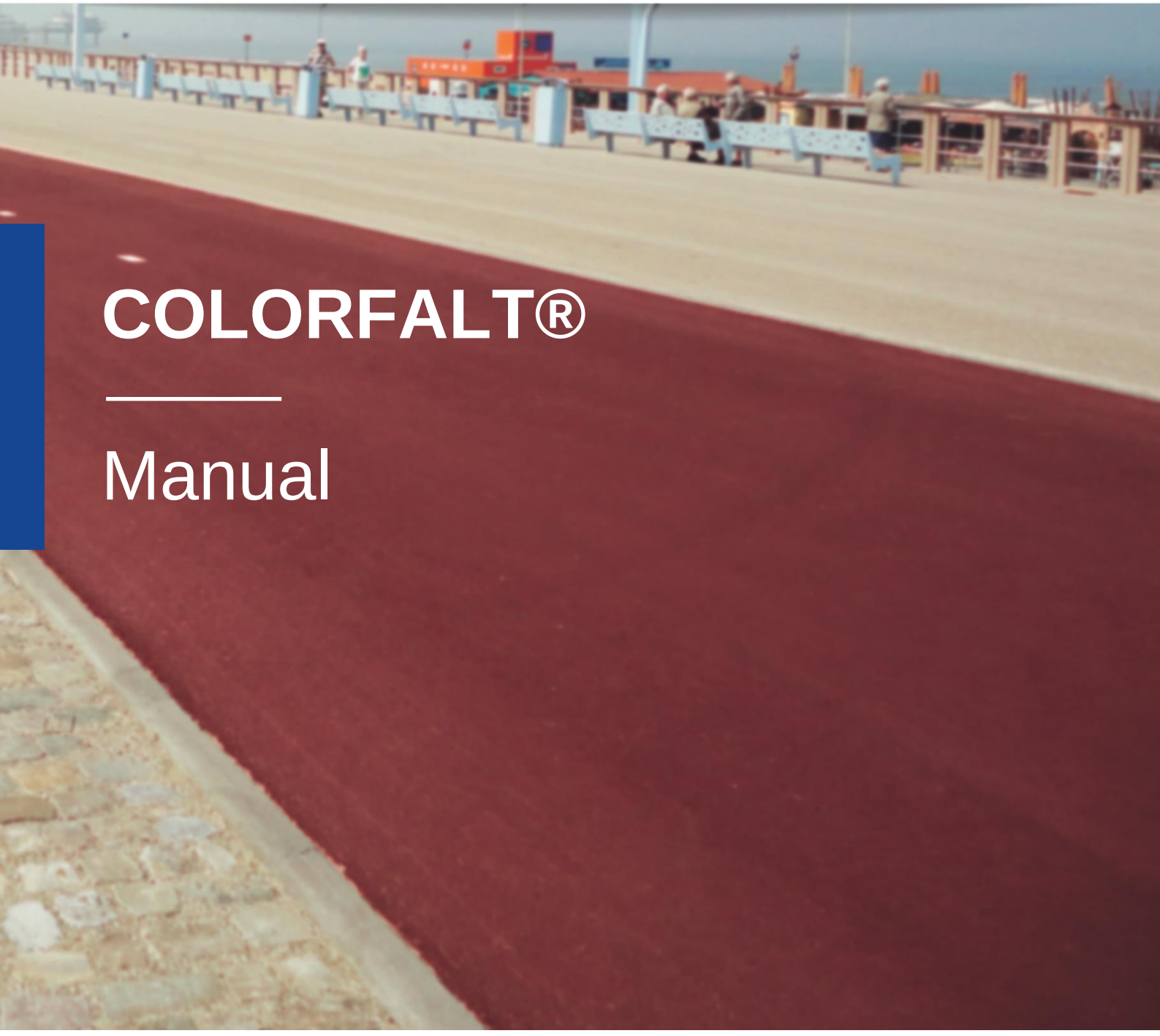
VENTRACO
Chemie B.V.



COLORFALT®

Manual

INTRODUCTION

Since 1991 Ventraco has been active in the market of high-grade pigments for the colouring of asphalt and concrete. ColorFalt® and Ferrotone® are the well-known brand names. These pigments give asphalt and concrete an extra architectonical and/or functional value.

ColorFalt® offers quite some advantages compared to powder pigments.
There is no contamination during storage, transport and dosing and the risk of inhalation during dosing is also excluded.

