Product Data Sheet
Pad Printing Ink

SunChemical®
Coates Screen Inks

AUXILIARY AGENTS & ADDITIVES (HM)

INTRODUCTION
Generally, pad printing inks are not supplied in a ready-to-print adjustment. They have to be adjusted to specific local conditions by addition of organic solvents (thinners/retarders) and if relevant hardener prior to printing.

In some rare cases, addition of further auxiliary agents/additives may be required.

This product data sheet contains information about the following auxiliary agents/additives:

I. ADJUSTMENT OF VISCOSITY:
- THINNERS
- RETARDERS
- RETARDER PASTES
- THICKENING POWDERS

II. SURFACE & FLOW PROPERTIES:
- MATTING POWDER
- FLOW AGENT
- ANTI FLOATING AGENTS
- ANTISTATIC AGENTS
- ADDITIVES TO INCREASE ABRASION RESISTANCE

III. ADHESION PROMOTERS

IV. HARDENERS

V. CLEANING AGENTS

GENERAL INFORMATION ABOUT THE USE OF THESE AUXILIARY AGENTS:
All information about amounts/addition are given in % by weight!

To adjust processing viscosity of an ink with thinners and if necessary, retarders, possible additions mostly range from 10 to 30%. The amount added will also have an influence on the colour shade (brightness, transparency). Hence, it is essential to keep addition at a constant level.

All other auxiliary agents and additives may only be added in low quantities. Any over-dosage may result in unfavourable effects. Recommended addition amounts refer to the individual products. Always start with a low dosage and determine the most effective addition for your application by carrying out pre-trials under local conditions. Also, carry out pre-tests to confirm that the addition of auxiliary agents/additives has no unfavourable influence on the other processing and post-processing properties and the final qualities of the products produced.

☑ Information about especially environmentally and user-friendly auxiliary agents
All printing ink ranges of Coates Screen Inks meet the requirements of REACH, RoHS and EuPIA. For special applications, printers and end customers may require pad printings inks that are free of certain substances, mainly for reasons of product safety or because of own company specifications. Our ink ranges TP 307, TP 313, TP 318, TP 340, TP 400 and TP/E-HF generally meet such requirements. For these applications, the required auxiliary agents and additives also must be free of the solvents cyclohexanone, butyl glycolate (GB-Ester), aromatics and Solvent Naphtha.

In the following product data sheet, additives, which do not contain these substances, are marked with symbol ☑. These additives have to be used in order to meet such special requirements.

I. ADJUSTMENT OF VISCOSITY:

Prior to adjusting viscosity of an ink, please also refer to the relevant product data sheet of the ink range.

THINNER:

Evaporation rate of thinners ranges from medium to very fast. Addition to the inks depends on local printing conditions. Generally, addition varies from 10 – 30%, if necessary, also in combination with a retarder.
Recommendation: preferably print inks with low viscosity (=highly fluid).

Generally, the thinner suitable for pad printing inks is ADDITIVE A.
The additional products listed below should only be used if because of specific printing conditions the required printing quality/ink transfer cannot be achieved using additive A.
Thinners are listed from quick evaporating thinners to thinners with a slow evaporation rate.

Additive C	☑	Extremely quick thinner, for very high printing speeds.
Additive B		Quick thinner, suitable for high printing speeds.
Additive D	☑	Alternative for Additive B. Application the same as ”B“.
VD 10	☑	Mild, low solving power. Very quick evaporation. Especially suitable for plastics sensitive to tension cracks, such as polystyrene (PS), PET-G or polycarbonate (PC) with ink range TP 249. Not suitable for 2-component inks (exception: TP 218/GL. LAB-N 341705). Also used as mild solvent to wash off misprints.
Additive A		**The standard thinner.** **First choice for nearly all our pad printing ink ranges.** Medium evaporation, good solving power. For medium to quick printing cycles.
Additive U	☑	Alternative for Additive A. Application the same as “A“.
VD 40		Medium evaporation, “aggressive“ thinner with strong solving power. Not recommended when printing substrates highly sensitive to solvents.
Additive R	☑	Slow thinner, good solving power, however quicker than VD 60.
VD 60	☑	Slow thinner with good solving power.

RETARDERS:

Retarders have a slow to very slow evaporation rate. They are added to the printing ink for (very) slow print cycles if transfer of the ink from the cliché to the pad and from pad to substrate is insufficient because the ink film has already started to dry in the cliché or pad.
Often retarders are only additionally added to the printing ink in combination with thinner.
Depending on type and amount of retarder added, drying times of the inks may be much or sometimes even significantly longer.

Retarders are listed from quick evaporating retarders to retarders with a slow evaporation rate.

