TLD 58W/965 are well suited. Although LED systems with a high colour rendition value are also suitable. LED tubes in the Philips LED Tube Ultra Output range are equally suitable.

A small light box can be useful for inspecting the metamerism (intricacy) of a colour tone if it contains both the above mentioned daylight fluorescent lamps and integral, colour-distorting fluorescent lamps with light source TL 84 and light bulbs.

We recommend a set of balance scales with a weighing capacity up to at least 4 kg and a display accuracy of 0.01 g for preparing the stains as per the formulation. Additional equipment includes stirring sticks made of glass or plastic, plastic cups in sizes 0.25 to 2 litres and miscellaneous accessories.

All metal parts that come into contact with the stains or stain raw materials must be made of 18/10 stainless steel. Copper, zinc, iron, brass or aluminium are not suitable and can lead to discoloration and partly also to coagulation of the stains.

### 1.3 Safe handling of chemical products

As far as possible (also out of self interest) coating and lacquer manufacturers try not to use any substances that are harmful to health or could even be toxic. Albeit it's not always possible to avoid the use of components that could result in harmful effects if not properly handled. Yet even substances that do not exhibit specific hazard indications are not necessarily harmless. All products used must therefore be processed and stored with the appropriate caution and in compliance with all occupational health and safety regulations. All other instructions, either from the Federal Institute for Occupational Health and Safety or via company-internal rules, must provide the basis for safe handling of chemical substances. The material safety data sheets and technical data sheets for the substances used must be observed.

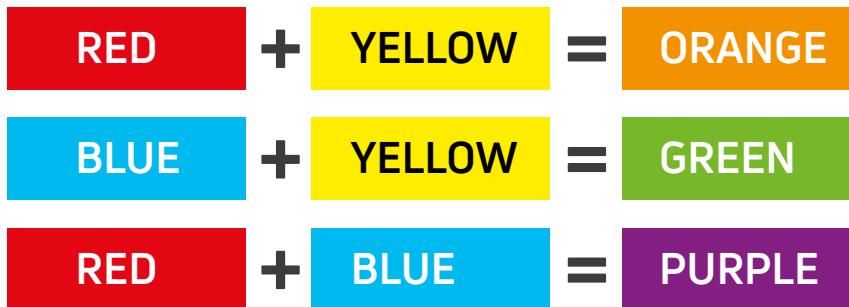
### 1.4 Colour mixing

A basic knowledge of the theory of colours makes it easier to adjust and correct stains. It enables derivation of the correct conclusions required to correct a colour tone. Members of staff entrusted with colour tone adjustment must be fully colour conversant. Those with the not uncommon red-green deficiency cannot or can no longer fully perceive the corresponding nuances.

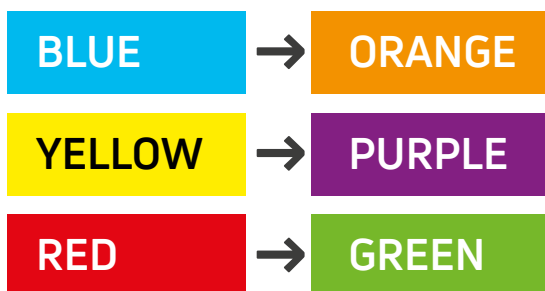
Some thirty famous people have concerned themselves with colour and colour mixing over the centuries. The colour theory of Johannes Itten seems for practical reasons to be the simplest to use and understand. It therefore has significant advantages over the substantially more complex theory expounded by Harald Küppers.

A distinction is made in colour mixing between light colours and body colours. Body colours deal with coloured bodies, as objects or surfaces, which have a specific colour.

In the case of body colours we differentiate into the primary colours MAGENTA, YELLOW and CYAN (in simple terms we refer to RED, YELLOW and BLUE) and the mixed colours obtained by mixing them, e.g.



We also know the complementary colours. These are the mixed colours opposite to the primary colours in the colour circle



The presentation above permits the individual base and mixed colours to be derived from the complementary colours. Disruptive colour themes can be mitigated by adding complementary colours to a stain or coloured lacquer. If the product is too blue, for example, then you add the colour opposite to the blue field, in this case orange. It is important to note that these additions can also influence other properties, such as concentration or brightness.

It is best when configuring colour tones not to try and correct over-dispensation of a dye by adding a further dye, but rather to reduce the disruptive product at the next attempt. This keeps the formulations brief – and thus also uncomplicated.

Figure 1: The Johannes Itten colour circle

### 1.5 Light fastness

The light fastness of a surface structure is dependent on multiple factors. The most important influencing factors are without doubt the type of wood used and the associated wood contents.

#### A differentiation can generally be made as follows:



Figure: Lightened bare woods. From top to bottom: beech, oak, maple, cherry tree, walnut and mahogany. The right half have been lightened (Atlas sun test)

- **Light woods** including maple, birch and poplar tend to darken when exposed to light and adopt a perceptibly yellow to orange-brown colour. This discoloration is principally due to a light-induced alteration of the lignins in the wood. Photochemical processes triggered by light (especially UV light) convert lignin into a yellowish to brownish artefact.
- **Darker woods** such as walnut, wengé and many other tropical woods contain significant proportions of different wood dyes or other colouring components, which are more or less strongly bleached away by UV light (and also by visible light!). So they become lighter. Although the aforementioned lignin yellowing also occurs, whereby there is the appearance of yellowish-brownish colour transformation.

This wood yellowing impacts the light fastness of the entire finishing procedure. A pale blue, transparent stain tone will therefore turn into a dirty olive green over time, even if had been produced using light fast pigments. This process can certainly be reduced via the influence of UV-absorbing and/or wood stabilising components, but it cannot be fully prevented.



**Basically: the more opaque or intense the stain / colour lacquer, the greater the reduction in yellowing of the wood.**

It is important that the stain components are coordinated as closely as possible with the bare wood. They must also "match" the coating.

The formulation must also include the different properties of dyestuffs and pigments with respect to their light fastness. Stains that contain both dyestuffs and pigments must not appreciably change due to shifts in colour tone. It is expedient to obtain a uniform colour reaction by building up the base tone using pigments (50 - 90 % of the final colour tone) and then completing the colour tone using dyestuffs. The base tone must therefore have the same colour tone as the final tone, only altogether weaker.

### 1.6 Wood contents

Wood contents can have a major impact on stain colour tone and effect.

They can equally be activated in different manners by any subsequent coating.

Type of wood	Effect
West African padauk	Strong bleeding of red wood dyes into the coating (in the case of solvent based coatings)
Oak	Contains many tannins which can react with alkaline components in the stain and (HYDRO) lacquers. There can be yellow-green-brown discolorations in HYDRO coatings with white or pastel tones
Ash	There can be yellow-green-brown discolorations in HYDRO coatings with white or pastel tones
Pine	Resinous components, therefore potential wetting problems. The resins may penetrate thorough the coating, especially given warmth
Teak	Rubbery components may cause wetting problems
Rosewood	Inhibiting components can impair/prevent the curing of polyester coatings
Beech	Strong red discoloration due to acidic hardener in acid-hardened coatings; red discoloration due to other acids
Maple	Pink discoloration due to acids

**Particularly pronounced effects occur when multiple factors converge.**

**These include:**

- The wood contents being water soluble and colouring
- When staining in light, pastel tones
- Top coating using HYDRO lacquers

Almost nothing happening when oak (high in tannic acid) is stained white using a water-based stain and then coated with a solvent-based PU lacquer, i.e. there is no discolouration. Should the same stained surface be coated using HYDRO lacquer, however, the tannic acid bleeds through the stain layer into the HYDRO lacquer and results in distinctly unsightly, yellow-green-brown discolouration. The best technique in such cases is thus to use a solvent-based PU lacquer for the basecoat. HYDRO lacquer can then be used for subsequent layers.

# Wood pretreatment

## 2

### 2 Wood pretreatment

The following is a summary of the topics important in creating the subsequent surface structure.

#### 2.1 Wood sanding

The usual silicon carbide or corundum sanding belts in non-ferrous quality can be used for sanding the wood. Final bare wood sanding using 150 to 180 grit on hardwood has proven effective when providing the surface finish on furniture. A grit of 100 to 120 is expedient for conifer woods, especially if positive stains are to be used. Graduated wood sanding with moderate increases is advisable (e.g. 120/150/180). It is particularly important to use "sharp" belts, since only these will cut the fibres. Dull, too fine or worn belts only comb the wood fibres without cutting them from the wood. This results in a grubby stain appearance and widespread raising of wood grain during subsequent staining. Attention must be paid to careful dust removal.

