

Polymer Additives for Plastics

ANTISTATIC AGENTS FOR POLAR PLASTICS

CLARIANT 

Confidential

Emilie Meddah
BL Polymer Additives
Global Technical Assistance
16.05.2014

what is precious to you?

Antistatic Agents for Polar Plastics

Hostastat^{®*} FA 14

Hostastat^{®*} FA 24

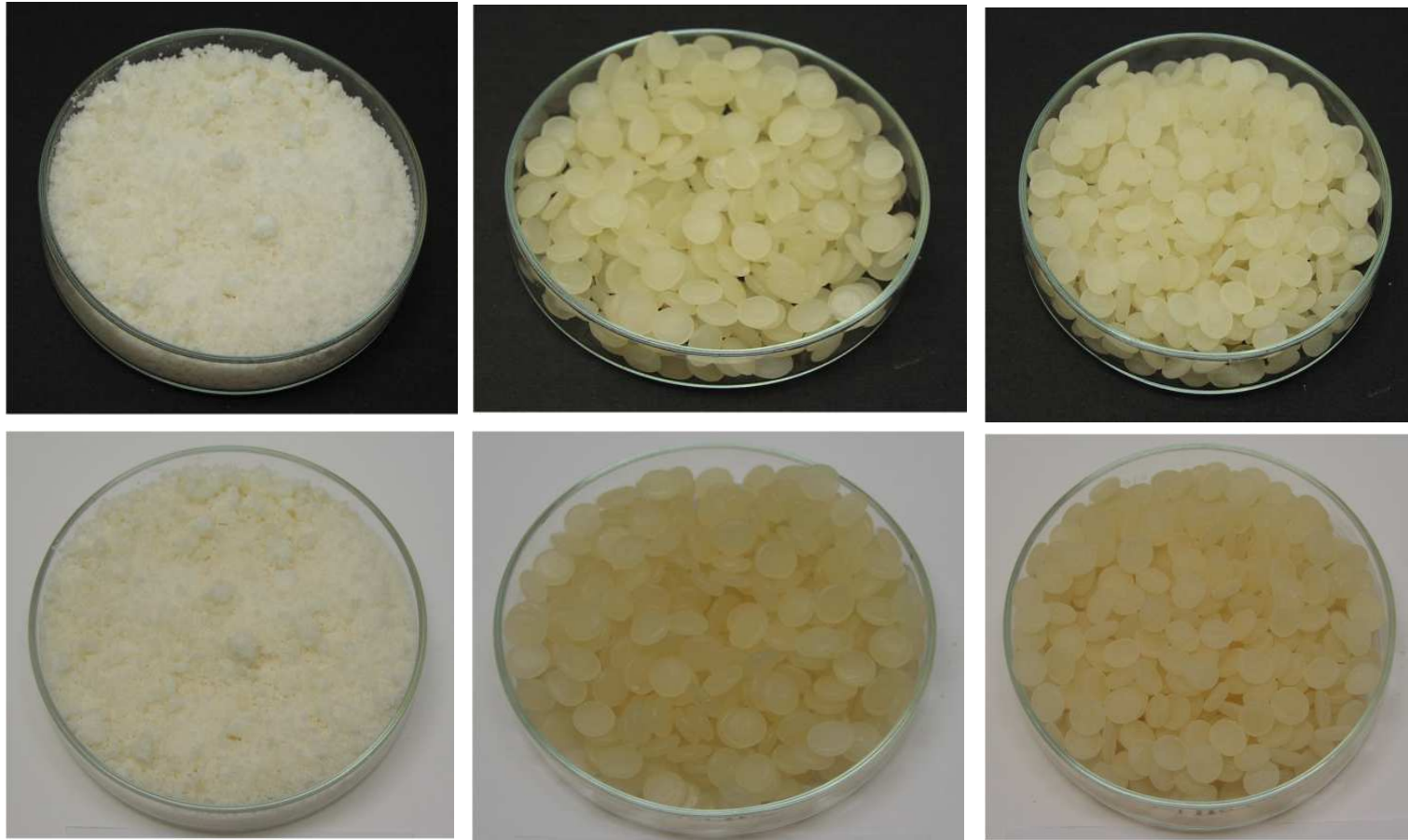
Hostastat^{®*} FE 20

Hostastat^{®*} HS 1

© Trademark registered by Clariant in numerous countries

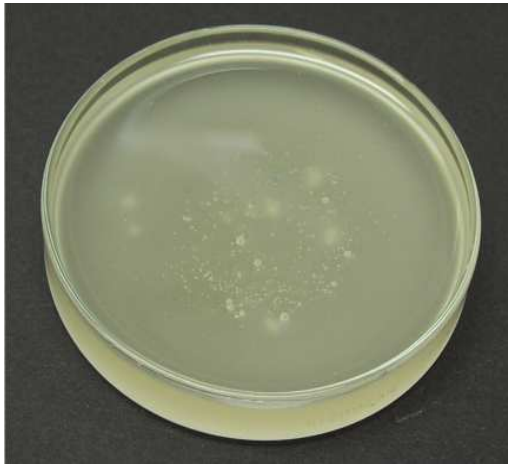
®* Trademark licensed to Clariant in numerous countries

Hostastat HS 1 Fine Grain / Pills / Zn Pills Appearance



Hostastat FE 20, Hostastat FA 14 and FA 24 Appearance

Hostastat FE 20



Hostastat FA14



Hostastat FA 24



Recommendation & Suitability

Standard Plastics	PS	PS-HI	PVC	ABS/ SAN	PET/ PBT	PA	PC	POM	TPU
Hostastat FA 14 / FA 24	○	○		●					
Hostastat FE 20	● 2)	●	●						
Hostastat HS 1	● 1)	●	●	●	○	○	○	●	○