This document contains the acquired knowledge and experience, which has been collected and bundled as a reference work to add value to all ColorFalt® users.

CONTENT

This document has been prepared as completely and carefully as possible.
If there are any questions which are not expressed in this document, please contact us for further assistance.

CHAPTER 1

What is ColorFalt®?

CHAPTER 1 – What is ColorFalt®?

ColorFalt® is a pigment preparation that has been developed to solve the problems of working with powder pigment at an asphalt plant. The demand for a pelletized product came from the asphalt producers.

The problems at that time were:
1. Heavy physical handwork
2. No proper control on the dosing quantities and mixing times
3. Pollution of the environment

Advantages ColorFalt® colouring pellets:
A great variety of colours available 'on demand'
Especially developed for the roadbuilding industry
Extra stability for the asphalt
Absolutely dustfree
High colouring strength
Sustainable
Easy to dose and easily applicable
Organic pigments can be used
Additional UV-stab en anti-oxidants possible
Remains stable when stored; outside storage is also possible

ColorFalt® is available in red, white, blue, yellow, green and black. Red is the best known and used application. Nearly every requested colour can be produced. These are tailor-made projects which are particularly interesting to landscape architects, local government and urban planners.

The composition of our ColorFalt® pellets has not changed over the last 10 years. With this composition more than 700.000 tons of coloured asphalt have been produced in various asphalt mixtures, in many different countries.

ColorFalt® is successfully used in surface layers such as Densed Asphalt, Stone Mastic Asphalt and thin noise-reduction layers.
Also applications in “sandcarpets” in the UK and hot mix surface dressings in the Middle-East.

ColorFalt® consists of 80% colour- and 20% binding additives.

The necessity of a binder is to make the ironoxide pigment dust free. In addition, the binder has to melt very quickly, within seconds, to shut out the pigment. Due to the high dispersion degree (distribution) it is possible to get the same good colour using less ironoxide than in the powder formula’s. Because the pigment requires much less distribution energy at the mixer as a separate powder pigment, the colour strength is much more equal, no matter what mixture is being made. The ‘colour reproducibility’ is much bigger than powder pigment. In powder pigments the mixing time and the fineness of the asphalt mixture have a major influence on the colour development in the asphalt.

As a comparison; 5% Ferrotone powder pigment equals 3% ColorFalt® in the same mixture.

Red asphalt produced with ColorFalt® has a higher stability than standard mixtures. This can increase to a higher Marshall stability of 10%. The polymer also increases the softening point of the bitumen. The red asphalt mixes with ColorFalt® perform much better than asphalt without ColorFalt® over long periods of warm weather and for example on bridge decks and parking decks.

When using ColorFalt you get the polymer ‘for free’.

CHAPTER 2

Packaging and dosage

CHAPTER 2 – Packaging and dosage

We offer several kind of packaging, depending on the way you want to dose the pigment pellets into the asphalt mix.
If automatic dosing is used, ColorFalt® is supplied in big bags or in a silotruck.

Big bag size empty: 1m x 1m x1m
Containing 1mt ColorFalt®: 1.20 x 1.20 x 1.20

The big bag is covered with a hood and the entire big bag is sealed with foil. This makes the big bag water resistant.

The big bag is broader than the pallet it stands on due to the bulkiness.
The big bags are placed on blockpallets of 1.10 x 1.20.

For manual dosing, we can provide ColorFalt in PE low melting bags. This can be either 10, 15 or 25kg per bag.
We stack 1.000kg on a blockpallet.

With a two tons mixer, four bags of 15kg will be used per batch. The packaging does not have to be cut open and shaken, but can be deposited straight into the mix through the mixing compartment.

The small PE bags are also packed and sealed on blockpallets. Obviously you need a platform at the depositing point. There should be enough room for 1 or 2 people and a pallet with ColorFalt bags.

CHAPTER 3

Binding and colour

CHAPTER 3 – Binding and colour

Colour in roads is a dynamic process. The ColorFalt® that is added, colours the binder in the mastic. This binder envelops the stones. In the course of time, the binder around the stone tops will wear off. The colour of the stones will therefore, to a greater or lesser extent, become part of the surface colour of the road surface. This is why the colour of the stone is rather important in supporting the chosen colour. The use of pigment, bitumen, filler and minerals must be well-coordinated.