Finishing with a Fladder-type rotary sander that works with tangential cuts can have a positive effect on the raising of wood grain after regular sanding, especially on woods with coarse pores. Even simple wetting, frequently forgotten nowadays, brings appreciable benefits.

#### 2.2 Texturing

Texturing of wood is used above all on conifer woods, less frequently on oak. This creates a pronounced three-dimensional structure on the wood surface, which can be further emphasized using certain stains. Textured wood is also useful for certain surface effects, e.g. Markotex, country style, relief or a weathered look.

The previously widespread sand blasting is best used now on individual pieces, since it is very labour intensive. The marking achieved by sand blasting produces a similar structure, but requires specific apparatus and breathing equipment. Common to both procedures, however, is very heavy roughening and a correspondingly weathered surface that can absorb large quantities of stain, and sometimes also unevenly.

Much more widespread is conversely the use of brushes to texture wood. These consist of steel or brass bristles, or better still of plastic bristles with abrasive particles incorporated into their fibres. These create a softer and more rounded structure on the wood than metal bristles.

#### 2.3 Wetting

Wetting was previously required each time before staining. This improves the stain appearance and simultaneously reduces roughening of the wood, with a positive impact on the filling power of a subsequent coating. Wetting is still advisable today in preparation for staining, despite the greater time and effort.

Evenly moisten the wood after bare wood sanding using warm water for wetting and leave it to dry for a few hours. Then l i g h t l y sand the surface using fresh sandpaper (the same grit as for the final bare wood sanding) and remove the dust. Staining should occur on the next day at the latest.

#### 2.4 Cleansing

Conifer woods, especially those rich in resin such as pine, are occasionally difficult to stain and have an uneven appearance; the positive effect of staining is also much less pronounced. This problem can be overcome by cleansing the bare wood so that the stain appearance is significantly improved and a more uniform overall stain appearance is achieved.

Cleansing is performed as follows:

1. Sand the bare wood carefully, e.g. at 120 grit
2. Dissolve 25 g of BZ 850 wood soap in one litre of boiling water
3. Apply the hot soap solution to the bare wood and brush it carefully and vigorously using a scrubbing brush
4. After one to two minutes penetration time, apply the soap solution once more and brush it again
5. Wash the soap solution away using lukewarm water
6. Rub the wood with cloths and let it dry for several hours
7. Lightly sand it again using 120 grit
8. Stain and apply lacquer on the next day at the latest

It is self-evident that wood materials with open edges (such as chipboard) can swell and lose their dimensional stability when exposed to water. Please check beforehand whether the material is suitable.

## 2.5 Bleaching

Colour tones that are lighter than the intrinsic colour of the wood either require the use of opaque pigments or the bare wood has to be bleached. There is a distinction to be made between the two main reasons that advocate bleaching:

- **To achieve lighter colour tones**

This is where light woods such as beech, maple, birch, cherry tree, ash, etc. are bleached to be able to achieve light or pale colour tones. This does prevent over-reliance on pigments to cover the wood substrate. It does not, or not significantly, improve the wood's light fastness or respectively its resistance to yellowing.

- **To improve the light fastness of certain tropical woods**

For example: wengé is a type of wood with very poor light fastness. Its colour fades significantly when exposed to light. The wood is first bleached to improve its light fastness and then a pigmented HYDRO stain is applied to stain it back to its natural colour tone. This results in a significant improvement in the surface's light fastness when combined with a light fast polyurethane coating that also contains light stabiliser.

Prior treatment of the bare wood for bleaching is the same as for staining (sanding, dust removal, etc.)

Drying: Bleached surfaces must be dried for at least 48 h in a well ventilated room with a minimum temperature of 20 °C. The drying time must be extended to 72 h in the case of cherry tree and some exotic woods. Only those lacquer systems that are expressly suitable may be used for subsequent coating. The standard bleaching agent based on hydrogen peroxide is BW 804 (=HWW 224).

**It is mandatory for your own protection that the safety and processing information specified in the material safety data sheets and the technical information must be followed! Particular attention must be paid to personal protective equipment (rubber gloves, safety shoes, eye protection, rubber apron, etc.).**

The precise instructions for bleaching can be viewed via [www.hesse-lignal.com](http://www.hesse-lignal.com).

# Wood stains



## 3

### 3.1 Which stain for what?

A pragmatic approach is always advisable: select a product with which the desired effect can most easily be achieved. In other words, don't dogmatically determine a particular "chosen" or "preferred" staining method in advance and then use a lot of effort and all kinds of tricks to force an only just acceptable result using a product that's not ideally suitable.

Legend:

- SMV = Spraying with wiping / brushing
- SOV = Spraying without wiping
- In brackets () = restricted use

Application	Typical woods	Coating	Recommended stains
Semitransparent to opaque stains (RAL tones, NCS, Sikkens or the like)	Oak, ash, beech, birch, maple and other light woods	PU (with light protection)	BC SMV
Brilliant wood colour tones without emphasis of the pores	<b>Woods with open pores</b> like oak, ash, mahogany, walnut and other precious woods	PU suitable	BE SMV BG SMV
	<b>Fine-pored woods</b> like cherry tree, beech, maple, birch,		BE SOV BG SOV
Brilliant to semitransparent stain tones with little emphasis of the pores	Oak, ash	HYDRO 1C HYDRO 2C PU	WUE SOV BG SMV
Rustic stain appearances with emphasis of the pores	Oak, ash, mahogany, walnut		WRB SMV
Positive stain appearance, wood tones without white pigment	Conifer woods In preference spruce, fir	PU	WN SOV
Positive stain appearance, pastel tones with white pigment		PU	WNS SOV
Equalising, pastel tones with white pigments	Porous woods like oak, ash, etc.	PU	BG SMV WUE SMV
	Fine-pored woods like beech, maple, birch, etc.	PU	BG SOV WUE SOV
Colour tones on laid parquet / flooring	Oak, beech and other light woods	Proterra Hard oils for roller coating HYDRO 1C HYDRO 2C PU 	WPB (rolling+pad application)

The Hesse PFB Customer Centre would be happy to answer any questions.

## 3.2 Base products for HYDRO stains

	Base product	Precious wood stains BE	Priming stains BG	Colour stains BC	Equalizing Multi stain WUE	HYDRO Rustic stain WRB	PICEA Softwood stain WN/WNS	Parquet stain WPB
Dyestuff concentrates	BF 1010	x	x			x		
	BF 1020-5	x	x			x		
	BF 1030	x	x			x		
	BF 1046-5	x	x			x		
	BF 1060	x	x			x		
	BF 1080	x	x			x		
	BF 1290	x	x			x		
	BF 1880							
	BF 2510-60						x	
	BF 2530-60						x	
	BF 2550-60						x	
	BF 2560-60						x	
	BF 2580-60						x	
	BF 2590-60						x	
Pigment concentrates	BP 2577						x	
	BP 3011		x	x	x	x		x
	BP 3031		x	x	x	x		x
	BP 3034		x	x	x	x		x
	BP 3038-25		x	x	x	x		x
	BP 3040-25		x	x	x	x		x
	BP 3051		x	x	x	x		x
	BP 3061		x	x	x	x		x
	BP 3091		x	x	x	x		
	BP 3570 (NEW)		x	x	x	x		x
Additives	BZ 100	x	x					
	BZ 120	x	x	x				
	BZ 415		x	x		x		
	BZ 625		x	x				
	BZ 628					x		
	BZ 700				x			
	BZ 725						x	
	BZ 890							x
	BZ 900	x	x	x	x	x		
	BZR 0560		x	x	x	x		x



### 3.3 Nomenclature

The product codes for a Hesse wood stain in the BMS System can be used to obtain a lot of information. Product codes are usually created in line with the following syntax:

Prefix [One- to two-digit number] – [five-digit number] e.g. BE 5-23456

The prefix is the letter combination that begins the product number:

Prefix	Name	Comments
BC	Colour stain	Pigment-based stain for opaque to semitransparent tones
BE	Precious wood stain	Dyestuff-based stains for transparent tones
BF	Dyestuff concentrate	
BG	Priming stain	Dyestuff- and pigment-based stains for "all" woods
BO	HYDRO Glaze stain	Pigment-based stain specifically for spraying framework furniture (beech chairs)
BP	Pigment concentrates	
BU	Gloss stain	Wax-based stain, preferably on conifer woods. Positive stain appearance when formulated with suitable dyestuffs. Especially good with BF 1880
BZ	Additives	
WN	PICEA Softwood stain	Dye-based, therefore only suitable for use under solvent lacquers.
WNS	PICEA Softwood stain	Dyestuff-based with white pigment, so can only be used beneath solvent-based lacquers
WRB	HYDRO Rustic stain	For rustic effects on coarse pored woods. Latest generation
WUE	HYDRO Multi stain	For equalising effects on somewhat fine pored woods

The one- to two-digit number following the prefix indicates the type of wood and processing for which this stain has been adapted:

Type of wood	Foam rubber roller	Hard rubber roller	Spraying without wiping	Special processing or multi-processing	Spraying with wiping; manual application
Oak	1	2	3	4	5
Red oak	6	7	8	9	10
Mahogany	11	12	13	14	15
Beech	16	17	18	19	20
Ramin	21	22	23	24	25
Limba	26	27	28	29	30
Walnut	31	32	33	34	35
Ash	36	37	38	39	40
African whitewood/Koto	41	42	43	44	45
Anigre	46	47	48	49	50
Macoré/ African pear	51	52	53	54	55
Conifer woods	56	57	58	59	60
Cherry tree	61	62	63	64	65
Maple/Bird's eye maple	66	67	68	69	70
Alder/red alder	71	72	73	74	75
Birch	76	77	78	79	80
Various	81	82	83	84	85

The trailing five-digit number indicates the respective colour tone number.

### 3.4 Base formulations

The following formulation recommendations are based on many years of experience in developing stain systems. Please do not alter the formulations unless you are clear about what follows, since this may significantly change the quality characteristics. The same applies to the use of components that are not recommended for the respective stain system.

There can also be inadvertent reactions if incorrect or unsuitable lacquer systems are used.

In case of doubt, the Hesse PFB Customer Centre will be happy to provide advice!

#### 3.4.1 BE Precious wood stains

Precious wood stains are formulated purely on a dyestuff base and feature a brilliant and transparent stain appearance. The structure and texture of the wood remains uncovered. The result is a warmer tone with deeper penetration. Coarse pored woods do not have the pores emphasized.

Good light fastness can be achieved depending on the type of wood, colour tone and colour depth, which can be further improved by well matched coating with lacquers containing light stabilisers. Sun-blocking qualities are advisable. Pigment-based Priming stains or Colour stains should be used to obtain increased light fastness requirements.

**Range of application:** staining living room, kitchen and bedroom furniture

**Colour tone range:** the usual wood colour tones (e.g. cherry or mahogany tones, brown tones, etc.)

**Wood types:** suitable for most hardwoods as well as many exotic woods. Not suitable for woods rich in contents, such as teak, rosewood and the like.

**Prior wood treatment:** usual wood sanding at 120 to 180 grit.

**Processing:** woods with coarse pores should preferably be stained by brushing or by spraying with wiping. Spraying without wiping is advisable for fine-pored woods (including beech, maple and cherry tree).

**Drying:** 2 to 6 h / 20 °C room temperature and a maximum of 60 % relative air humidity.

**Subsequent treatment/coating:** all common PU lacquers, HYDRO 2C lacquers



and suitable HYDRO 1C lacquers (see QR code on the left!).

It is essential to use lacquers with light stabiliser for lighter or more susceptible tones.

**Particular instructions:** do not use for colour tones not natural to wood, e.g. pink, blue, green, purple, etc.!

**Base formulation:**

BZ 900	Preservative	1 %
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**Dyestuff concentrates:**

BF 1010	Yellow	Total maximum proportion 80 %
BF 1020-5	Orange	
BF 1060	Green	
BF 1080	Brown	
BF 1290	Black	
BF 1030	Red	Total maximum proportion 50 %
BF 1046-5	Ruby	
Water		Remainder up to 100 %

**Possible additional components:**

BZ 100	Thickener to improve spraying properties	10 % (maximum 15 %)
BZ 120	Thixotropic thickener to prolong the open time of stains that need to be wiped.	5 % (maximum 15 %)
BZR 0560	Odorless retarder that extends the open time and makes the product smoother	5 % (maximum 10 %)

BF 1110 (yellow) and BF 1120 (orange) can also be used as dyestuffs provided that only solvent-based coatings are to be used.

### 3.4.2 BG Priming stains

Priming stains usefully combine pigment and dyestuff properties with one another: the brilliance and luminosity of the dyestuffs are augmented by the equalisation capability and increased light fastness of the pigments. The emphasis of the pores can also be influenced at the same time. They are therefore to be used in preference whenever the qualitative properties of Precious wood stains are to be improved or other effects are to be achieved.

**Range of application:** staining living room, kitchen and bedroom furniture

**Colour tone range:** the usual wood colour tones (e.g. cherry or mahogany tones, brown tones, etc.) and with appropriate formulation also for tones not common to wood.

**Wood types:** suitable for most hardwoods as well as many exotic woods.

**Prior wood treatment:** usual wood sanding at 120 to 180 grit.

**Processing:** woods with coarse pores should preferably be coated by brushing or by spraying with wiping. Spraying without wiping is advisable for fine-pored woods (including beech, maple and cherry tree).

**Drying:** 2 to 6 h / 20 °C room temperature and a maximum of 60 % relative air humidity.

**Subsequent treatment/coating:** PU lacquers, HYDRO 2C lacquers, suitable HY-



DRO 1C lacquers (see QR code on the left!). It is essential to use lacquers with light stabiliser for lighter or more susceptible tones.

**In the case of woods rich in contents, including oak, ash or similar and where sensitive colour tones are involved, at least the first layer of the surface process must be coated using a PU lacquer (such as UNA-PUR DE 4259x)!**

**Particular instructions:** colour tones not common to wood must be created predominantly based on pigment; then only use a small amount of dyestuff!

#### Base formulation:

BZ 900	Preservative	1 %
BZ 120	Thickener, advisable for brush application or spraying with wiping	Possibly 5 % (to 15 %)
BZ 625	Binder for highly pigmented stains (>10 % proportion of BP concentrate) as well as for emphasis of the pores	Possibly 5 - 10 % (up to 30 %)



**Classic wood colour tones:** Please formulate the stains based on a pigment to achieve high light fastness, only use dyestuffs if absolutely necessary to achieve high brilliance!

**Pigment concentrates:** (for base colouring)

BP 3011	Yellow	
BP 3031	Red	
BP 3034	Ruby	
BP 3038-25	Mahogany-red	
BP 3040-25	Violet	
BP 3051	Blue	
BP 3061	Green	
BP 3091	Black	
BP 3570 (NEU)	White	

**Dyestuff concentrates:** (for increasing brilliance)

BF 1010	Yellow	
BF 1020-5	Orange	Total maximum quantity 80 %
BF 1060	Green	
BF 1080	Brown	
BF 1290	Black	
BF 1030	Red	Total maximum quantity 50 %
BF 1046-5	Ruby	
Water		Remainder up to 100 %

**Possible additional components:**

BZ 100	Thickener to improve spraying properties	10 % (maximum 15 %)
BZR 0560	Odorless retarder that extends the open time and makes the product smoother	5 % (maximum 10 %)
BZ 415	Improves pore wetting	

BF 1110 (yellow) and BF 1120 (orange) can also be used as dyestuffs provided that only solvent-based coatings are to be used!

The use of 10 % BZ 625, potentially even more or less, must be considered in relation to highly pigmented stains (more than 10 % BP concentrate). The lacquer adhesion should be reviewed and the proportion of BZ 625 increased as necessary, particularly when subsequently coating with HYDRO lacquers.

### 3.4.3 BC Colour stains

Colour stains are created based purely on pigment. Due to the use of micro-fine pigments, however, they have a higher brilliance and transparency than otherwise usual for this stain type. The wood's structure is more or less strongly covered depending on colour tone depth. Colour tones can therefore be achieved which are even lighter than the inherent wood colour. The light fastness of Colour stains represents the maximum achievable among all stains.

**Range of application:** staining of living room, kitchen and bedroom furniture, in the contract sector, on interior fixtures and fittings and much more.