● = Main application

○ = Applicable

1) for opaque PVC applications

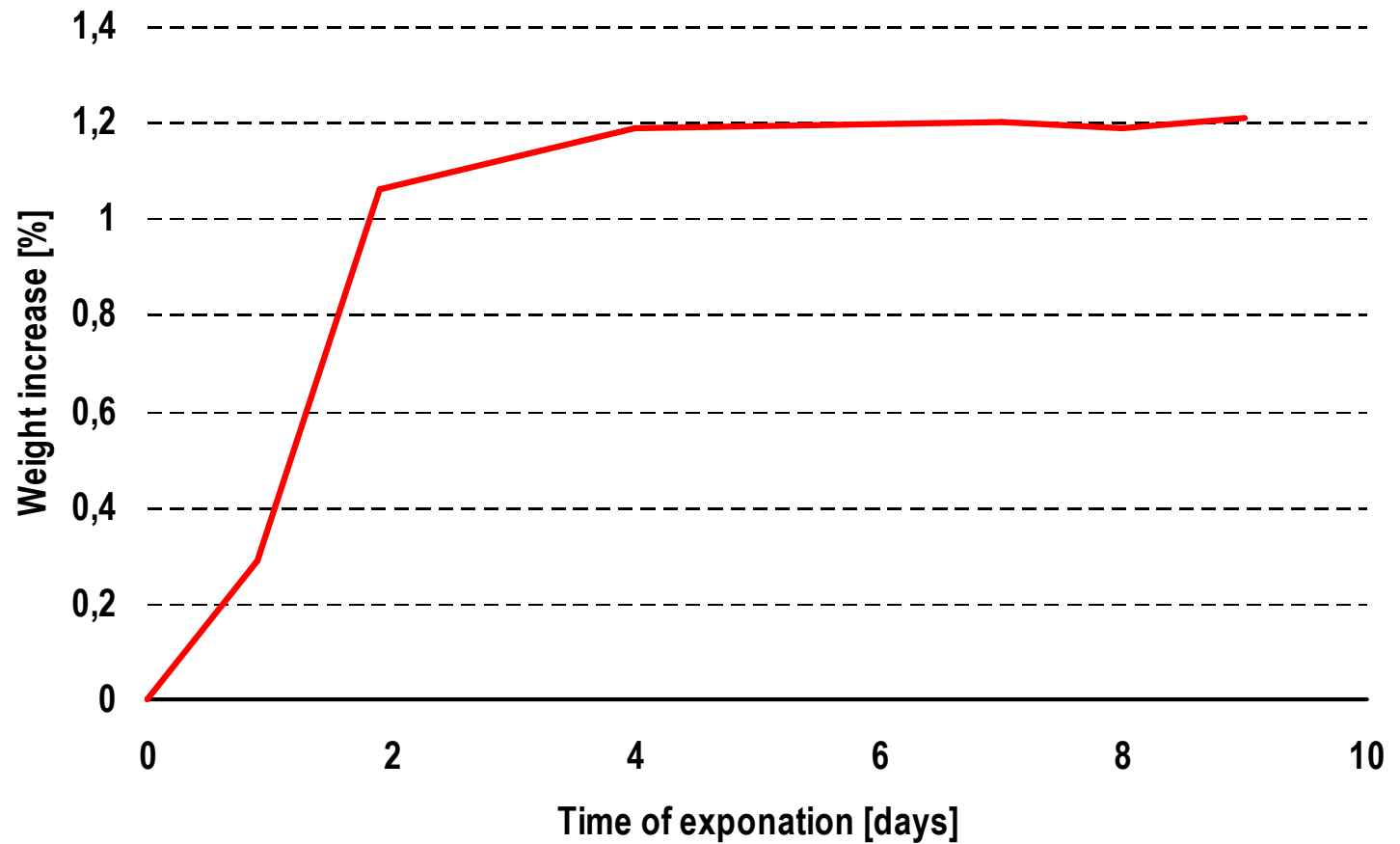
2) for transparent PVC applications

Hostastat HS 1 in Polar Plastics General Recommendation Table



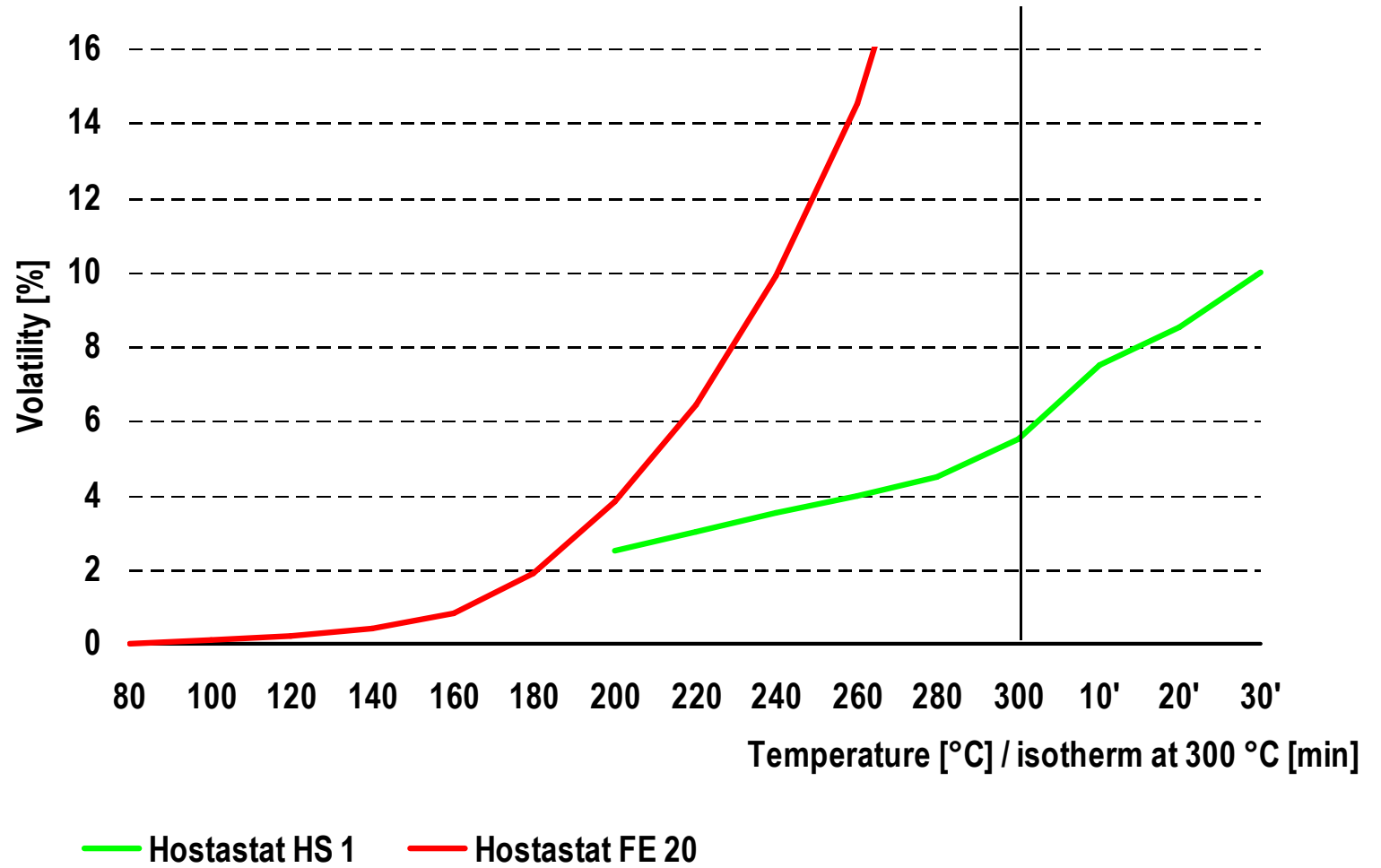
Polymer	Dosage [phr]	Achievable Effects (reduction of surface resistivity / static decay time)	Remark
PA 6.6 PA 6	2-3	from $10^{13} \Omega$ / > 180 sec. to $10^9 \Omega$ / ~ 10 sec.	the hygroscopic behaviour of PA leads to a low surface resistivity itself
PC	2	from $10^{14} \Omega$ / > 180 sec. To $10^9 \Omega$ / ~ 2 sec.	strong colour influence not for transparent application
PET	2-3	from $10^{15} \Omega$ to $10^{13} \Omega$	not transparent colour influence
PBT	2-3	from $10^{13} \Omega$ / > 180 sec. to $10^{10} \Omega$ / ~ 4 sec.	only small colour influence (ΔYI approx. 3)
POM	2	from $10^{14} \Omega$ / ~ 120 sec. to $10^{12} \Omega$ / < 1 sec.	only small colour influence
TPU	1	from $10^{15} \Omega$ to $10^{11} \Omega$	only small colour influence
PS/ABS	2-3	from $10^{15}/10^{14} \Omega$ / > 180 sec. to $10^9/10^{10} \Omega$ / < 5 sec.	not for transparent application only small colour influence

Weight Increase of Hostastat HS 1 23 °C at 50 % rel. Humidity



Test: 2 g fine grain distributed on 9.6 cm²

Volatilities



Thermogravimetry: 1 l air/min, sample size 500 mg, surface 3 cm², heating rate 2 K/min.

Antistats in PVC

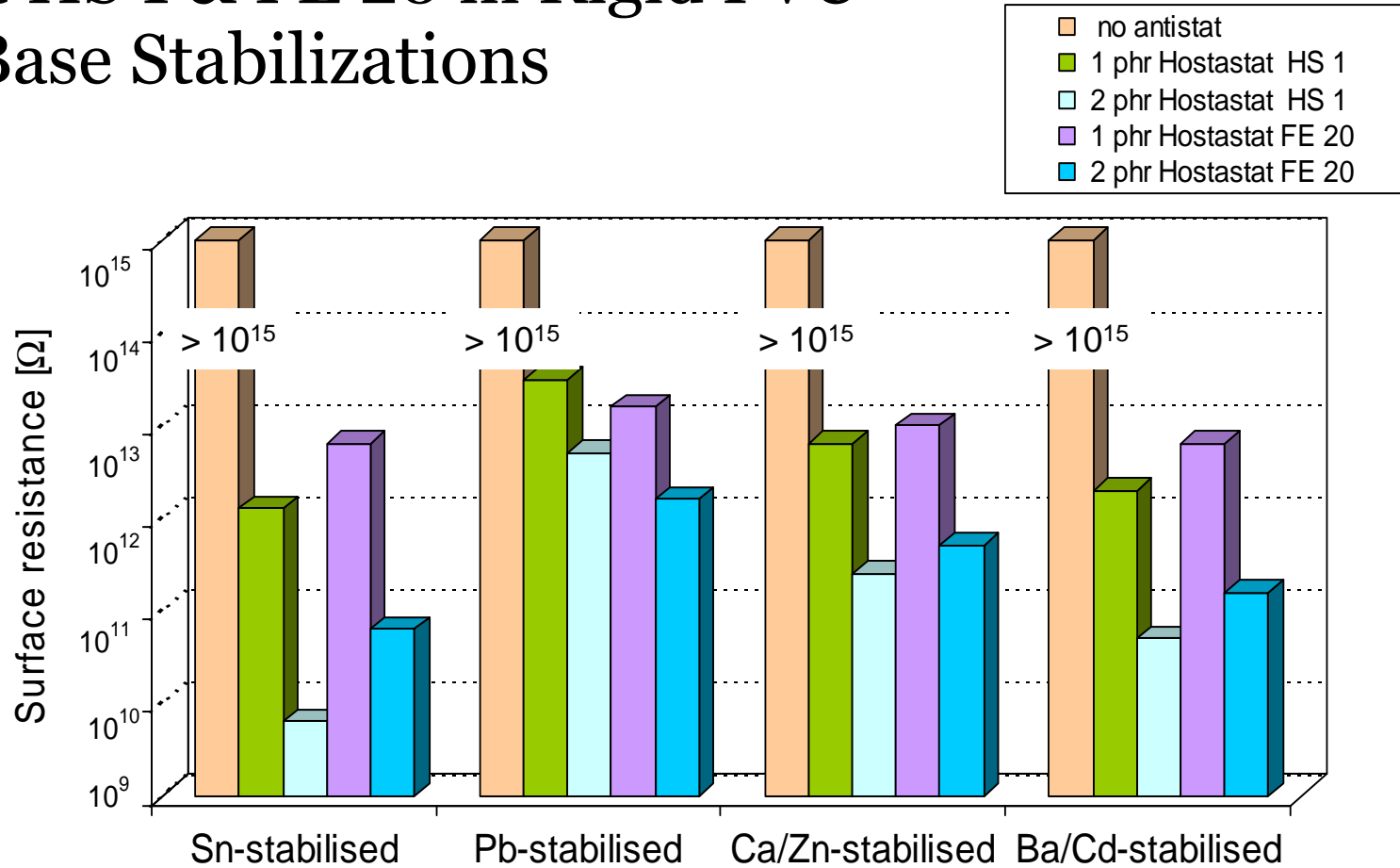
Scope of the Tests

Surface resistance

- Rigid PVC different stabilizations (Sn, Pb , Ca/Zn & Ba/Cd)
- Semi- Rigid PVC different stabilizations (Sn, Pb , Ca/Zn & Ba/Cd)
- Flexible PVC different stabilizations (Sn, Pb , Ca/Zn & Ba/Cd)