Frequently used combinations:

Pigment	Filler	Stone type	Bitumen
ColorFalt® Red 3%	Lime filler	Cloburn red /tillred	Black 70/100
ColorFalt® Red 1%	Lime filler	Cloburn red / tillred	Clear binder
ColorFalt® Yellow	Lime filler	Cloburn red / tillred	Clear binder
ColorFalt® Yellow with White	Lime filler	Reflecting white/Luxovite	Clear binder
ColorFalt® Green	Lime filler	Microdioriet/porfier/Hessisch neugrunn/Bestone	Clear binder
ColorFalt® Blue	Lime filler	Microdioriet/porfier//Bestone	Clear binder
ColorFalt® Black	Lime filler	Basalt	Black bitumen
ColorFalt® White	Lime filler	Reflecting white/Luxovite	Clear binder

Note*
All the above mentioned proposals contain lime fillers and no fly ash fillers as these make the colour less bright.
Commonly used clear binders are Sealoflex Colour and Mexphalt.
Other types of stones can also be used. The examples mentioned above are only common combinations.

CHAPTER 4

Recipes and mixture development

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Recipe and mixture development

Coloured asphalt always starts in the laboratory, following the normal examination procedures. Because asphalt has a volumetric design in which voids play a major role, density ratios must be considered. Most common colour in asphalt is Red. It is known that the pigment from ColorFalt® should be added to the filler fraction and the binder to the bitumen part. In terms of densities, the original bitumen and the binder of ColorFalt® are similar and therefore no correction is necessary.

This is different with the ironoxide. Ironoxide has a density of around 5.000kg/m3 while most fillers are between 2.500 and 2.800kg. This means that a grain of ironoxide in the same volumic space weighs almost twice as much as the filler grain with that same volume. In black bitumen with 3% ColorFalt®, 2.4% ironoxide is added to the filler fraction. To maintain the volume of the filler, approximately 1.2% extra filler will have to be added to maintain the same volume.

It is up to the designer whether or not to correct this in order to keep the mastic (filler and bitumen) slightly more wet or dry. Volumetric equality means in any case that if a normal filler of 2.600kg/m3 is 8% in the mineral mix, it must be corrected for the volume.

It can be calculated with the formula 2.4 * (5000-2600) / 5000 = 1.15%.
The total filler must then be 9.15% for the same volumetric construction 8 + 1.15.
With 1% addition of ColorFalt® with clear binder this is 0.8 * (5000-2600) / 5000 = 0.4%, an increase of 0.4% filler to 8.4%.
The binder used in ColorFalt is obviously added up with the binder.
An example of a standard mixture of an AC surface layer with black bitumen you find on the next page.

Without ColorFalt®:	With ColorFalt®:	
51,7% stone	**51,0% stone**	(stone + sand ratio same to original)
34,8 % sand	**34,35% sand**	(stone + sand ratio same to original)
7,5% filler	**6.25% filler**	(7,5- 2,4 ironoxide +1,15 correction on volume)
6,00% bitumen	**5,4% bitumen**	(6% bitumen – 0,6% binder from ColorFalt®)
	3% ColorFalt®	(containing 2,4% ironoxide and 0,6% binder)

Of course it is up to the producer to estimate the recipe in such a way that the figures in the type-test are good. However, we recommend that as a starting point, sufficient bitumen should be added to the mixture.

You have to be aware that the lab mixer often delivers less shear than the actual production. We therefore recommend a longer wet mixing time when making lab samples. Depending on the type of mixer, this will differ according to the type of mixer by experiment. However, extending the mixing time by at least one minute is a rule of experience.
For blends with the laboratory mixer you should take 150 seconds wet mixing time instead of the regular 90 seconds. The distribution of the pigment in the mastic should now be fully developed.

The mixing temperature is also an important issue. The higher the temperature, the sooner the binder melts and the pigment is being distributed in the mastic. In general, we keep a mixing temperature of at least 160 degrees.

If colour samples are made in tablets, a good method to assess the colour after weathering and losing the bitumen layer, is to treat the upper side, after cooling, with a high-pressure water sprayer until the stone tips show.
In this way you get an idea what the colour will look like after approximately two years. This gives a more realistic picture during the using period than an untreated tablet. Certainly with SMA, the colour of the stone can exert a considerable influence and can give a distorted idea of when it is not treated.

CHAPTER 5

Mill setting and processing

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Mill settings and processing

For the asphalt installation a number of settings can help to obtain a nice colour change. In principle, a mixture with ColorFalt® can be rotated in the same order as a normal mixture. Before and after coloured asphalt is produced we advise to clean the mixer with hot minerals (stone fractions). Otherwise, the first mixture may contain sweepings of black bitumen. The mixer also needs to be cleaned after the production of the coloured batches.