XVH	☑	Quick retarder, very mild, alternative to VD10. Not suitable for 2-component inks (Exception: TP 218/GL, LAB-N 341705).
TPD		Slow retarder, good solving power.
VZ 35	☑	Alternative to TPD.
TP/V	☑	Very slow retarder. Mild, low solving power. Not suitable for 2-component inks (Exception: TP 218/GL, LAB-N 341705).

Overview: Thinners and Retarders. Main Properties:
Among other properties, the table below lists evaporation rates of the individual products in relation to Additive A. Example: VD 60 evaporates 5 times slower than Additive A, whereas Additive B evaporates twice as fast than Additive A. This table is a guide only.

Product		Evaporation	Factor*	Solving Power	Application
Additive C	☑	very quick	0,25	medium	universal
Additive B		quick	0,5	medium	universal
Additive D	☑	quick	0,5	medium	universal
VD 10	☑	quick	0,6	very mild	All 1-comp. inks & TP 218/GL
Additive A		**medium**	**1**	**medium**	**universal**
Additive U	☑	medium	1	medium	universal
VD 40		medium	1	strong	universal
Additive R	☑	medium to slow	3	medium	universal
VD 60	☑	medium to slow	5	medium	universal
XVH	☑	slow	10	mild	All 1-comp. inks & TP 218/GL
TPD		very slow	25	medium	universal
VZ 35	☑	very slow	25	medium	universal
TP/V	☑	extremely low	50	mild	All 1-comp. inks & TP 218/GL

*= Evaporation rate always in relation to Additive A.
☑ = Product does not contain aromatics, cyclohexanone, butyl glycolate (GB Ester), Solvent Naphtha.

RETARDER PASTES:

Fluid retarders reduce the viscosity of pad printing inks. If printers want to avoid/limit this effect for technical reasons a retarder paste can be used (alternatively or better mixed with the liquid thinner/retarder). Addition of retarder paste will brighten the colour shade to some extent. However, it cannot be used as transparent paste. To brighten colours (or make them more transparent) use varnish E50 or transparent paste of the relevant ink range.

LAB-N 111420/VP

Gel like thixotropic universal retarder paste with a slightly olive green tint (has no influence on colour shade).
Effect: Retarding effect, no reduction of viscosity.
Addition: 5 - 10%.
Suitable for all our pad printing ink ranges.

TP 247/VP

Thixotropic retarder paste, especially for ink range TP 247.
Recommended addition: 5 -10%.

VISCOSITY INCREASE:

THICKENING POWDER

Very light, whitish powder.
Effect: Increase in viscosity/thixotropy of pad printing inks.
Improves reproduction of details of line and process prints if required.
Application: Stir into pad printing inks.
Addition: Up to 3%.
Note: Thickening powder has to be mixed (dispersed) into the ink using a suitable mixer, dissolver or shaker. If not mixed properly printing ink film may have a rough, dull and matt finish. Curing reactions of UV-curing pad printing inks mixed with thickening powder may be slower. Possibly higher UV-energy level will be required.

II. CHANCE OF SURFACE AND FLOW PROPERTIES:

MATTING POWDER

Very light, whitish powder.

Effect: Reduction of gloss level (matting) of glossy pad printing inks.
The required degree of matting (also depending on ink type) will be achieved by different amounts of addition.

Application: Stir into pad printing inks.

Addition: Up to 6%.

Note: Matting powder has to be mixed (dispersed) into the ink using a suitable mixer, dissolver or shaker. If not mixed properly printing ink film may have a rough surface with changing degrees of gloss.
Check if matted printing ink film still meets the necessary requirements.
Only very limited suitability for UV-curing pad printing inks (pre-tests are absolutely essential).

FLOW AGENT:

Because of the great variety of pad printing substrates and their different surface properties, you may sometimes experience problems like bubbles, pinholes, orange peel and similar effects showing in the printed film. To avoid/reduce such undesired effects special additives, so-called flow agents can be added to the printing ink.
Handle flow agents with care; do not exceed maximum addition. If more than the maximum amount is added flow properties may become worse and the excess flow agent will form a smudgy film on the surface of the ink film.

Flow agents VM 1 or VM 11 and VM 2 or VM 21 contain silicone and cannot or hardly be overprinted with other inks or varnishes.
To obtain a homogeneous dispersion in the ink, flow additives added should be stirred well using a suitable mixer, dissolver or shaker.

VM 1 AND **☑ VM 11**

Clear liquid, active substance (silicone) in a solvent mixture.

Effect: Improvement of flow properties.

Application: Stir into solvent based and UV-curing pad printing inks.

Addition: 1 - 5%.

VM 2 AND **☑ VM 21**

Clear liquid (VM 2) or slightly milky liquid (VM 21), active substance the same as in VM1, but highly concentrated!

Effect: Improvement of flow properties.

Application: Stir into solvent based and UV-curing pad printing inks.

Addition: 0.3 – 1%.

