Can tailored stabilizers improve hot melt tack?

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Agenda

- Why should we investigate in better stabilizations?
- BASF additive heritage
- Hot melt adhesive composition
- Technical results
- Summary
- Conclusion

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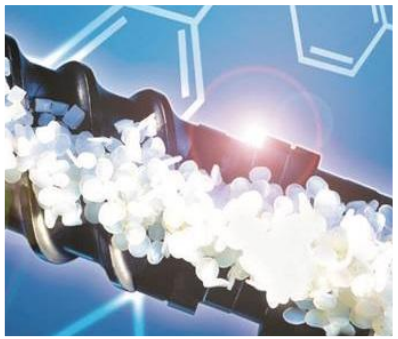
Impact of heat exposure on tack

Extrusion



Additives stabilize raw materials during the extrusion process against degradation

Storage

Storage of hot melt adhesives in liquid form can cause chain cleavage

Application

Application of hot melt adhesives at elevated temperature leads to product stress

End Use

Adhesives properties such as tack need to remain stable from production through end use

Thermal stress causes discontinuity in processes
e.g. down time and adhesion failure

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Why should we investigate in better stabilization?

Topics of growing importance

- Radiation Cure
- Lower melt temperatures
- Longer temperature resistance
- Higher bond strength

Focus: Adhesives with new properties

Traditional selection of stabilization

- Base material, e.g. EVA → Irganox® B 215
- Tackifier, e.g. rosin ester → Irganox® B 612

Focus: Control of oxidation

New: Stabilization of the hot melt **adhesion** is in focus

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BASF competencies for superior process and performance

Ciba

Combining product and application know-how for adhesives & sealants

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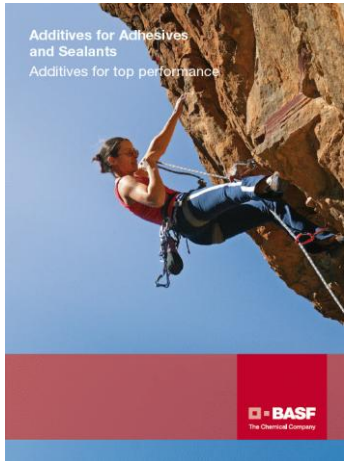
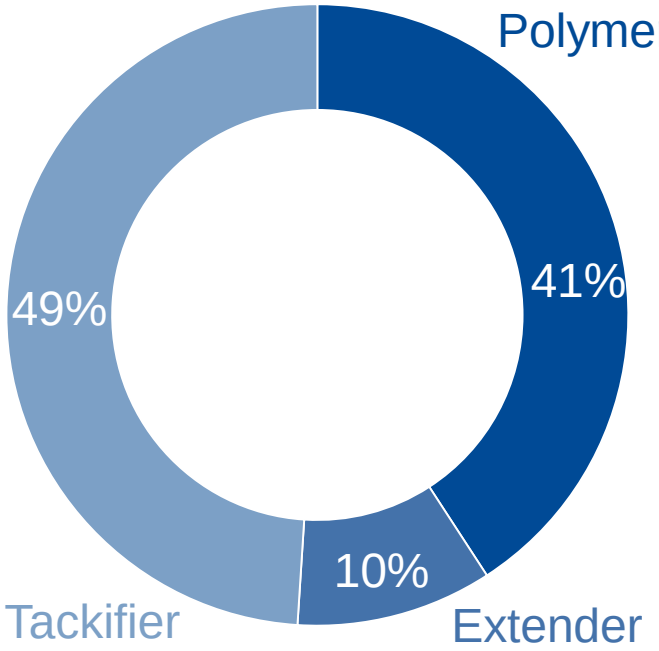
Performance additives



Adhesive raw materials

Hot melt adhesive components and their main attributes

PSA Formulation Example



Base Polymer: EVA, SBC, PO…

- Cohesive strength, color

Extender: Wax, Oil

- Viscosity, open/set time

Tackifier: Rosin, Hydrocarbon

- Tack, adhesion, viscosity, color

Stabilizer selection needs to take **all** components of the adhesive into account