The ColorFalt® pellets are added to the mix directly with, or just after the bitumen. No delay has to be built in.

Add the ColorFalt® in one movement after the bitumen injection in the manual addition. With automatic dosing, this happens naturally in this way. Mixing temperature with ColorFalt® should preferably be between 160 and 175 degrees.

Temperatures above 190 degrees should be avoided due to thermal discolouration.
And temperatures below 160 degrees will cause the pigment distribution to slow down and can therefore have a delaying effect on the colour change. A longer mixing time may be necessary.

In any case, the mixing time is longer than with regular asphalt because the pigment has to be distributed over the mixture. Normally the mixer has enough mixing energy to get the mixture thoroughly coloured with a wet mixing time of about 30 seconds. Not every mixer mixes in the same way, so it is advisable to establish the mixing time by trial and error at the beginning.

A wet mixing time after dosing ColorFalt® between 20 and 50 seconds should be enough for the colouration. In the case of finer mixtures, however, less and less energy is present in the mixture. A longer mixing time may then be necessary.
This counts for e.g. the 0/5mm mixtures.

Because this is about the pigment distribution and the time required for that, there is not so much difference between the clear and the black bitumen. The required time extension is slightly shorter when using a clear binder.

Coloured asphalt can be stored in the same way as regular asphalt. However, crusts of black asphalt can detach from the storage wall if long-lasting warm coloured asphalt is stored in the same hot shelter. So the shorter the storage the better.

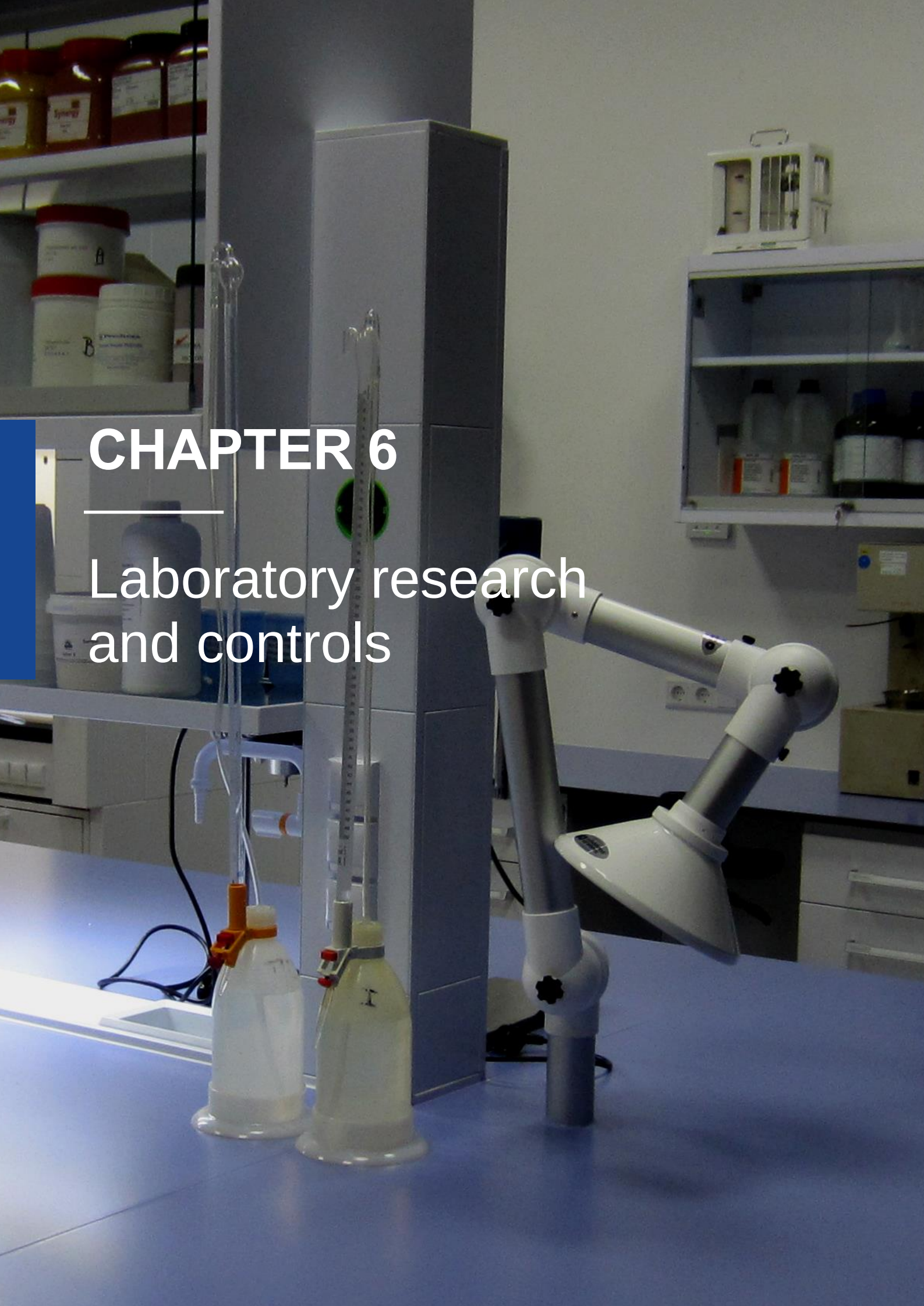
Transport in trucks can also result in pollution from previous loads. It is obvious that trucks must be as clean as possible.