**Colour tone range:** (virtually) all colour tones are possible

**Wood types:** suitable for the light hardwoods and conifer woods, e.g. ash, oak, beech, maple, birch, pine, etc.

**Prior wood treatment:** usual wood sanding at 120 to 180 grit

**Processing:** Colour stains are used as standard for spraying with wiping or brushing. They must be wiped particularly evenly after application to prevent colour differences.

**Subsequent treatment / coating:** using light fast PU lacquers. Lacquers with light stabiliser should be used for lighter tones or colour tones not natural to wood.

Colour stains in natural tones can be recoated using 1C and 2C HYDRO lacquers.

**Subsequent treatment/coating:** PU lacquers, HYDRO 2C lacquers, suitable HYDRO



1C lacquers (see QR code on the left!). It is essential to use lacquers with light stabiliser for lighter or more susceptible tones.

**In the case of woods rich in contents, including oak, ash or similar and where sensitive colour tones are involved, at least the first layer of the surface process must be coated using a PU lacquer (such as UNA-PUR DE 4259x), and then subsequent coats of HYDRO 1C or 2C lacquers can be applied.**

**Particular instructions:** the light fastness of stained surfaces intensifies with increasing opacity, since the yellowing wood contents are better protected.

#### Base formulation:

BZ 900	Preservative	1 %
BZ 120	Thickener	5 % (to 10 %)
BZ 625	Binder for highly pigmented stains (>10 %) as well as for emphasis of the pores	5 - 10 % (up to a maximum of 30 %)
BP 3011	Pigment concentrates	depending on colour tone up to a maximum of 75 %
BP 3031		
BP 3034		
BP 3038-25		
BP 3040-25		
BP 3051		
BP 3061		
BP 3091		
BP 3570 (NEW)		max. 50 %
Water		Remainder up to 100 %

#### Possible additional components:

BZR 0560	Odorless retarder that extends the open time and makes the product smoother	5 % (maximum 10 %)
BZ 415	Improves pore wetting	

### 3.4.4 HYDRO Multi stain WUE equalising

Multi stains have been conceived for universal recoating using standard lacquer systems common in craftsmanship. That is why they have been formulated based on extremely fine nanoscale pigments and are therefore suitable for finishing using HYDRO lacquers or equally as well using classic PU lacquers (minor colour differences may arise due to differing accentuation). The Basecoat stain used ensures good equalization, workability of the stain and fixing of the extremely fine pigments. The subsequent HYDRO coating can be lightly tinted by means of adding 1 - 3 % stain to further increase the colour brilliance.

**Range of application:** staining of living room, kitchen and bedroom furniture, in the contract sector, on interior fixtures and fittings and much more.

**Colour tone range:** (virtually) all colour tones are possible

**Wood types:** suitable for the light hardwoods, e.g. ash, oak, beech, maple, birch, etc.

**Prior wood treatment:** usual wood sanding at 120 to 180 grit

**Processing:** WUE Multi stains are mostly applied by spraying with wiping.

Spraying without wiping is advisable for especially good equalization.

**Subsequent treatment/coating:** with light fast PU, 1C and 2C HYDRO lacquers (see QR code on the left!). Lacquers with light stabiliser should be used for lighter tones or colour tones not natural to wood.



**In the case of woods rich in contents, including oak, ash or similar and where sensitive colour tones are involved, at least the first layer of the surface process must be coated using a PU lacquer (such as UNA-PUR De 4259x)!**

#### Particular instructions:

##### Base formulation:

BZ 900	Preservative	1 %
BZ 700	Basecoat stain	3 to 20 % (Cherry tree 3 - 5 %, beech 20 %)
BP 3011	Pigment concentrates	depending on colour tone up to a maximum of 30 %, see "Particular instructions" in the event of higher additions
BP 3031		
BP 3034		
BP 3038-25		
BP 3040-25		
BP 3051		
BP 3061		
BP 3091		
BP 3570 (NEW)		max. 20 %
Water		Remainder up to 100 %

##### Possible additional components:

BZR 0560	Retarder To retard drying	At most 10 %
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### 3.4.5 HYDRO Rustic stain WRB pore emphasizing/rustic

HYDRO Rustic stains have been conceived for universal overcoatability using standard lacquer systems common in the crafts and are intended, as opposed to WUE Multi stain which is equalising, to produce as strong and rustic an emphasis of the pores as possible. The Basecoat stain used ensures good emphasis of the pores, processability of the stain and fixing of the extremely fine pigments. The subsequent HYDRO coating can be lightly tinted by means of adding 1 - 3 % stain to further increase the colour brilliance.

**Range of application:** staining of living room, kitchen and bedroom furniture, in the contract sector, on interior fixtures and fittings and much more.

**Colour tone range:** (virtually) all colour tones are possible

**Wood types:** suitable for light-coloured hardwoods with coarse pores, such as oak or ash.

**Prior wood treatment:** usual wood sanding at 120 to 180 grit

**Processing:** HYDRO Rustic stain WRB should be processed by spraying with wiping, or respectively by brushing. Spraying without wiping is possible in exceptional cases, but is inadvisable due to the weaker effect.

**Subsequent treatment/coating:** with light fast PU, 1C and 2C HYDRO lacquers (see QR code on the left!). Lacquers with light stabiliser should be used for lighter tones or colour tones not natural to wood. Given the potential for discoloration, pastel shades or colour tones not natural to wood (including blue, pink, green and others) on woods that are rich in contents should at least in the first coat be coated using traditional PU lacquers. Less light fast lacquers like Proterra products should only be used on colour tones where lacquer yellowing will not cause negative alterations in colour tone.



#### Base formulation:

BZ 900	Preservative	1 %
BZ 628	Basecoat stain	30 %
BZ 415	Pore wetting	3 %
BP 3011	Pigment concentrates (the addition of white pigment reduces the rustic effect)	depending on colour tone up to a maximum of 30 %, see "Particular instructions" in the event of higher additions
BP 3031		
BP 3034		
BP 3038-25		
BP 3040-25		
BP 3051		
BP 3061		
BP 3091		
BP 3570 (NEU)		max. 20 %
Water		Remainder up to 100 %

#### BF Dyestuff concentrates can be added to increase the brilliance:

BF 1010	Yellow	In total at most 20 %
BF 1020-5	Orange	
BF 1060	Green	
BF 1080	Brown	
BF 1290	Black	
BF 1030	Red	
BF 1046-5	Ruby	

BF 1110 (yellow) and BF 1120 (orange) can also be used as dyestuffs provided that only solvent-based coatings are to be used!

### 3.4.6 PICEA Softwood stain WN

PICEA WN Softwood stain is an entirely new stain quality developed to have a highly positive effect. The natural colour play between early and late wood is retained and is even emphasized. This results in highly expressive markings. Brushing or sand blasting can give the wood a three-dimensional surface structure, which appears particularly appealing. A clear top coat is only possible with standard PU lacquers.

**Range of application:** staining of living room, kitchen and bedroom furniture, in the contract sector, on interior fixtures and fittings and much more.

Colour tone range: usual wood tones, not pastel tones!

**Wood types:** conifer woods, primarily pine and fir.

**Prior wood treatment:** usual wood sanding at 100 to 120 grit, not finer! The bare wood can also be brushed to add structure (plastic sanding brushes are preferable to metal brushes). Sandblasting is also possible. Dust removal. Resinous conifer woods such as pine may need to have the resin removed beforehand or be cleansed. Different prior wood treatment can sometimes result in significant differences in colour tone and effect that need to be taken into account.

**Processing:** spraying without wiping is the recommended application method; brushing is possible to a limited extent.

**Drying:** at least 3 - 6 h / 20 °C room temperature. No forced drying!

**Subsequent treatment /coating:** use light fast PU lacquers and matching

HYDRO 1C and 2C lacquers (see QR code on the left!). It is advisable to use



brightener for light or pale tones. Lacquers with light stabiliser should always be used in preference!

**Particular instructions:** please do not mix the stain with other colour concentrates or additives!

#### Base formulation:

BZ 725	Base stain for a positive effect	50 %
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#### Standard colour concentrates:

BF 2510-60 Yellow	Dyestuff concentrates	bis 30 %
BF 2530-60 Red		
BF 2550-60 Blue		
BF 2560-60 Green		
BF 2580-60 Brown		
BF 2590-60 Black		
Water		Top up to 100 %

The proportion of BZ 725 can be reduced and replaced with water to weaken the positive effect.