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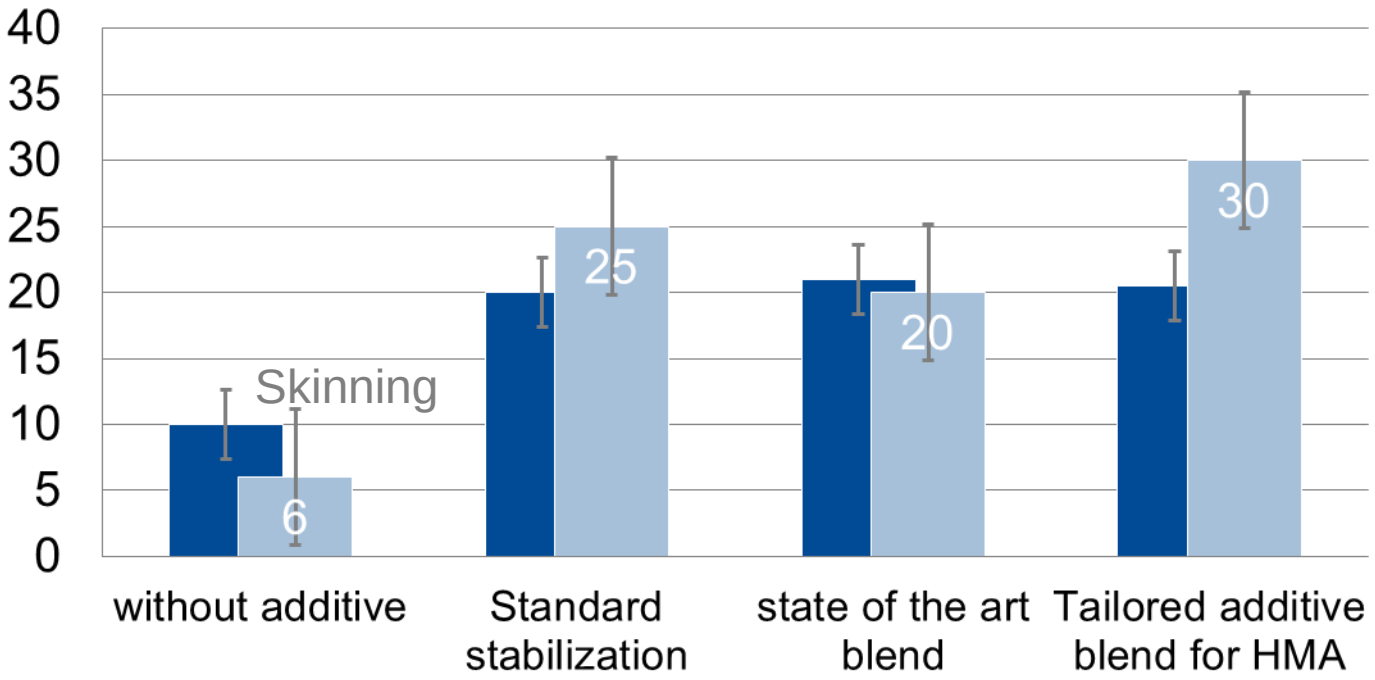
Impact of stabilization on tack and viscosity

Remaining level of Tack/viscosity (%)

Relative values after 16 hrs at 177 °C



Test methodology

Traditional:

Heat Stability of HMA
ASTM D 4499-95 (Cycle I)

New:

Including tack
ASTM D2979-95

Tack – the leading parameter for HMA performance optimization

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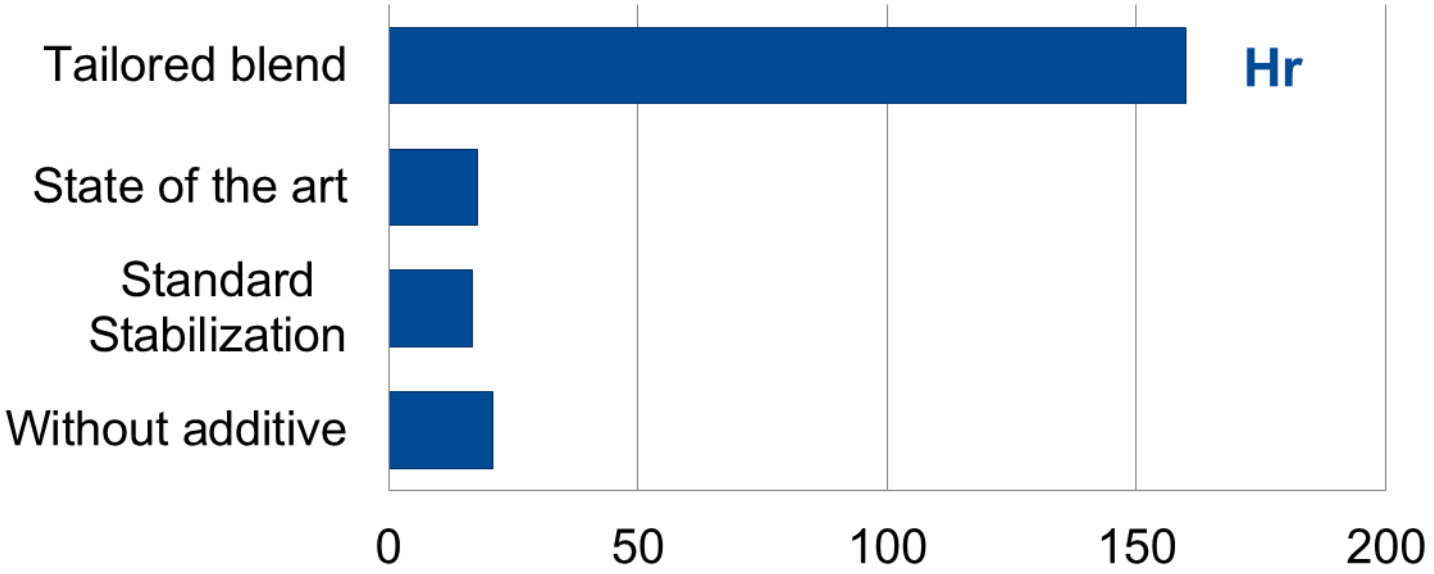
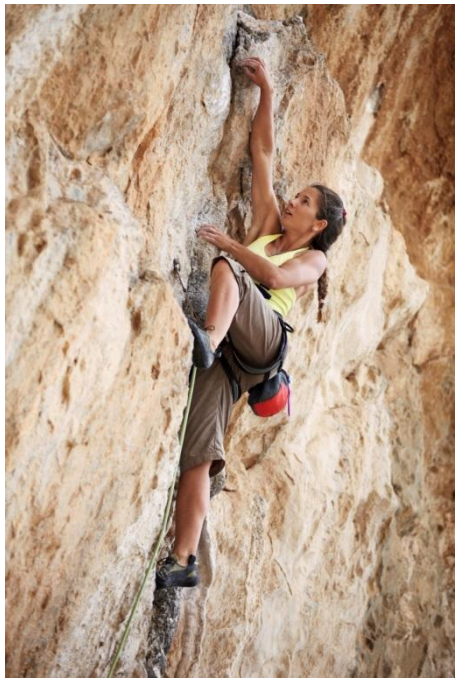
Hot melt adhesion values

Shear Strength (FTM 8; 0,5 Kg / 12,5 mm)





Large improvements under critical conditions possible

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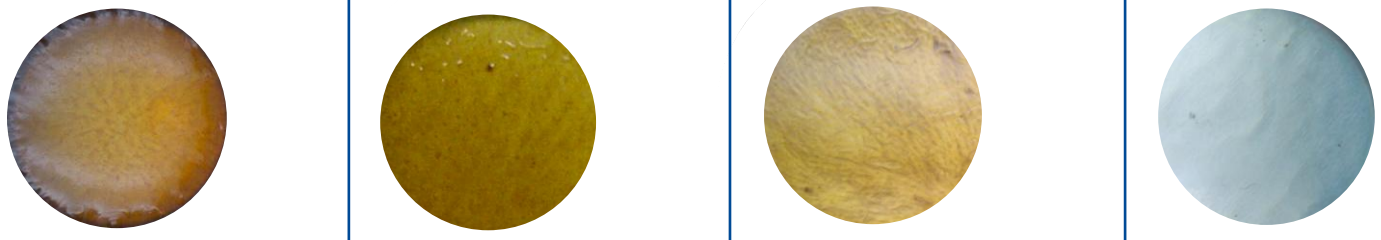
Significant improvements for clear adhesive film

Focus topic: Color of hot melt adhesive (HMA)

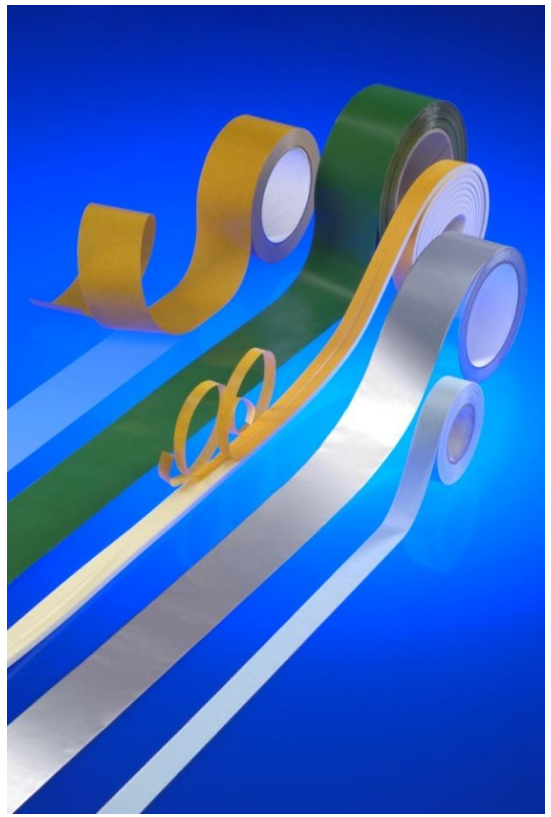
8 hrs aging at 177 °C (ASTM D 4499)