- Influence on transparency different products
(+ surface resistance)

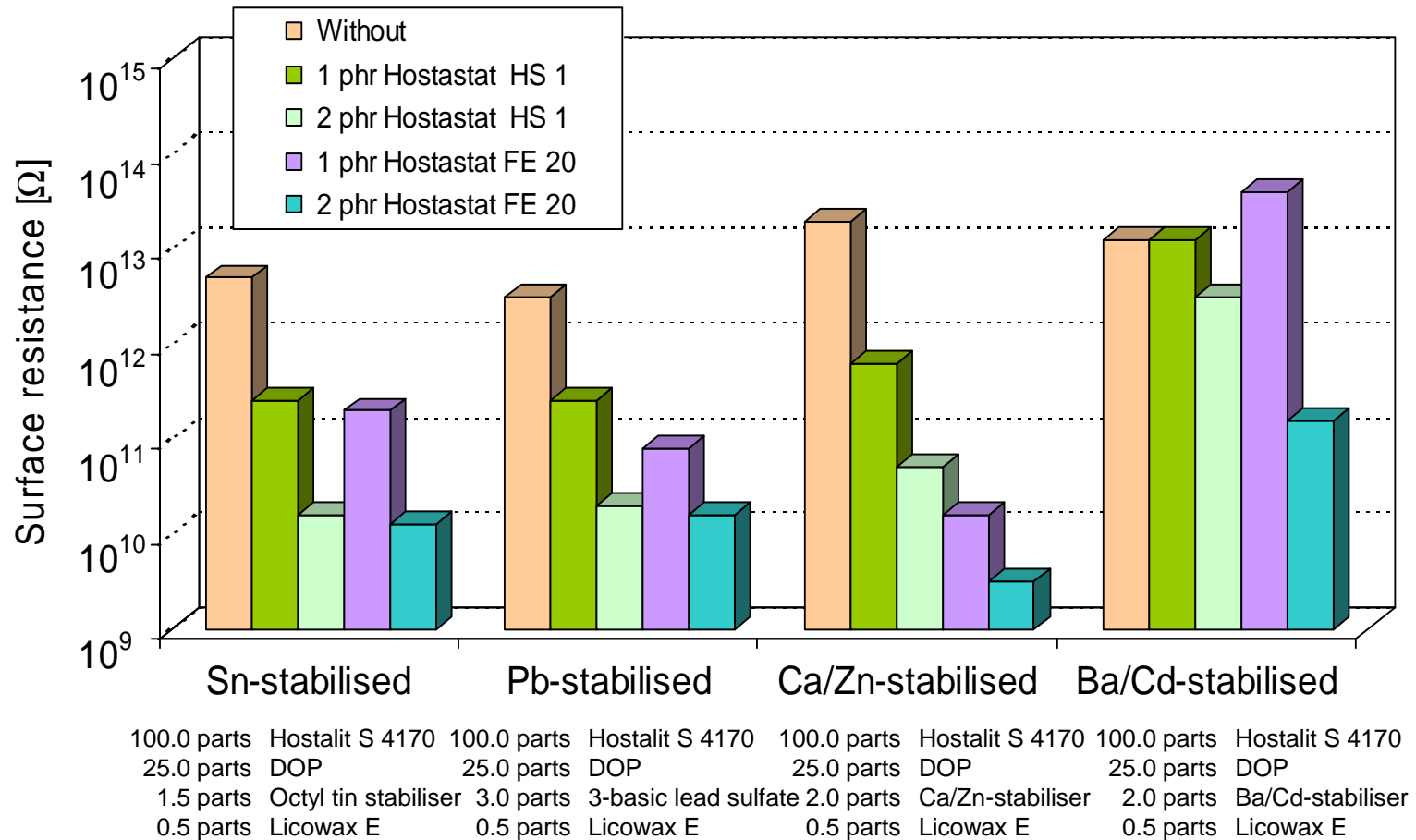
Hostastat HS 1 & FE 20 in Rigid PVC Various Base Stabilizations



100.0 parts	Hostalit S 4170	100.0 parts	Hostalit S 4170	100.0 parts	Hostalit S 4170	100.0 parts	Hostalit S 4170
1.5 parts	Octyl tin stabiliser	3.0 parts	3-basic lead Sulfate	2.0 parts	Ca/Zn-stabiliser	2.0 parts	Ba/Cd-stabilizer
0.5 parts	Licowax E	0.5 parts	Licowax PED 521	0.5 parts	Licowax PED 521	0.5 parts	Licowax PED 521

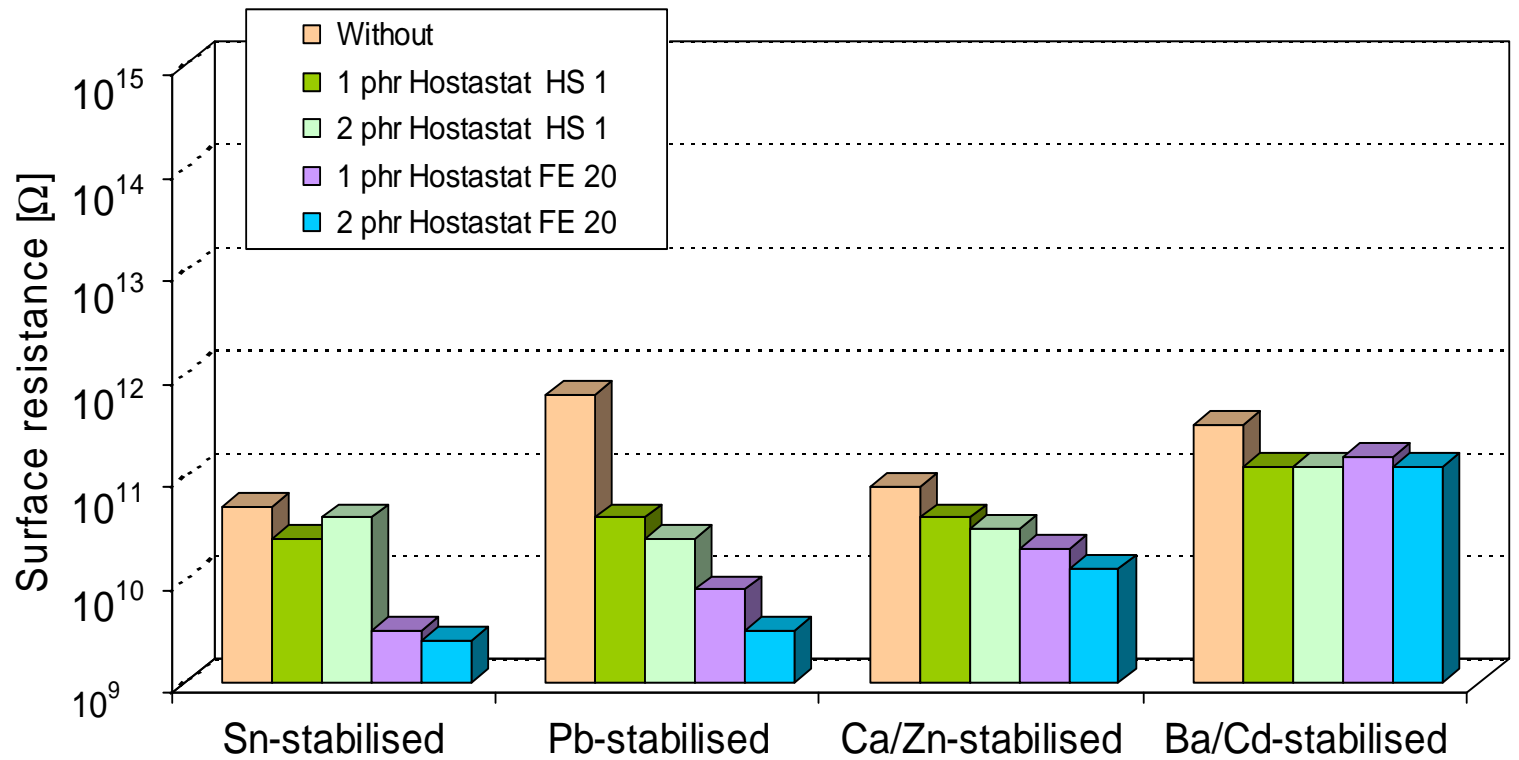
Test: 1 mm pressed sheet, determination after 3 days storage at 23°C/ 50 % rel. humidity