VM 3 AND **☑ VM 31**

Clear liquid, active substance in a solvent mixture.

Effect: Improvement of flow properties.

Application: Stir into solvent based and UV-curing pad printing inks.
Preferred for pad ink ranges TP 267 and TP 218/GL.
For other ink ranges only if prints will be overprinted with varnish.

Addition: 1 - 5%.

ANTI FLOATING AGENTS:

All colour shades of one ink range can be mixed in any ratio.
When mixing colour shades, mostly blue, violet or black with white at a certain ratio, a rejection reaction initiated by certain physical properties may occur. This reaction will show by floating of white pigments on the surface of the ink. In some rare cases, this problem then also shows in the printed film. This can be improved/avoided with the addition of anti floating agents.

Anti Floating Agent
Clear, slightly brownish fluid.
Effect: Suppression of pigment floating effects.
Application: Stir into solvent based pad printing inks.
Addition: 3 - 5%.

LAB-N 561969
Clear, slightly brownish fluid.
Effect: Suppression of pigment floating effects.
Application: Stir into solvent based pad printing inks.
Addition: 1 - 2%.

Generally, „Anti Floating Agent“ is the first choice. Use of LAB-N 561969 is recommended if anti-floating agent did not achieve the required improvement.

ANTISTATIC AGENT:

Static electricity may cause many problems when printing plastic materials. In pad printing applications static electricity will cause splashes (cob webbing/spider threads) in or around the printed image.
To avoid or reduce this static charge printers have following possibilities:

- Sufficient humidity (< 60 % RH) in the print room.
- Ionisation equipment to achieve sufficient conductivity of material surfaces and environment.
- Use of antistatic agents in the inks.

LAB-N 111420 AND **☑ STM-P1**
Transparent, slightly yellowish gel-like pastes with antistatic effect.
Effect: Reduction/elimination of „cob webbing/spider threads“ in the printed image by thixotropic effect.
Application: Stir into solvent based pad printing inks.
Addition: 5 - 10%.

INCREASE OF ABRASION RESISTANCE:

Certain applications require a very high mechanical resistance (abrasion) of the pad prints. In some individual cases an additive to further enhance the abrasion resistance is required. Because of the variety of influencing factors, the most suitable additives need to be identified by carrying out pre-trials.

LAB-N 560469
Fine, whitish powder, micronized wax based on PTFE.
Effect: Increase of abrasion resistance by additional stabilisation of the printed ink layer.
Application: Mix into pad printing inks effectively with stirrer/mixer.
Addition: 1 - 3%.
Note: Over-dosage will cause a significant reduction of gloss of the printed ink layer.

LAB-N 561645
Fine, whitish powder, micronized wax based on PE.
Effect: Increase of abrasion resistance by additional stabilisation of the printed ink layer.
Application: Mix into pad printing inks effectively with stirrer/mixer.
Addition: 1 - 3%.
Note: Over-dosage will cause a significant reduction of gloss of the printed ink layer.

LAB-N 561644
Clear liquid, active substance (silicone) in a solvent mixture.
Effect: Increase surface smoothness of the printed ink layer.
Application: Mix into pad printing inks effectively with stirrer/mixer.
Addition: 1 - 3%.
Note: Over-dosage will cause lubricant film on the printed ink layer.

Note: LAB-N 561644 and LAB-N 561645 can be used together as a combination.

OVERVIEW OF ADDITIVES FOR INK SURFACES AND FLOW:

Application/Product Name	Form of Delivery	Addition:	Mixing	Over-printable
FLOW AGENT				
• VM 1 / VM 11	fluid	1-5%	quick mixer	no
• VM 2 / VM 21	fluid	0,3-1%	quick mixer	no
• VM 3 / VM 31	fluid	1-5%	quick mixer	yes
ANTI FLOATING AGENT				yes
• Anti Floating Agent	fluid	3-5%	10 min. dissolver	yes
• LAB-N 561969	fluid	1-2%	10 min. dissolver	yes
ANTISTATIC AGENT				
• LAB-N 111420	paste	5-10%	manually	yes
• STM-P1 ☑	paste	5-10%	manually	yes
VISCOSITY				
• Thickening powder	solid/powder form	2-3%	10 min. dissolver	yes
DEGREE OF GLOSS				
• Matting Agent	solid/powder form	3-5%	10 min. dissolver	yes
ABRASION RESISTANCE				
• LAB-N 560469	solid/powder form	1-3%	10 min. dissolver	no
• LAB-N 561645	solid/powder form	1-3%	10 min. dissolver	limited
• LAB-N 561644	fluid	1-3%	10 min. dissolver	no

III. ADHESION PROMOTER

PP/111925
Active substance, dissolved in solvent.
Application: Primer for polypropylene (PP) substrates.
Alternative to flame, corona or plasma pre-treatment.
Possibly also suitable for other plastics and metals.
Pre-tests to confirm efficiency are absolutely essential.
Application: As shortly as possible before printing.
Only effective if applied very thin by wiping, dipping or coating.
Dries quite quickly (air supply/exhaust system necessary)
Materials can be printed immediately after primer has dried.