**3.4.7 PICEA Softwood stain WNS**

This product range is intended to complete the Hesse PICEA WN Softwood stain. It enables the configuration of pastel tones that need to contain white pigment. It can therefore only be coated using solvent-based lacquer systems, preferably PU lacquers. A clear top coat is only possible with standard PU lacquers.

**Range of application:** staining of living room, kitchen and bedroom furniture, in the contract sector, on interior fixtures and fittings and much more.

**Colour tone range:** usual wood tones and pastel tones!

**Wood types:** conifer woods, primarily pine and fir.

**Prior wood treatment:** usual wood sanding at 100 to 120 grit, not finer! The bare wood can also be brushed to add structure (plastic sanding brushes are preferable to metal brushes). Sandblasting is also possible. Dust removal. Resinous conifer woods such as pine may need to have the resin removed beforehand or be cleansed. Different prior wood treatment can sometimes result in significant differences in colour tone and effect that need to be taken into account.

**Processing:** spraying without wiping is the recommended application method; brushing is possible to a limited extent.

**Drying:** at least 3 - 6 h / 20 °C room temperature. No forced drying!

**Subsequent treatment/coating:** using light fast PU lacquers. It is advisable to use brighteners for light or pale tones. Lacquers with light stabiliser should always be used in preference!

**Particular instructions:** please do not mix the stain with other colour concentrates or additives!

**Base formulation:**

BZ 725	Base stain for a positive effect	Difference in BP 2577 quantity to 50 %
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**Standard colour concentrates:**

BF 2510-60 Yellow	Dyestuff concentrates	Up to 30 %
BF 2530-60 Red		
BF 2550-60 Blue		
BF 2560-60 Green		
BF 2580-60 Brown		
BF 2590-60 Black		
BP 2577	White pigmented Basecoat stain	max. 15 %
Water		Top up to 100 %

The proportion of BZ 725 can be reduced and replaced with water to weaken the positive effect.

### 3.4.8 Parquet stain WPB

Parquet stains should be applied and distributed using the pad method due to the large surfaces to be coated. Parquet stains are based purely on pigments to achieve maximum light fastness. This enables universal coating, both with solvent-based and aqueous lacquer systems.

**Wood types:** usual parquet woods from temperate zones, e.g. oak, beech, etc. Not suitable for tropical woods.

**Range of application:** staining of parquet flooring

**Colour tone range:** virtually all colour tones are possible.

**Prior wood treatment:** usual wood sanding at 100 to 120 grit.

**Processing:** roller application (e.g. velour). Even application to be moist with sufficient excess. Immediately work this in using a single-disc sanding machine (white ultra-fine sanding pad) until the stain is streak-free. It is advisable that this process involves two people due to the need for rapid processing.

**Drying:** at least 16 h / 20 °C room temperature.

**Coating:** solvent-based PU Parquet lacquers, HYDRO Parquet lacquers (see QR code on the left!), Proterra oil sealants (rolled thick layer structure at least 2 x 80 g/m<sup>2</sup>). Pastel tones on woods containing tannin like oak and ash must not be coated using HYDRO lacquers or oils!



**Particular instructions:** Due to the complexity of parquet coating we also refer to the corresponding technical information on these products!

The stain should be modified with the addition of 10 - 20 % Retarder BZR 0560 in the case of very large areas or high processing temperatures. (Note that this could alter the colour tone or colour intensity; conduct a trial coating!)

#### Base formulation:

Water		at 100 %
BZ 890	Basecoat stain for parquet flooring	75 %
BP 3011	Pigment concentrates (please follow the instructions in the "Light fastness" section)	depending on colour tone up to a maximum of 20 %
BP 3031		
BP 3034		
BP 3038-25		
BP 3040-25		
BP 3051		
BP 3061		
BP 3091		
BP 3570 (NEU)		max. 20 %

#### Possible additional components:

BZR 0560	Odorless retarder that extends the open time and makes the product smoother	5 % (maximum 10 %)
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### 3.5 Application

HYDRO stains are predominantly applied in the craftsmanship sector according to three methods: spraying without wiping, spraying with wiping and brushing. There is also a special method used when staining parquet, whereby even large surfaces can be stained evenly and seamlessly.

There are certainly other application techniques occasionally used, such as applying and wiping a HYDRO stain using a cloth, but these cannot be recommended. Differences in stain effect and colour tone are to be expected. Unfortunately the customer's planned processing method does not always match the application method intended when adjusting the colour tone. A stain adjusted for spraying without wiping becomes twice as dark when applied using a brush. It is therefore vitally important that the colourist always observes the correct processing method.

#### 3.5.1 Spraying without wiping

This technique is mostly used on fine-pored woods that sometimes have a somewhat irregular, swirly wood structure. These include beech, maple, cherry tree, etc. An even spray application means that each area of the wood receives the same amount of stain, which results in better equalization.

**Application method:** Spray the HYDRO stain in a cross coat using a cup gun (1.2 - 1.5 mm nozzle, circa 2 bar spray pressure, potentially reduced stain supply) to be uniformly moist – not wet. Do not wipe any excess! Dispersal of multiple thin, almost sheen-like spray coats results in a particularly even stain appearance.

#### 3.5.2 Spraying with wiping

Spraying with wiping is used in preference on woods with coarse pores like oak, ash, mahogany, etc. The copious excess and its subsequent incorporation by means of wiping with a brush provides better wetting of the pores. Spraying with wiping is not beneficial on fine-pored woods like beech, maple, cherry tree, etc. Here the excess stain is more heavily absorbed at the swirls and these growth impairments are then unattractively emphasized.

**Application method:** Spray a copious coat of the HYDRO stain using a cup gun (1.5 - 2 mm nozzle, circa 2 bar spray pressure) in one pass. Allow a brief penetration time and distribute the excess using a broad spreading brush, working first across and then with the grain. Intermittently wipe stain absorbed by the spreading brush onto a rag. It is advisable to use two people to wipe large surfaces. An even application method and the same advance sanding are essential to prevent colour tone differences between two surfaces.

Important: colour tone adjustment usually involves trial coatings only on small areas, e.g. postcard size or even smaller. Such a surface can be stained in just a few seconds. It is important that the stain is allowed to penetrate for exactly the same time as when subsequently staining the workpiece.

This will ensure that the trial coating is actually transferred to the workpiece. As a guideline, the stain should be allowed to penetrate for at least 1 - 1.5 min before the excess is distributed.

#### 3.5.3 Brushing / sponge application

Speed of application means that this traditional method is increasingly being superseded by spraying with wiping.

**Application method:** Apply a copious coat of the HYDRO stain onto the wood using a brush or sponge. Distribution as described in "Spraying with wiping". Distribution of the excess using a sponge is certainly possible, although this mostly loads a greater amount of stain onto the wood resulting in a darker / more intense colour tone. We recommend wiping using a broad brush. See the text outlined in red in "Spraying with wiping".

### 3.5.4 Special method for staining parquet

Our Parquet stains in the WPB range can be applied evenly over large surfaces using a method developed specifically for parquet layers.

**Application method:** Apply the HYDRO stain onto the prepared floor using a micro fibre or velour roller. There should only be a little excess. Distribute the excess immediately thereafter using a disc sander with white pad attached until the surface is streak-free. This must involve two people to ensure a speedy application method. The stain can also be distributed into the edges as necessary using a sanding block with a pad attached.

**Important:** Do not first stain the entire surface and only then start wiping, but rather directly hand in hand! Work quickly and widthways!

### 3.6 Top coating

Each stain, with the exception of a few special types such as the gloss stains (BU ...), must be recoated. This serves not only to provide adequate fixation of the colour components on the wood surface and protection against mechanical and chemical demands, but also the colour tone's appearance and effect only come properly and expressively to the fore with coating.

**There is by now a large selection of different lacquer types available for coating. The most significant in the field of furniture surfaces / interior fittings are:**

- Polyurethane lacquers (PU)
- HYDRO lacquers
- HYDRO PU lacquers
- Conventional UV-hardened lacquer systems
- Water-based UV-hardened lacquer systems
- Natural resin lacquers (shellac or the like)
- Oils, oil lacquers and artificial resin lacquers
- Special qualities, etc.