Hostastat HS 1 & FE 20 in Semi-Rigid PVC - Various Base Stabilizations -



Test: 1 mm pressed sheet, determination after 3 days storage at 23°C/ 50 % rel. humidity

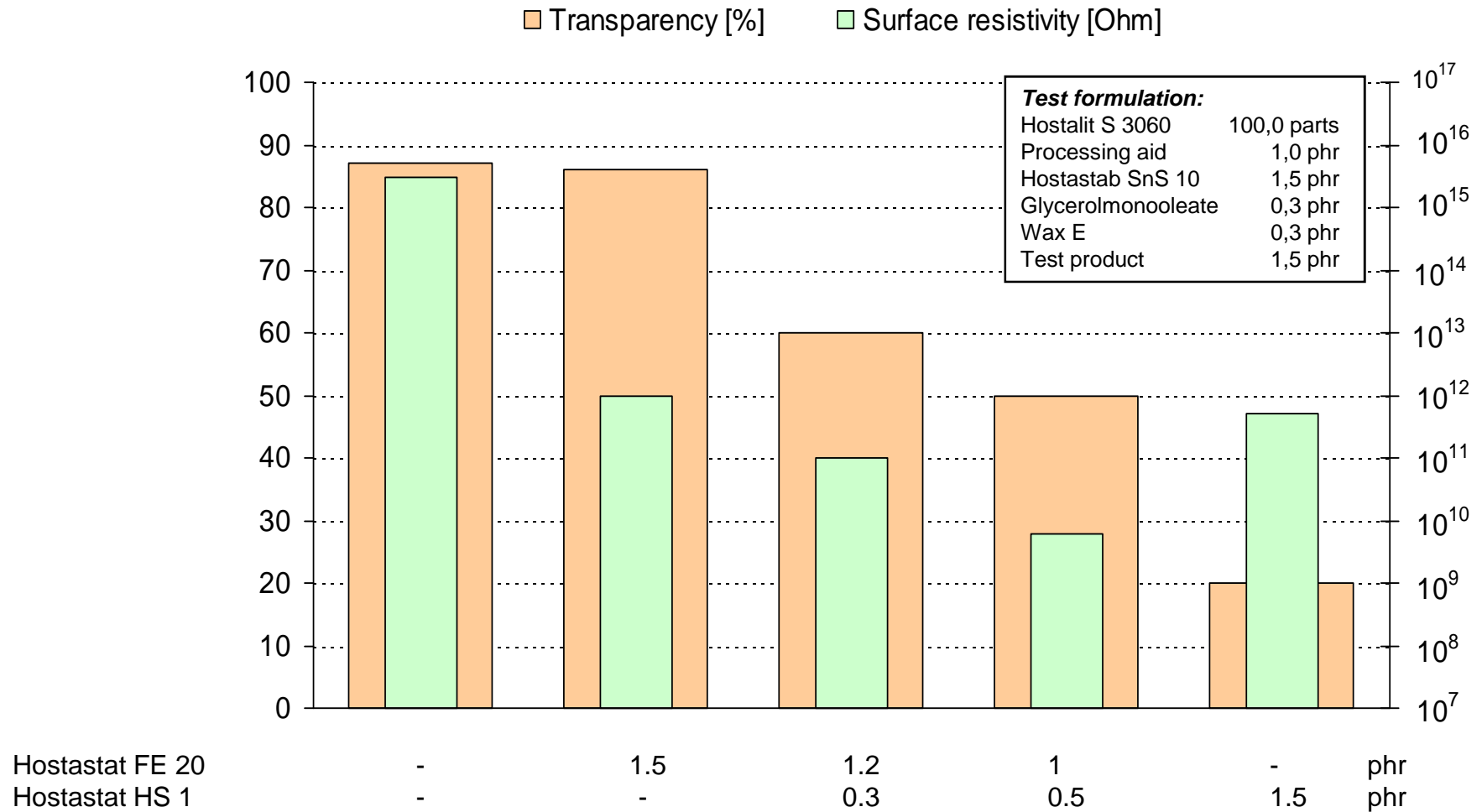
Hostastat HS 1 & FE 20 in Flexible PVC Various Base Stabilizations



100.0 parts	Hostalit S 4170	100.0 parts	Hostalit S 4170	100.0 parts	Hostalit S 4170	100.0 parts	Hostalit S 4170
66.0 parts	DOP	66.0 parts	DOP	66.0 parts	DOP	66.0 parts	DOP
1.5 parts	Octyl tin stabilizer	3.0 parts	3-basic lead sulphate	2.0 parts	Ca/Zn-stabilizer	2.0 parts	Ba/Cd-stabilizer
0.5 parts	Licowax PED 521	0.5 parts	Licowax PED 521	0.5 parts	Licowax PED 521	0.5 parts	Licowax PED 521

Test: 1 mm pressed sheet, determination after 3 days storage at 23°C/ 50 % rel. humidity

Impact of Antistats on Transparency of PVC



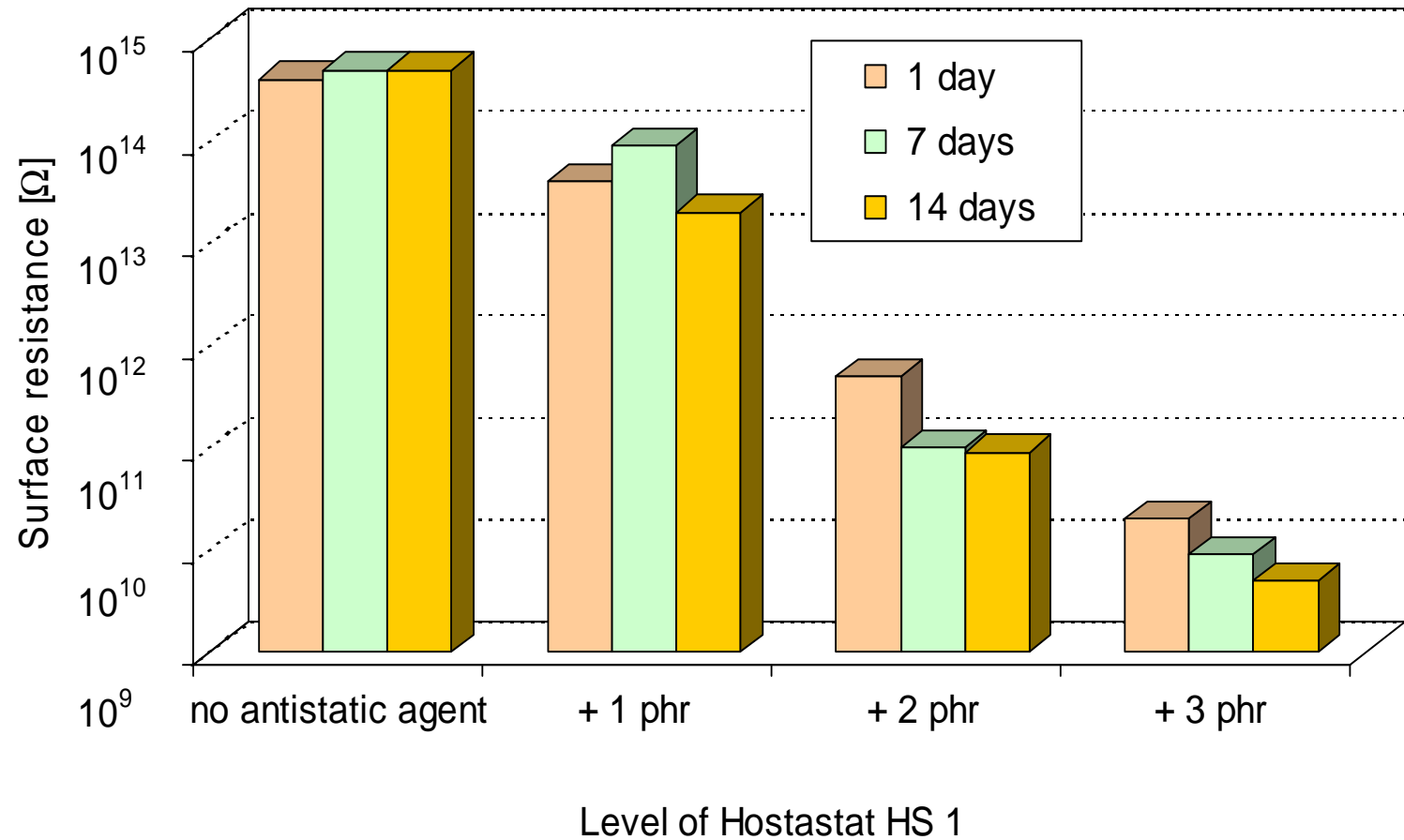
Test: 1 mm pressed sheet, determination after 3 days storage at 23°C/ 50 % rel. humidity