As for the processing of coloured asphalt it is important that all machines and accessories used at the project are clean. A machine that has been used for black asphalt and then switches to red must be cleaned first.
The shoes of asphalt workers also should be cleaned. Walking through the stick and then over red asphalt gives black footprints and should be avoided.

Processing red asphalt is no different than regular asphalt when it comes to compaction and finishing. Normally, the standard use of the roll package as used in compacting the black variant (modified SMA or modified AC surf) is sufficient.
However, due to the surface profile (roof profile and small width), you often see that iron-rollers are less suitable. Often smaller machines are used for this.

In any case, multiple rollers must be used in order to be able to keep up with the cooling process. This is similar to rolling black asphalt.

Bulk density: 2,05/dm3
Density: 3.400kg/m3



CHAPTER 6

Laboratory research and controls

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Business control
In general, the company control takes place via the centrifuge extraction. The pigment will remain in the centrifuge jar. Obviously one will encounter some colouration in the machine, but after a few washes with black asphalt it will also disappear again. The basket may also slightly colour. In this fresh asphalt, no experiences have yet been heard that the total binder can't be found because of adding the EVA as a binder.
This does not count for cored samples and with the soxhlet extraction.
As this is the controlling method, the non-recoverable part of the asphalt must be mentioned on the CE form, together with the type of solvent (methylene chloride).

***Note*:** *Since clear bitumen do not fall under the standard of penetration bitumen, an asphalt mix with clear bitumen may not carry a CE logo.*
Still this is not a problem. The European legislation says that if something can't be delivered under the CE, clients can purchase these mixtures under company own delivery papers.

Reports are available from various companies that have examined the polymer content at various times and with different research methods. These can be retrieved. It is known that in general with the soxhlet method the non-recoverable content can run up to 0.4 to 0.6% bitumen. The filler content also suffers from this phenomenon. Mentioning this on the CE sheet can prevent a lot of discussion on delivery.

CHAPTER 7

Health and safety

CHAPTER 7 – Health and safety

ColorFalt® is very user-friendly compared to powder pigment.
For manual dosing we can provide any requested amount per PE bag.
You must keep in mind that there must be sufficient space at the mixer inlet to put down the necessary stock of bags and a safe space for one or two persons to put the bags into the mixer. Experience has shown that the speed of mixing is quite high and therefore two people at the inlet can be recommended (one for unloading the pallet and one for depositing in the mixer).
The advantage of the low melting bags is that they do not have to be cut open and can therefore be used completely dust-free. Naturally, dust and heat are released at the inlet, which means that wearing dust caps remains as a safety measure. But inhalation of pigment is excluded.

In the field of the environment care, ColorFalt® has great advantages compared to powder pigment.
If during transport or handling, bags are leaking or broken, ColorFalt® is still a bounded product and will therefore not contaminate the near equipment, groundwater and / or soil. With powder, this is of course a risk, for both soil and inhalation by humans.
The binders that hold the pigment together are completely harmless in normal use.

By taking the usual safety measures which are part of the safety precautions of an asphalt plant, the use of ColorFalt® does not provide an extra risk.

If you still have some questions remaining, please feel free to contact us and we will be happy to answer your questions and give you any technical support you need.

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