Please check the respective Technical Information to see whether your proposed lacquer can be used to achieve the planned surface structure! Suitable HYDRO lacquers can be displayed by scanning the QR code on the left. This list is constantly updated and expanded

It is clear that the stains and lacquers used in a surface structure must be matched to one another. A universal stain for all lacquer systems is not or is only to a limited extent possible or meaningful.

Moreover, lacquers have a major impact on the colour development and effect of stains. Precious wood stain will for instance result in a totally different colour tone beneath a PU lacquer than beneath a HYDRO lacquer. It is therefore very important when adjusting the colour tone for a stain to know the exact planned lacquer structure in order to prevent problems with subsequent coating (colour deviations, adhesion problems, etc.).

### 3.7 Trouble-Shooting with HYDRO stains

<b>The stain has a foul smell</b>	The stain has gone off due to bacterial and/or fungal attack. This can occur due to frequent removal and reintroduction of amounts required or a dirty tool (brush, stirring sticks). Treatment is either not possible or pointless as most vital ingredients have decomposed and the colour tone has been altered. Prevention by adding 1 % BZ 900 Preservative. The amount added can be increased to 2 % BZ 900 for stains that are particularly heavily used, e.g. dipping stains or products where small amounts are constantly removed or reintroduced.
<b>The stain is taking too long to dry</b>	First check the spatial conditions: are the premises sufficiently ventilated and heated? Is the air humidity too high (over 65 %)? Is the room temperature below 16 °C or are the workpieces too cold? Otherwise the addition of fast drying solvents can help, e.g. CV 501. For Precious wood stains up to 25 %, for Priming stains up to 10 %. In the case of other stains or higher additive amounts, please contact the Hesse PFB Customer Centre due to the risk of incompatibilities.
<b>The stain is being absorbed too quickly</b>	This may occur in the case of stains sprayed with wiping or manually, above all on absorbent or swirly woods. The addition of retarding solvents generally has no effect, since the stain is not drying too fast, it is only seeping away too quickly. The addition of 5 - 15 % BZ 120 to Basecoat and Colour stains can help in the case of precious wood. This is in principle also possible using Positive stains, but it reduces the positive effect. Ensure that the workplace is draught-free and shaded from direct sunlight.
<b>Wetting problems</b>	Wetting problems on greasy or hard to wet woods (teak, bubinga, etc.) can generally be resolved by adding binder and/or wetting agents. The addition of 0.1 - 0.5 % BZ 923 is usually sufficient. Further improvement by solvent addition, e.g. 5 % CV 501. Solvents alone have an overall weaker impact. Incompatibilities with binders may arise in the event of over dispensing. A small dash of washing-up liquid can help as a local fast-track solution (conduct a trial staining and coating!).
<b>Spotted and dappled stain appearance</b>	This problem can have many causes: a. Did you forget or omit wetting? b. Poor wood quality: Wood with a convoluted grain can be smoothed again using sharp sanding paper (maximum 150 grit!). Only apply stains by spraying without wiping. Each brush or sponge stroke, even by wiping, increases the problem. c. Poor sanding: dull sanding belts do not smooth the wood, they only compress the fibres. These fibres are then raised during staining and together with the unevenly absorbent surface they create a spotted stain appearance. The ideal sanding paper is 120 - 180 grit d. Unsuitable processing: it is best to only spray fine-pored woods, without wiping. Dispersal of multiple thin, almost sheen-like spray coats results in a particularly good equalization. e. The wood's resin content may be too high or irregular. Cleanse the wood if possible. The addition of 10 % CV 501 to a Positive stain may be sufficient as an emergency solution for minor issues. A small amount (0.1 %) of BZ 923 can even be added as an alternative.

<b>Adhesion problems</b>	This problem usually occurs only with highly pigmented and strongly coloured stains beneath critical lacquer systems. It can be resolved by adding from 5 % binder, e.g. BZ 670. As much as necessary, as little as required (price!).
<b>Resinous or greasy components in the wood</b>	The high resin content in resin-rich woods, including certain species of pine, mean that Positive stains may not form a good effect. Cleansing the wood is recommended here: see the "Cleansing" section.
<b>End-grain wood too dark</b>	This is generally because too much stain was applied; processing by spraying without wiping is ideal here. The entire wood can alternatively be moistened, with particular moistening of the end-grain wood. Do not allow it to dry, but rather stain the damp wood. The stains may need to be adjusted to be more concentrated.
<b>The wood grain is excessively raised</b>	Roughening the wood leads to higher lacquer consumption due to seepage of the basecoat. Advance isolation of the wood can be achieved by adding larger quantities of binder dispersion. This means the wood may subjectively feel rougher due to the raised wood fibres, but it provides a better overall base for the lacquer to adhere. BZ 625 is suitable for this, depending on the desired effect, albeit in concentrations of over 20 %.
<b>Insufficient positive effect</b>	In the case of Softwood stains: apply a sufficiently damp coat! Allow the stains to dry slowly at room temperature. Forced drying reduces the positive effect. Possibly increase the application quantity. Sand the wood more coarsely (100 - 120 grit with fresh sandpaper).
<b>Excessive positive effect</b>	The positive effect of Positive stains can be controlled by reducing BZ 725 and adding more water.
<b>Insufficient rustic effect</b>	Provided that only wetting problems are involved, these can be minimised or resolved by the following actions. Although the improvements may only be slight if the issue is filled pores, for instance due to lignification or glue penetration. <ul style="list-style-type: none"> <li>a. As far as possible use a WUR Multi stain.</li> <li>b. If even this still results in inadequate pore coloration, concentrate the stain, sand the wood more finely (180 - 220 grit) and carefully brush out the pores.</li> <li>c. The use of a rustic stain must be pondered in the case of woods that are especially difficult to wet (African whitewood or ayous).</li> <li>d. Strong brushing or light structuring of the wood with metal brushes to remove / reduce the deposits in the pores.</li> </ul>
<b>Excessive rustic effect</b>	In this case too there are several possibilities: <ul style="list-style-type: none"> <li>a. Formulation: improvement is possible by switching from pore-emphasizing pigmentation to dyestuffs and by reducing all the auxiliary materials and binders that promote the rustic effect.</li> <li>b. Reducing the application quantity is generally sufficient for pure spraying stains.</li> </ul>

### 3.8 HYDRO stain components

Like every technical product, the individual components of a stain system have characteristics and properties that should be known for successful formulation. Certain characteristics, such as a good positive effect, cannot be achieved just with the components providing colour. Certain additives are required here.

The following list of the stain mixing system's products should facilitate this. Certain topics are only outlined. Further instructions are listed with the respective base products.

**Further information about handling, treatment and health aspects can be found in the respectively current versions of the material safety data sheets. The relevant customer adviser can provide these on request.**

Product	Type	Important information
BF 1010	Yellow	Standard Dygestuff concentrate with good light fastness as per state of the art technology. With excellent brilliance and transparency. Used in Precious wood stains, Priming stains and HYDRO Rustic stains.
BF 1020-5	Orange	
BF 1030	Red	
BF 1046-5	Bordeaux red	
BF 1080	Brown	
BF 1290	Black	
BF 1060	Green	
BF 1880	Brown	Colour concentrate for PICEA Softwood stains
BF 2510-60	Yellow	
BF 2530-60	Red	
BF 2550-60	Blue	
BF 2560-60	Green	
BF 2580-60	Brown	
BF 2590-60	Black	
BP 2577	White	<b>Only for PICEA WNS stains !!!</b>
BP 3011	Yellow	Nano-technology Pigment concentrates with outstanding transparency and light fastness for pigments
BP 3031	Orange-red	
BP 3034	Ruby	
BP 3038-25	Mahogany-red	
BP 3040-25	Purple	
BP 3051	Blue	
BP 3061	Green	
BP 3091	Black	
BP 3570 (NEU)	White	



Product	Type	Important information
BZ 100	Thickener	Standard product for Priming stains for spraying without wiping; improves sprayability; addition amount 5 - 15 %
BZ 120	Thixotropic thickener	Special thickener for Basecoat and Colour stains for application via brushing or spraying with wiping. Reduces seepage of the stain into the substrate and thus improves the removal behaviour during wiping. Addition of 5 - 15 % (standard is 5 %)
BZ 415	Additive	Improves emphasis of the pores and stirring properties; addition 3 - 10 %
BZ 625	Standard binder	Binder for fixation of the colouring components to the wood surface and for influencing the effect (heavier emphasis of the pores)
BZ 628	Binder with good emphasis of the pores	Primary use in WRB Stains, but also possible in other stains
BZ 700	Basecoat stain for WUE Multi stain	Good equalization; improves ready-for-use properties; can be used beneath conventional solvent-based lacquers and HYDRO lacquers.
BZ 725	Basecoat stain for PICEA softwood stains	For achieving a pronounced positive effect
BZ 900	Preservative	Preservative for storage conservation of stains to protect against microbial attack by bacteria and/or fungi. Without additive the stain will only keep for a few days. Normal addition 1 %, up to 3 % for more severe requirements.