Antistats in Styrenics

Scope of the Tests

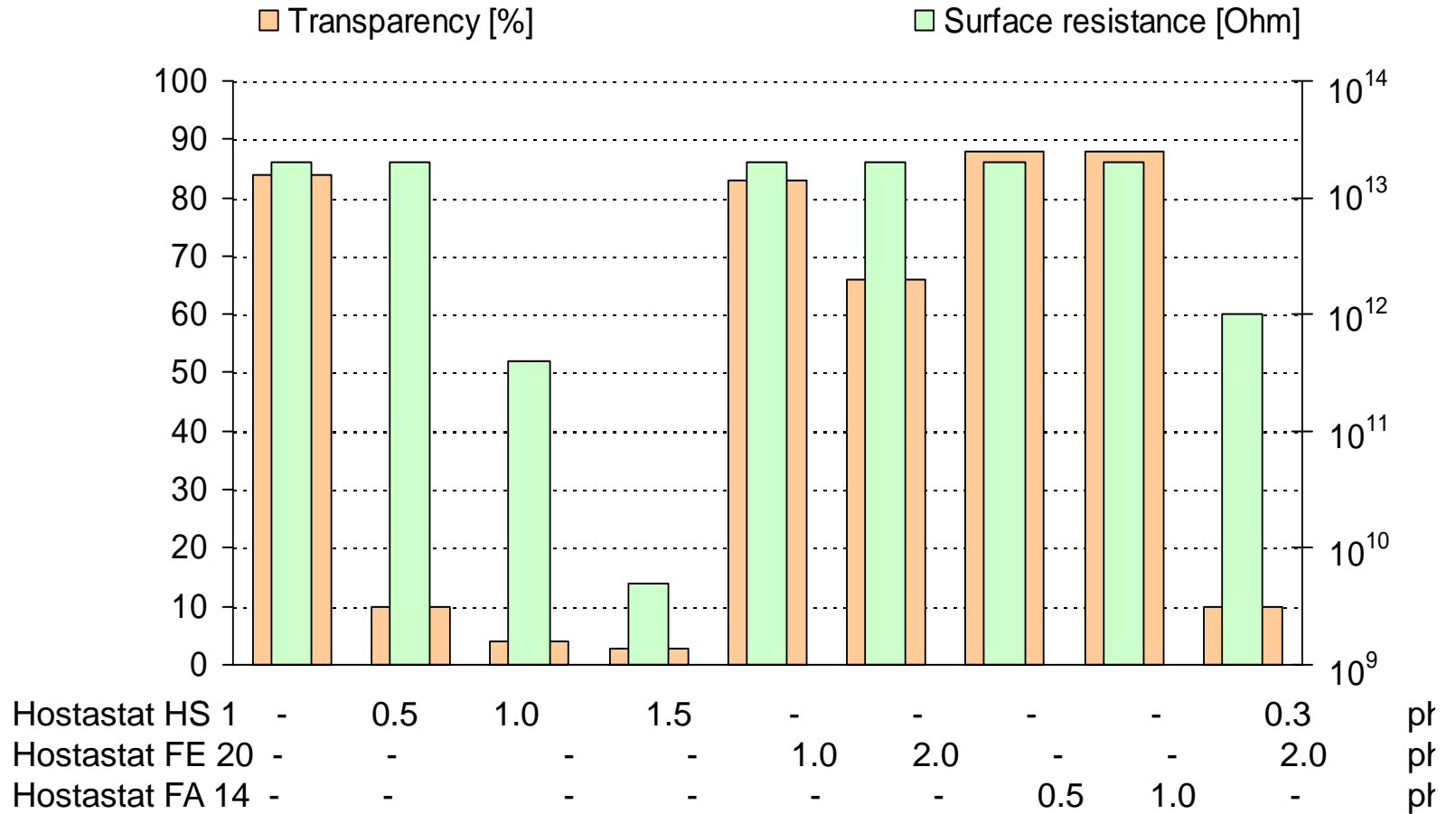
- GP – PS dosage level & storage days
- influence on transparency in a GP - PS
- influence on colour in a GP - PS
- HI – PS dosage level & storage days
- ABS dosage level & products surface resistance & static decay
- SAN dosage level & products surface resistance

Hostastat HS 1 in PS-GP (General Purpose)



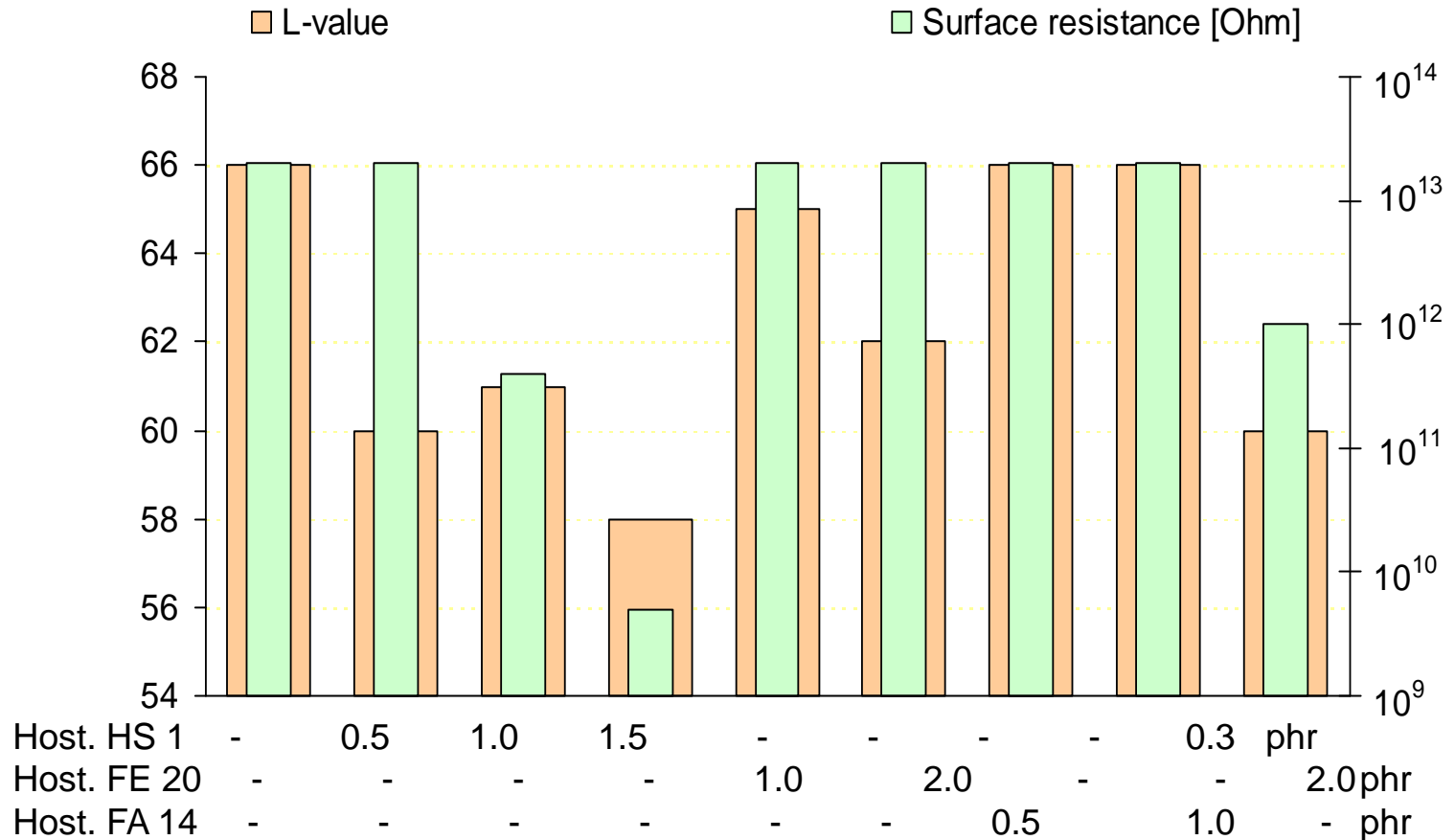
Test: 1 mm injection moulded plates, standardized storage (24h @ 23°C/ 50% rel. humidity)