IV. HARDENERS:

- Hardeners are the „second component“ of 2-component ink systems (2-comp. inks)
- In a chemical reaction hardeners cross-link with the binding agents of the relevant ink ranges. Ink mixed with hardener, however, can only be processed for a limited period of time. This period is called pot life. Pot lives vary depending on ink range.
- Ink mixed with hardener should not be processed longer than the recommended pot life, even if ink still seems liquid and processable. Quality will only be consistent during the recommended pot life.
- Complete chemical reaction of ink and hardener required up to 6 days. During this period, a minimum temperature is required. Please refer to the reaction temperature of the individual hardeners below.
- Resistances should not be checked before completion of cross linkage process.
- Hardeners are sensitive to humidity. Therefore, containers always have to be tightly closed.

☑ TP 219

TP 219 is the most frequently used hardener.

Use for:	TP 218, TP 247, TP 253, TP 260, TP 267, TP 273, TP 273/T, TP 300, TP 305, TP 307, TP 313, TP 318, TP 340, TP 400, TP/E-HF.
Reaction temperature:	>15°C.
Note:	Not recommended for outdoor applications. Tends to yellowing.

☑ TP 219/N

Use for:	TP 247, TP 253, TP 267, TP 273 & TP 273/T, TP 300, TP 305, TP 307, TP 313, TP 340, TP 400,TP/E-HF, TP/UV-P & TP/UV-P2.
Reaction temperature:	>20°C.
Note:	Also suitable for outdoor applications.

☑ TP 219/12

Use for:	TP 400. Required for USP Medical Class VI certificate.
Reaction temperature:	>15°C.
Note:	Not recommended for outdoor applications. Tends to yellowing.

☑ TP 219/VCH

Use for:	TP 318.
Reaction temperature:	>15°C.
Note:	Mandatory for printing on glass, ceramics, optionally for metals. Suitable for air and oven drying (up to 140°C / 30 minutes).

TP 219/L

Use for:	TP 253 L.
Reaction temperature:	160°C/ 15 minutes.

Special hardeners for ink series TP 218/GL:

TP 219/GL

Use for:	TP 218/GL, LAB-N 341705.
Reaction temperature:	>20°C.
Note:	Suitable for air and oven drying (up to 140°C / 30 minutes). Cured prints exhibit very good water resistance and good chemical resistance.

TP 219/02-GL

Use for:	TP 218/GL, LAB-N 341705.
Reaction temperature:	>20°C.
Note:	Suitable for air and oven drying (up to 140°C / 30 minutes). After oven curing (140°C / 20 – 30 minutes) prints show a very good chemical resistance. Also recommended for substrates made of metal and duroplastics.

TP 219/03-GL
Use for: TP 218/GL, LAB-N 341705.
Reaction temperature: >20°C.
Note: Suitable for air and oven drying (up to 140°C / 30 minutes).
Especially oven-cured prints (140°C / 20 – 30 minutes) show a very good water and chemical resistance.

V. CLEANING AGENTS:

Universal Cleaning Agents URS AND URS 3
Clear fluids. Solvent mixtures.
Effect: Solving of dried ink residues.
Application: Wiping off ink residues from tools, cliché and other equipment (doctor blades, ink pots etc.) using cleaning rags saturated with URS or URS 3.
Suitable for cleaning of solvent based and UV-curing pad printing inks.
Dosage: Undiluted.
Note: Only use wearing appropriate personal protective equipment (PPE) such as solvent resistant protective gloves, glasses and clothing. Read material data sheets before use!

Additional information:

SAFETY DATA SHEETS
Read safety data sheet prior to processing
Safety data sheets comply with Regulation (EC) No. 1907/2006 (REACH), Appendix II.

CLASSIFICATION AND LABELLING
Hazard classification and labelling comply with Regulation (EC) No. 1272/2008 (CLP/GHS).

CONFORMITY
Coates Screen Inks GmbH does not use any of the substances or mixtures for the production of printing inks, which are banned according to the EUPIA (European Association of the Printing Inks Industry) exclusion policy.
Further compliance confirmations are available upon request.

ADDITIONAL INFORMATION ABOUT OUR PRODUCTS
Brochures: Pad Printing Inks
Product data sheets: Product data sheets of our Pad Printing Ink series
Internet: www.coates.de, Service & Support, Technical Articles

Coates Screen Inks GmbH
Wiederholdplatz 1 90451 Nürnberg
Tel.: 0911 6422 0 Fax: 0911 6422 200
http://www.coates.de