### 3.9 Rules for staining

- Follow the working instructions precisely.
- Be aware of glue penetration! Thoroughly sand away any glue penetration. It is better to colour the glue with the subsequent stain tone prior to processing it. There is also a special glue stain for this.
- Remove lime and drops of cement using thinned, non-ferrous hydrochloric acid (thinning ratio 1 part hydrochloric acid plus 10 parts water) and then wash it off with water. Do not use on woods sensitive to acid (e.g. beech or maple).
- Conifer woods do not accept stain in places where there is any resin. Remove resin → cleansing.
- Remove all types of contamination, especially that caused by grease and added separating agents, as in removing resin → cleansing.
- End-grain wood eagerly absorbs colour stain and therefore often ends up too dark. Solution: wet and directly stain the wood whilst it is still damp.
- Thoroughly brush out wood dust after sanding, otherwise proper staining of the pores is at risk.
- Remove metal fittings before staining.
- Carefully cover, mask or protect adjacent surfaces and edges by priming them if they are not also to be stained; this will prevent them from absorbing stain.
- Shake stain well before use or stir it thoroughly using a wooden stirring stick.
- In the case of spraying or brushing with wiping: apply a rich amount of the stain using a stain sponge or brush, or spray it using a cup gun, first copiously with the grain and then across the grain. Once the stain has penetrated sufficiently, use a spreading brush to distribute it first crosswise and then along the grain. Intermittently wipe off any excess from the spreading brush.
- As far as possible ensure horizontal placement of large surfaces to be stained. Stain vertical surfaces from the bottom upwards without an approach border. Turntables or turning frames are advisable for parts that are to be stained on all sides. The support table should be spotless, so that the underside of the workpiece also remains clean.
- The opaque nature of pigment stains means that they must be applied with particular care.
- Constantly monitor the stain equipment for yield and colour consistency when dipping. Keep dipping baths clean and fill and replenish them in good time.
- Stained parts should normally be dried at room temperature; the introduction of heat accelerates the drying process. Protect freshly stained parts from draughts.
- Do not tip stain remnants back into the original container.
- Clean staining equipment immediately after completing your work. Check for cleanliness while still wet.
- Sand and stain any wood putty after drying or use tinted wood putty. Do not select wood putty by the bare wood colour, but rather check whether with the stain it results in the same tone as the stained wood! Correct the colour tone using ink or patina tincture. Wax putty and burnout putty cannot be stained!
- Elimination of the stain generally presents more difficulties when refurbishing old furniture than complete stripping of the lacquer coating. Follow the manufacturer's instructions when using bleaching agents that may destroy dyestuffs. Pigmented stains can no longer be bleached. Use subsequent staining to achieve a darker finish if possible.

## 4 HYDRO Wiping stain

HYDRO Wiping stains are generally used to tint the pores of coarse pored woods (oak, ash).

### 4.1 Base products

#### 4.1.1 For aqueous wiping stains TW 4130

##### Base product

BP 3011

BP 3031

BP 3034

BP 3038-25

BP 3040-25

BP 3051

BP 3091

BP 3570 (NEU)

BZ 100

BZ 415

BZ 900

TW 4140

TW 4130-9343

### 4.2 Base formulations

#### 4.2.1 Aqueous TW 4130 wiping stain for pore colouring

Aqueous wiping stains are in principle only used for pore colouring. These are low odor products with good processing properties.

**Range of application:** antique staining of living room, kitchen and bedroom furniture and much more

**Colour tone range:** virtually all pastel and full tones are possible

**Wood types:** coarse pored woods, in preference oak and ash appropriately pre-primed e.g. using PU-lacquers

**Substrate preparation:** usual wood sanding at 120 to 180 grit. Remove dust thoroughly from the pores, ideally using a copper or nickel brush.

Then 2 x priming using a suitable Basecoat (e.g. PU-lacquer) with interim lacquer sanding. Do not sand after the second priming! Allow to dry for at least 16 h / 20 °C room temperature.

**Processing:** apply copiously using a brush or sponge and work it well into the pores. These wiping stains can alternatively be sprayed using a cup gun with 1.5 - 2 mm nozzle / 2 bar spray pressure. Application quantity 30 - 80 g/m².

**Drying:** around 2 - 3 h / 20 °C room temperature; do not force dry!!

**Subsequent treatment:** neatly remove the excess using steel wool or a white sanding fleece. Carefully remove dust!

**Hint:** any excess of TW 4130-ct on parts with large surfaces can even be removed when wet using a rubber wiper. This reduces the effort during subsequent work after drying.

**Coating:** sand lightly prior to finishing. 1 x finish using a suitable PU lacquer

**Particular instructions:** the TW 4130 range may only be created using the specified components. The addition of other products can result in incompatibilities!

## Base formulation:

BP 3011	Yellow	Total maximum quantity 10-30 % (reference quantity)
BP 3031	Orange-red	
BP 3034	Ruby	
BP 3038-25	Mahogany-red	
BP 3040-25	Purple	
BP 3051	Blue	
BP 3061	Green	
BP 3091	Black	
BP 3570 (NEU)	White	

## For pastel tones:

TW 4130-9343	White wiping stain	Top up to 100%
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## For full tones:

TW 4140	Clear Wiping stain	Top up to 100 %
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## Additive:

BZ 900	Preservative	1 %
BZ 415	Thixotropic agent; improves stirring properties if the product is excessively thinned	5-10 %

It is possible to dilute these wiping stains with water (spraying properties).  
TW 4140 and TW 4130-9343 can be combined with one another in any ratio.

## 4.3 Components

### 4.3.1 for HYDRO Wiping stains TW

Product	Type	Important information
BP 3011	Yellow pigment concentrate	
BP 3031	Orange-red pigment concentrate	
BP 3034	Ruby pigment concentrate	
BP 3038-25	Mahogany-red pigment concentrate	
BP 3040-25	Purple pigment concentrate	
BP 3051	Blue pigment concentrate	
BP 3061	Green pigment concentrate	
BP 3091	Black pigment concentrate	
BP 3570 (NEU)	White Pigment concentrate	
TW 4130-9343	Standard white wiping stain	
TW 4140	Standard opaque wiping stain	
BZ 900	Preservative	Protects a liquid product against decomposition and bacterial attack
BZ 415	Thixotropic agent	Improves settling behaviour

## 5 Proterra

Proterra products based on oils and modified resins firstly dry due to the evaporation of any solvents they may contain. Much more significant, however, is its complete hardening due to a chemical reaction with oxygen in the air. This is absorbed by the product and results in a polyoxide reaction, which causes the oil to thicken and finally become solid. This reaction is irreversible and improves the film's chemical and mechanical resistance.

Oxidation reactions are exothermic, in other words they take place given the release of heat. This heat can lead to problems if it can't be dissipated. Should absorbent materials such as rags, paper towels, cleaning wool be wetted with the product and left crumpled up, then the accumulated heat can ultimately result in spontaneous combustion.

A complete compilation of our Standard Proterra systems can be found in our Oil brochure, which you can access by scanning the adjacent QR code.



### 5.1 Safety instructions

#### Important!

Coating materials that generate heat when drying (oxidatively curing oils) and coating materials that form easily combustible deposits must not be readily used at the same spraying station due to the risk of self-combustion (see BGR 500, Chapter 2.29, Section 3.12, Working with differing types of coating materials). In the case of oil-soaked, flammable materials there is a risk of spontaneous combustion due to heat accumulation. Please therefore spread out any contaminated materials in the air to dry and then dispose of them. Even oil-saturated wood dust is prone to spontaneous combustion; please do not dispose of it in sealed containers, and as a precaution do not sand wood in the spray station where possible.