Impact of Antistats on Transparency of PS-GP



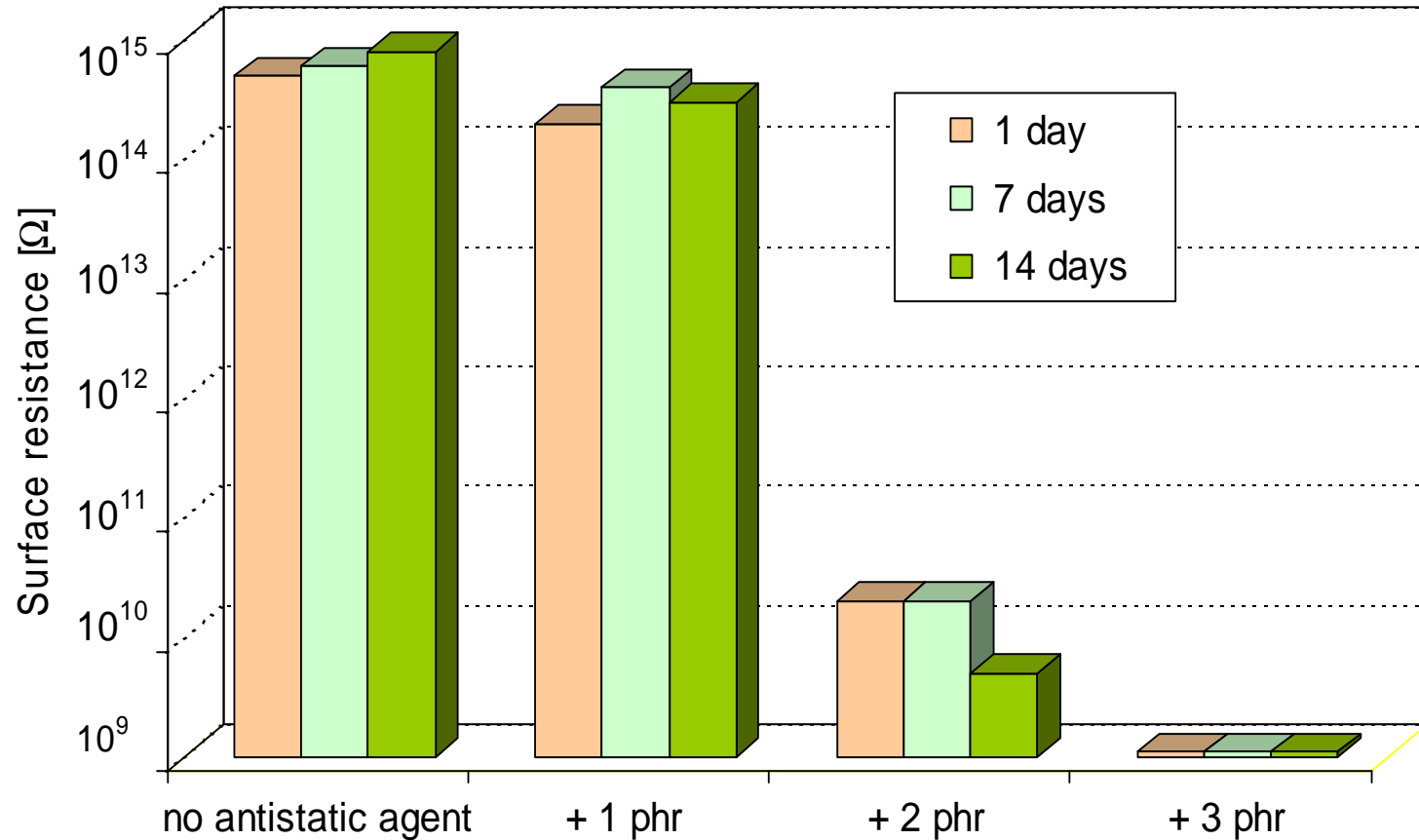
Test: 2 mm injection moulded plates, 7 days 23 °C/ 50 % rel. humidity

Impact of Antistats on Colour of PS-GP



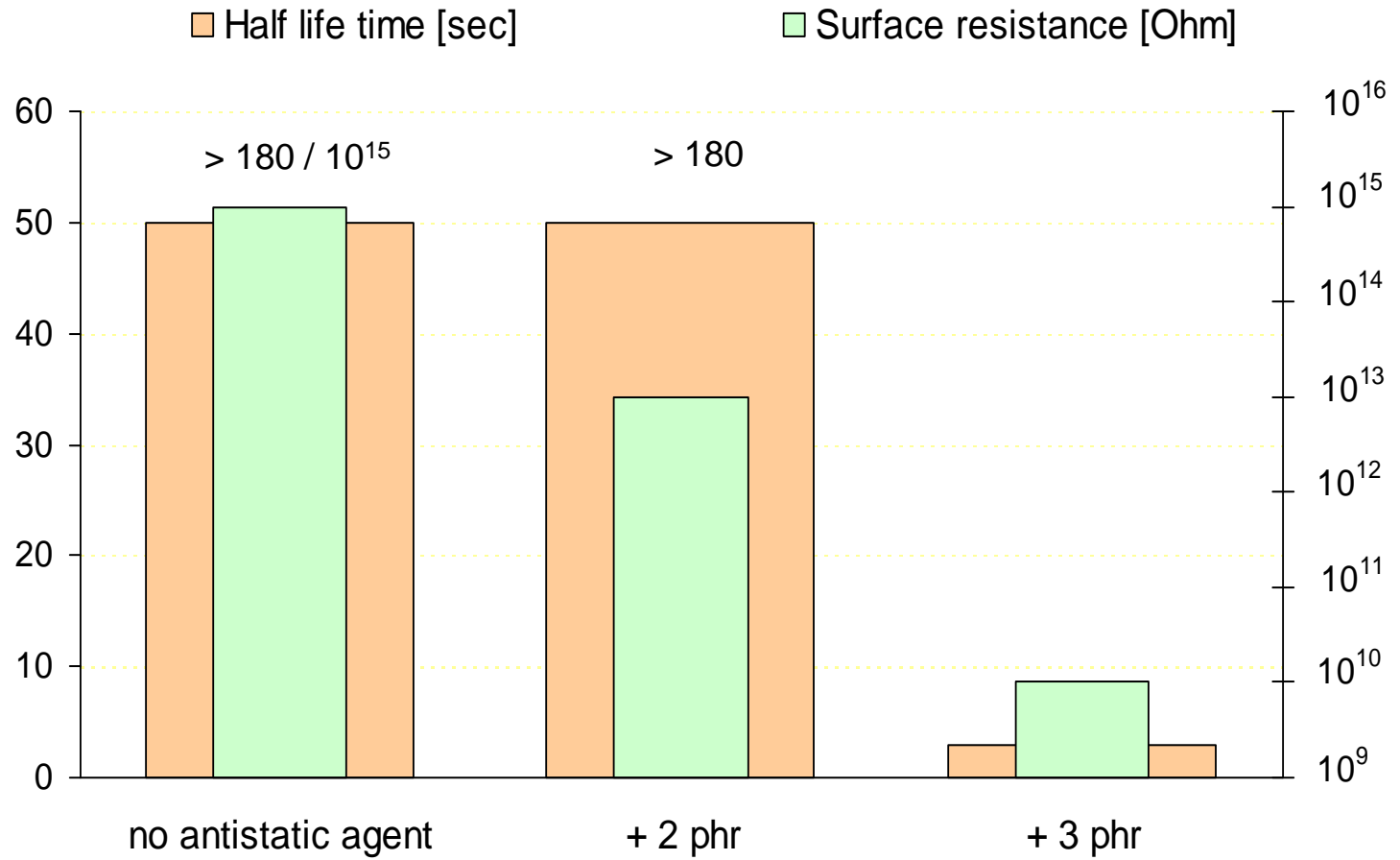
Test: 2 mm injection moulded plates, 7 days 23 °C/ 50 % rel. humidity

Hostastat HS 1 in PS-HI (High Impact)



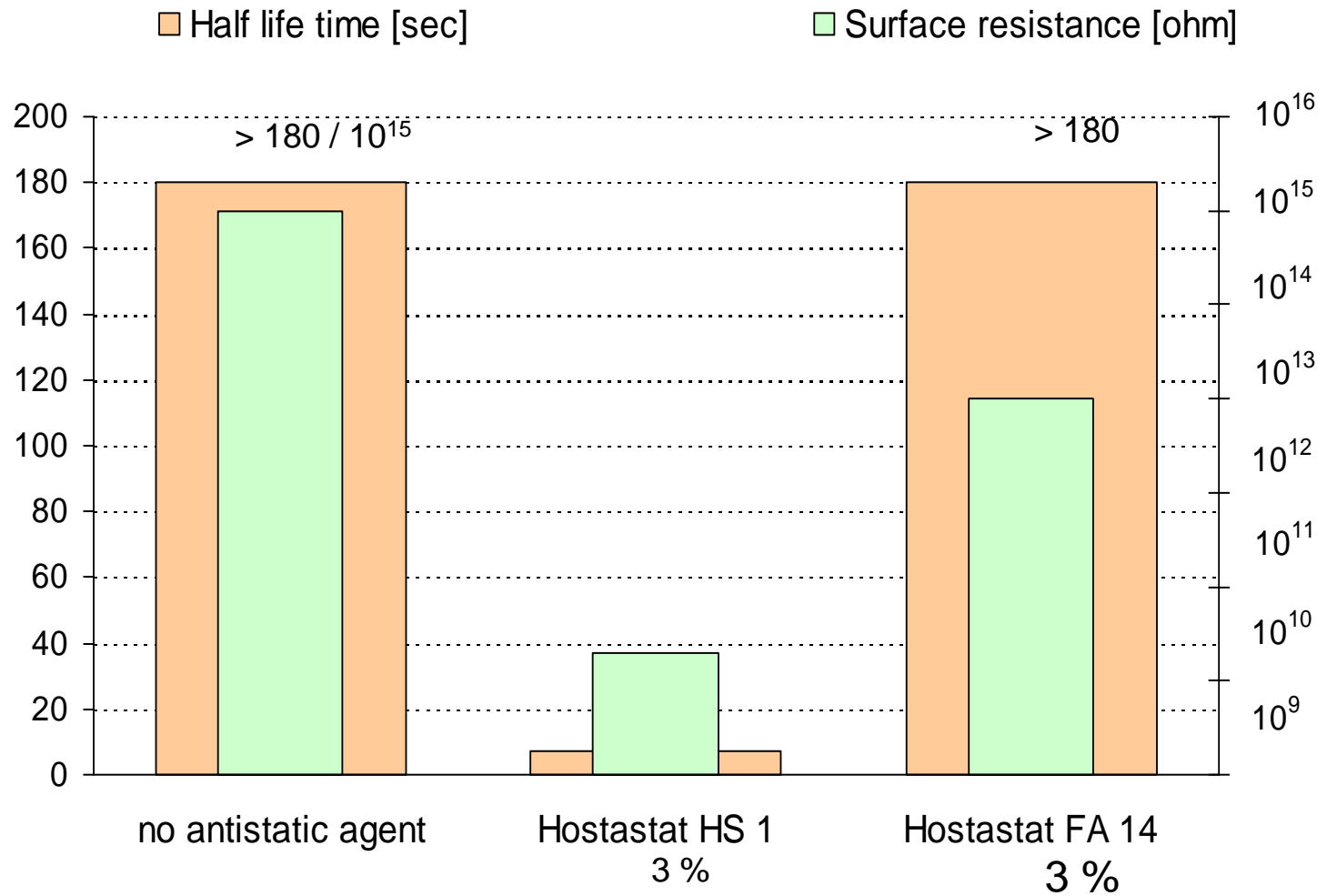
Test: 1 mm injection moulded plates, standardized storage (24h @ 23°C/ 50% rel. humidity)