HMA without additive	Standard stabilization	State of the art blend	Tailored blend

Large performance differences

Application Example: adhesive tape



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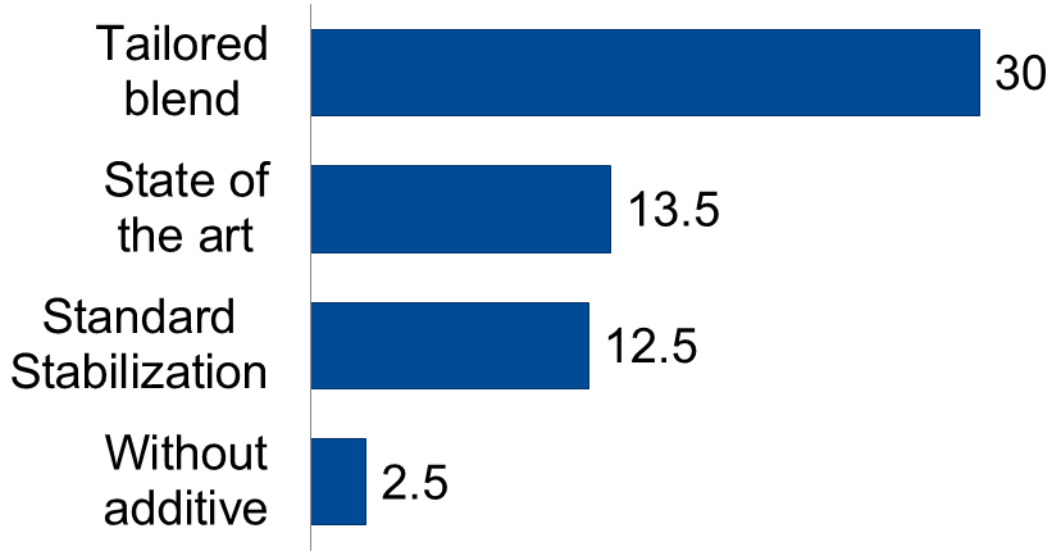
Preservation of color during application

Color development of hot melt formulations

hrs at 177°C	Without additive	Standard stabilization	State of the art blend	Tailored blend for HMA
0				
16				
24				

Gardner Color acc. ASTM D 6166

Hours to Gardner Color No. 12



Long term color retention enables longer usage times

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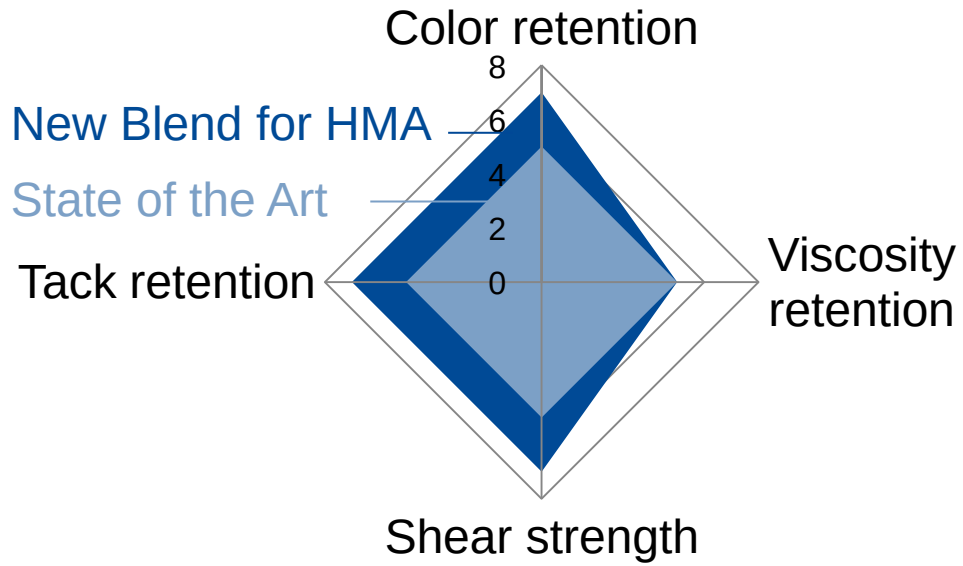
BASF additives help you to achieve your target

- Degradation impacts
  - ▶ Color
  - ▶ Viscosity
  - ▶ Tack
- All parameters to be considered for selection of best additive package
- Focus on tack as selection criteria enables better stabilization



Remarks:

1. Artificial units
2. Higher numbers indicate better performance

Stabilizers tailored to hot melt adhesive compositions improve retention of adhesive properties

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150 years

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