## 5.2 Product groups

### 5.2.1 NATURAL-COLOR-OIL OB 52832-ct

This product based on modified resins and oils is ideally suited for colouring surfaces in the furniture sector. Natural colouring results from its lower accentuating properties compared to other oils.

**Range of application:** Coating of parquet flooring, stairs, furniture and decorative objects

**Colour tone range:** (virtually) all colour tones are possible

**Wood types:** suitable for the light hardwoods, e.g. ash, oak, beech, maple, birch, etc.

Woods rich in contents are unsuitable due to drying delays.

**Prior wood treatment:** usual wood sanding at 150 to 180 grit

**Processing:** Padding and wiping

**Subsequent treatment/coating:** with suitable Proterra products, such as OE 52832

**Particular instructions:** The formula should as far as possible be based on pigments; dye-stuffs should only be used in exceptional cases!

Follow the Safety instructions! (Page 35)

#### Base formulation:

OE 52832	Base oil	Remainder up to 100 %
OP 101 Yellow	Pigment concentrates	depending on colour tone up to a maximum of 30 %
OP 103 Oxide Yellow		
OP 300 Red		
OP 306 Oxide Rec		
OP 400 Violet		
OP 405 Magenta		
OP 500 Blue		
OP 600 Green		
OP 900 White		
OP 905 Black		
OF 8011 Yellow	Dyestuff concentrates	max. 10 % (only use in exceptional cases)
OF 8031 Red		
OF 8034 Magenta		
OF 8090 Black		
OP 8099 Deepblack		depending on colour tone up to a maximum of 30 %

Please observe the addition limits relating to the Pigment and Dyestuff concentrates, otherwise drying will be delayed!

**5.2.2 COLOR-SOLID-OIL GB 11252-ct**

This product based on natural oils is ideally suited for colouring surfaces in the furniture sector. It highly accentuates the wood substrate, which originates vibrant colour tones.

**Range of application:** coating of parquet furniture, stairs, living room and bedroom furniture, fit-outs, interior fittings and so much more.

**Colour tone range:** (virtually) all colour tones are possible

**Wood types:** suitable for the light hardwoods, e.g. ash, oak, beech, maple, birch, etc.

Woods rich in contents are unsuitable due to drying delays.

**Prior wood treatment:** usual wood sanding at 150 to 180 grit

**Processing:** Padding and wiping

**Subsequent treatment/coating:** with suitable Proterra products, such as GE 11254

**Particular instructions:** The formula should as far as possible be based on pigments; dye-stuffs should only be used in exceptional cases!

Follow the Safety instructions! (Page 35)

**Base formulation:**

GE 11254	Base oil	Remainder up to 100 %
OP 101 Yellow	Pigment concentrates	depending on colour tone up to a maximum of 30 %
OP 103 Oxide Yellow		
OP 300 Red		
OP 306 Oxide Rec		
OP 400 Violet		
OP 405 Magenta		
OP 500 Blue		
OP 600 Green		
OP 900 White		
OP 905 Black		
OF 8011 Yellow	Dyestuff concentrates	max. 10 % (only use in exceptional cases)
OF 8031 Red		
OF 8034 Magenta		
OF 8090 Black		
OP 8099 Deepblack		depending on colour tone up to a maximum of 30 %

Please observe the addition limits relating to the Pigment and Dyestuff concentrates, otherwise drying will be delayed!



### 5.3 Application

The following are some recommendations for application of Proterra products. Please refer to the Technical Information to find processing recommendations tailored to the respective products.

#### 5.3.1 Padding

The product is applied in a thin layer

1. by rolling it on using a short-haired velour roller or
2. via brushing using a brush or
3. using a sanding fleece

The product is then padded in using a white sanding fleece:

1. given small surface areas by hand in circular movements or
2. given larger surface areas using a random orbital sander

Applying by pad simultaneously smooths the wood surface and removes loose wood fibres. This results in a much more attractive final surface.

After a brief exposure time, use a lint-free gauze cloth (or similar) to remove any excess; finally in the direction of the grain. A net application quantity of between 10 and 20 g/m<sup>2</sup> should remain on the surface. It is expedient to measure the excess sufficiently, but not too generously, so that the surface is completely wetted.

#### 5.3.2 Rolling

The material for layer-forming products can be applied using a velour roller. The quantity required for laid parquet flooring generally means pouring a long strip and then using a velour roller to evenly distribute it crosswise and along the grain. The material can even be applied via roller in the traditional manner.

The application quantity needs to be aligned with the specifications in the Technical Data Sheet for the product. An excessively thick layer can delay drying to a considerable extent!

#### 5.3.3 Spraying

Cross coat application using a normal cup gun. Nozzle 1.8 mm, spray pressure 2 - 3 bar, throttled material supply if necessary.

Please note the information in the Technical Information and the Safety instructions! (Page 35)

## 5.4 Troubleshooting in the case of Proterra products

<b>Oil not drying/ drying too slowly</b>	<p>The following are possible causes:</p> <ol style="list-style-type: none"> <li>1. Inadequate processing temperature: an optimal processing and drying temperature is between 18 and 25 °C. Your workpieces and the product also need to be within this temperature range!</li> <li>2. Product expired: too long a storage period beyond the best-before date and/or unsuitable storage conditions (above 30 °C); siccative addition at a maximum of 0.5 % ZD 3971 if required</li> <li>3. Bright, light-flooded rooms accelerate complete hardening!</li> <li>4. Excessive air humidity</li> </ol>
<b>Skin formation</b>	<p>Skin formation in the can is a frequent side effect of fast-drying products and cannot always be fully avoided.</p> <ol style="list-style-type: none"> <li>1. Open the can without shaking it. Use a knife to loosen any skin from the edge and then lift it off in one piece and dispose of it. Use a cup sieve!</li> <li>2. Align the can size with the consumption quantity: the ideal outcome is that the total quantity can be processed in one operation.</li> <li>3. Constant opening and closing results in increased oxygen supply and associated skin formation</li> </ol>
<b>Mottled surface</b>	<p>This can be caused by the following:</p> <ol style="list-style-type: none"> <li>1. Wood sanding too fine – sanding at 150 - 180 grit is ideal</li> <li>2. Areas of the wood with a convoluted grain could as necessary be dampened and then lightly sanded again</li> <li>3. Uneven/insufficient application quantity: The wood could not uniformly absorb the oil across the surface</li> </ol>
<b>Colour tone too weak</b>	<p>may be insufficient on "hard" woods with relatively low absorbency. Remedy:</p> <ol style="list-style-type: none"> <li>1. coarser sanding down to 120 grit</li> <li>2. Wetting: It's very effective to wet the wood uniformly and leave to dry at room temperature avoid pools.</li> <li>3. Apply multiple times</li> </ol>
<b>Product is difficult/ tough to process</b>	<p>Dilute at a maximum of 5 % with OV 1200 Please note that the colour intensity decreases due to dilution!</p>

**5.5 Components**

<b>Product</b>	<b>Type</b>	<b>Important information</b>
<b>Base oils</b>		
OE 52832		
GE 11254		
<b>Pigment concentrates</b>		
OP 101	Yellow	Pigment concentrate with superb light fastness and coating properties
OP 103	Oxide yellow	
OP 300	Red	
OP 306	Oxide red	
OP 400	Violet	
OP 405	Magenta	
OP 500	Blue	
OP 600	Green	
OP 900	White	
OP 905	Black	
<b>Dyestuff concentrates</b>		
OF 8011	Yellow	Soluble dyestuffs with high brilliance and transparency. Great light fastness
OF 8031	Red	
OF 8034	Magenta	
OF 8090	Black	
OP 8099	Deepblack	depending on colour tone up to a maximum of 30 %
<b>Additive/thinner</b>		
ZD 3971	Siccative	Additive to accelerate oxidative drying; maximum advisable dispensing 0.5 %; never over dispense!
OV 1200	Thinner	

## Notice



## **Disclaimer**

Our technical information is continually adapted to keep up to date with the latest technology and statutory regulations. The latest version is always available online at [www.hesselignal.de](http://www.hesselignal.de) or talk to your local account manager. This information is for advice and is based on the best knowledge available and careful research in line with the current state of the art. This information is not legally binding. We also refer you to our Terms and Conditions. Material safety data sheet is provided in accordance with EC regulation no. 1907/2006.

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