Hostastat HS 1 in ABS



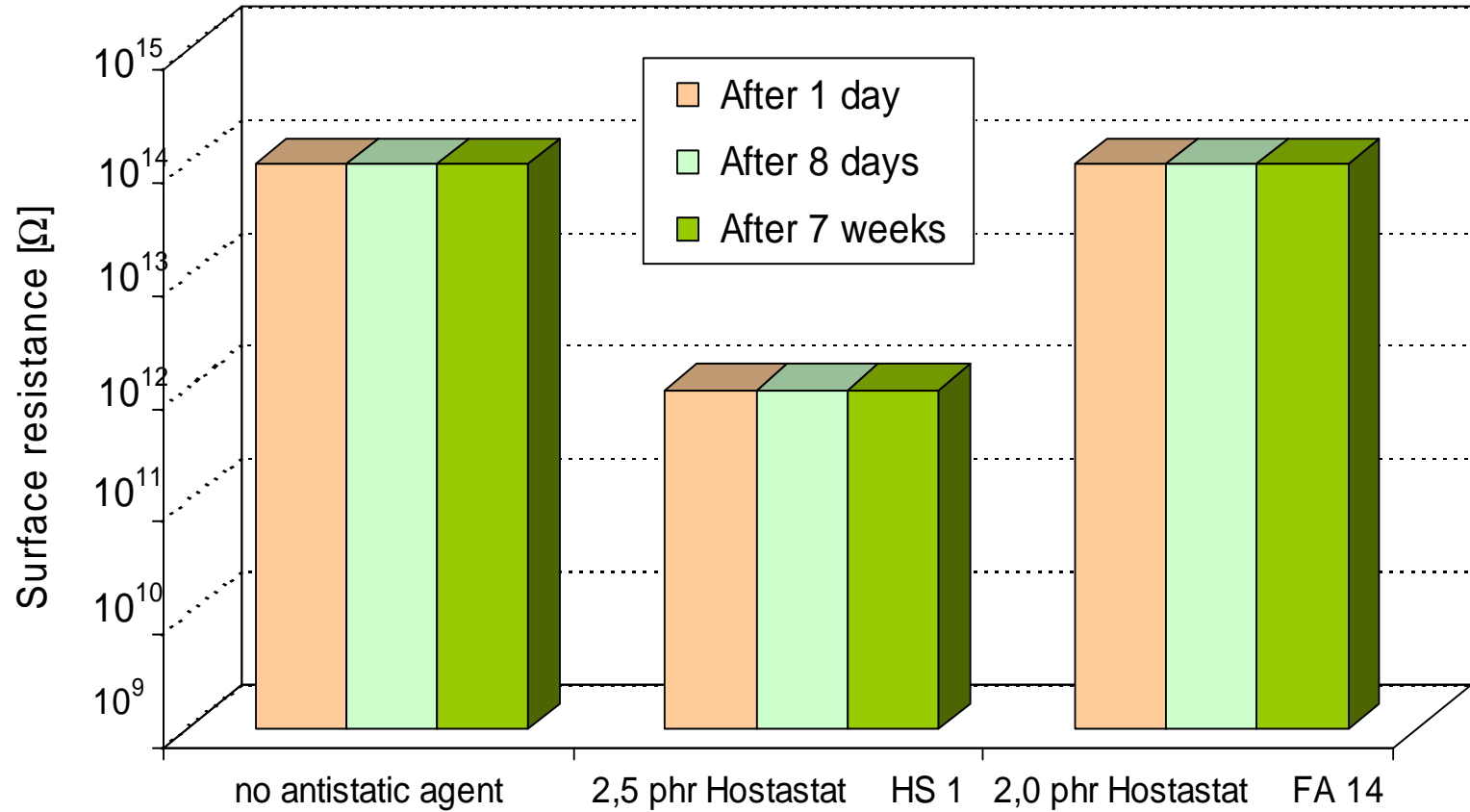
Test: 1 mm injection moulded plates, standardized storage (24h @ 23°C/ 50% rel. humidity)

Ethoxylated Amine vs. Alkylsulfonate in ABS



Test: 1 mm injection moulded plates, standardized storage (24h @ 23°C/ 50% rel. humidity)

Hostastat HS 1 in SAN



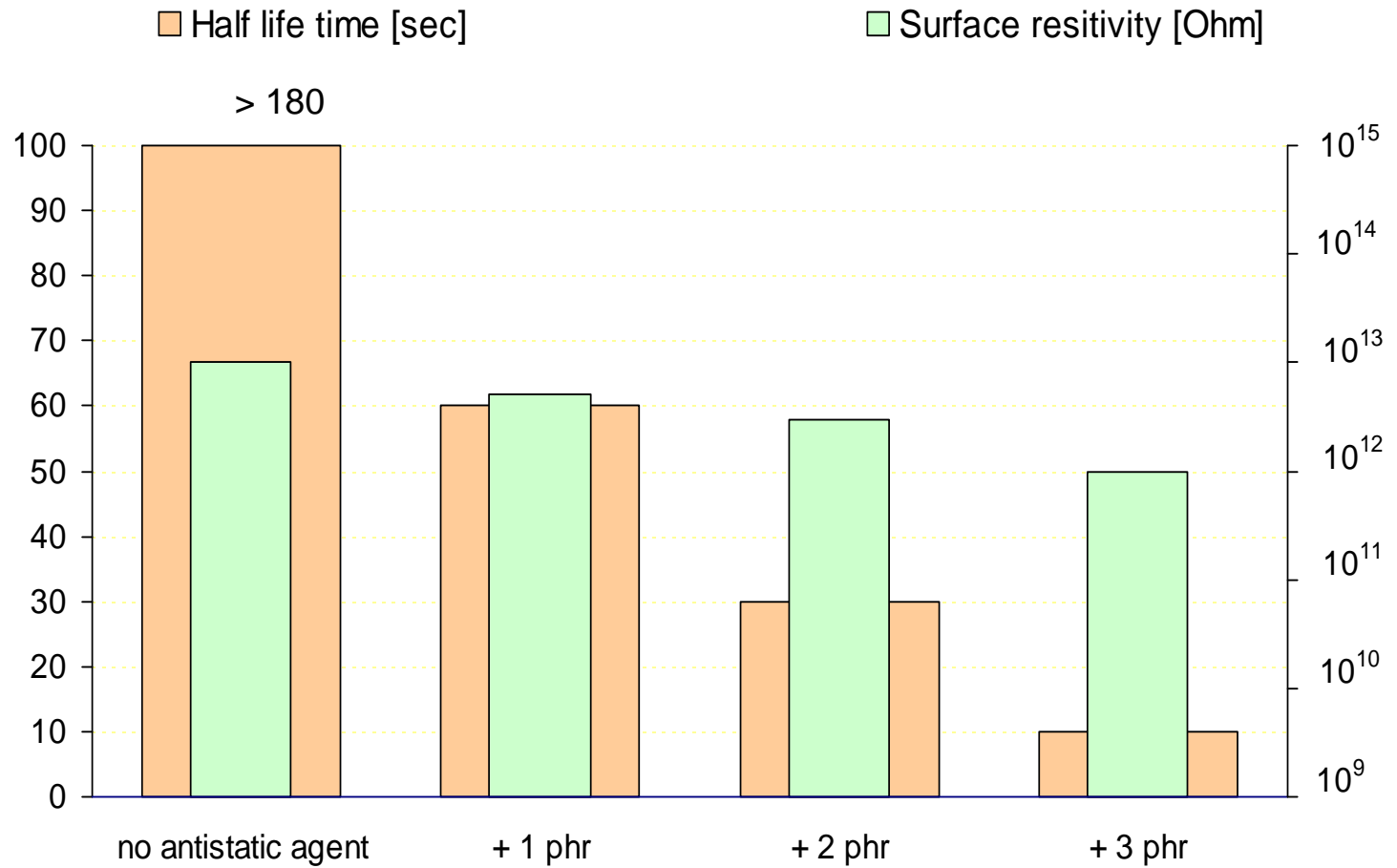
Test: 1 mm injection moulded plates, standardized storage (24h @ 23°C/ 50% rel. humidity)

Antistats in PA

Scope of the Tests

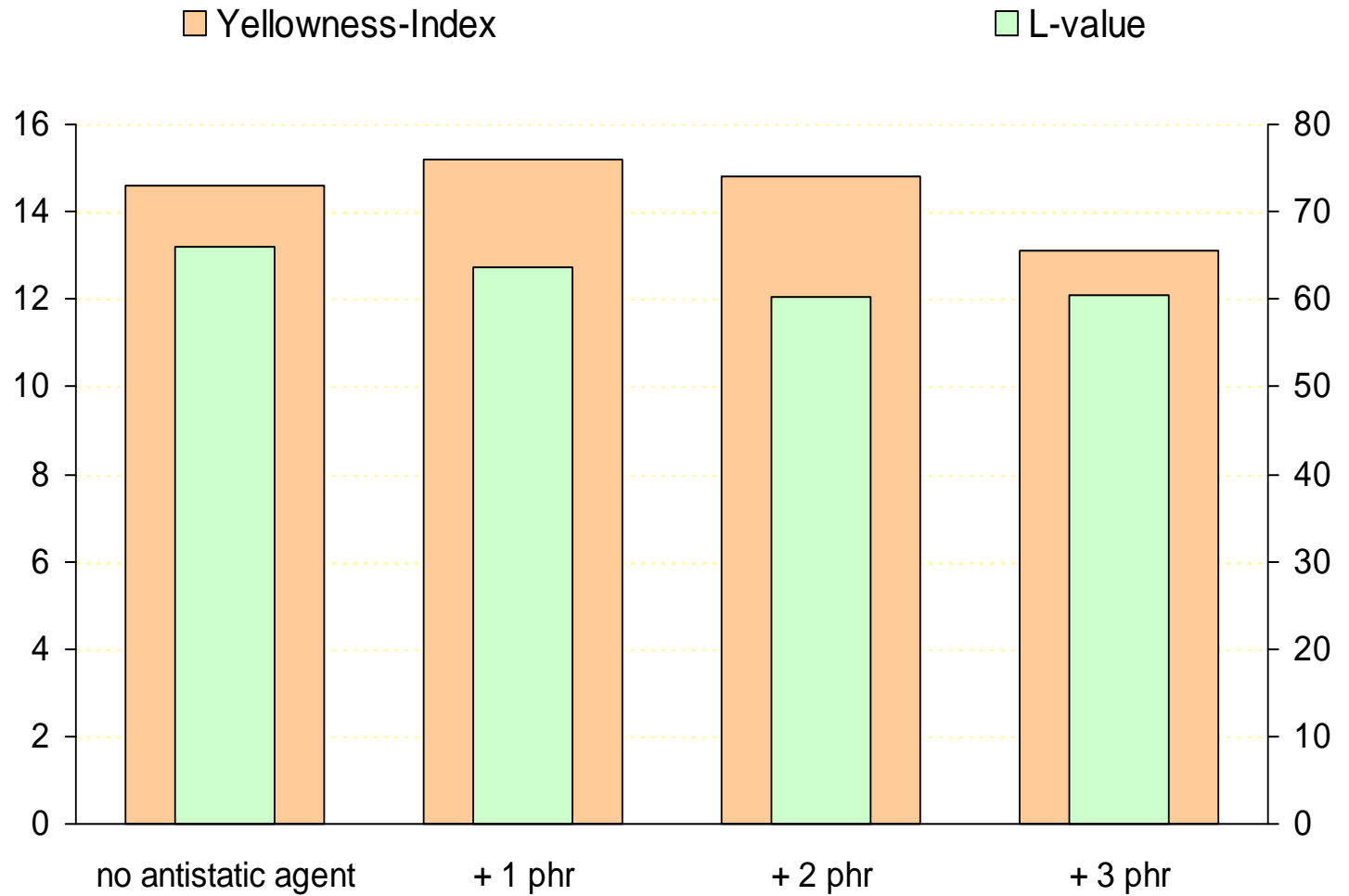
- PA 6.6 dosage level surface resistance & static decay
- PA 6.6 dosage level influence on colour
- PBT dosage level surface resistance & half time
- PBT dosage level colour
- TPU surface resistance
(Polyester and Polyether based on TPU)

Hostastat HS 1 in PA 6.6



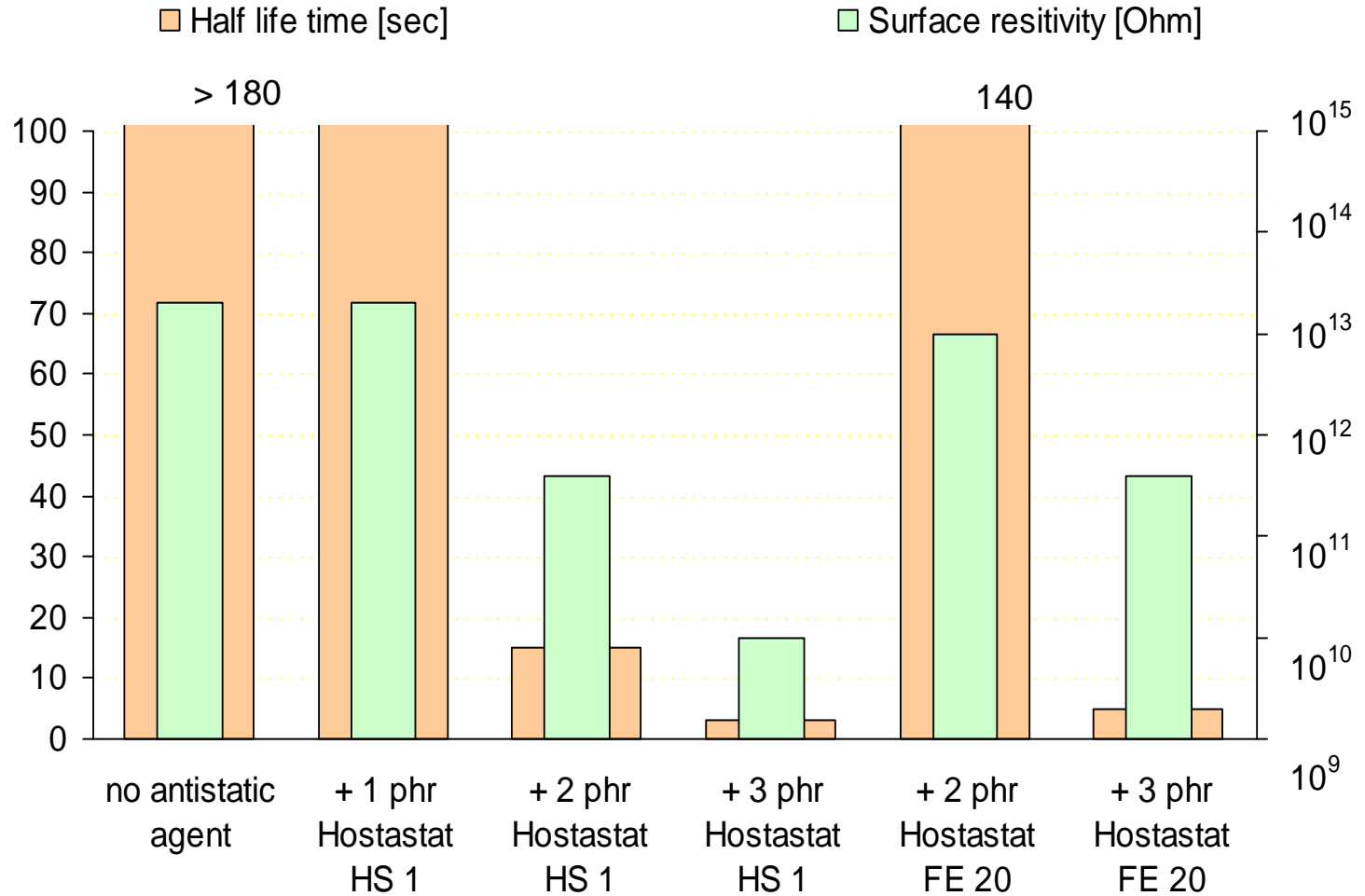
Test: 2 mm injection moulded plates, 2 days 23 °C/ 50 % rel. humidity

Influence of Hostastat HS 1 on Colour of PA 6.6



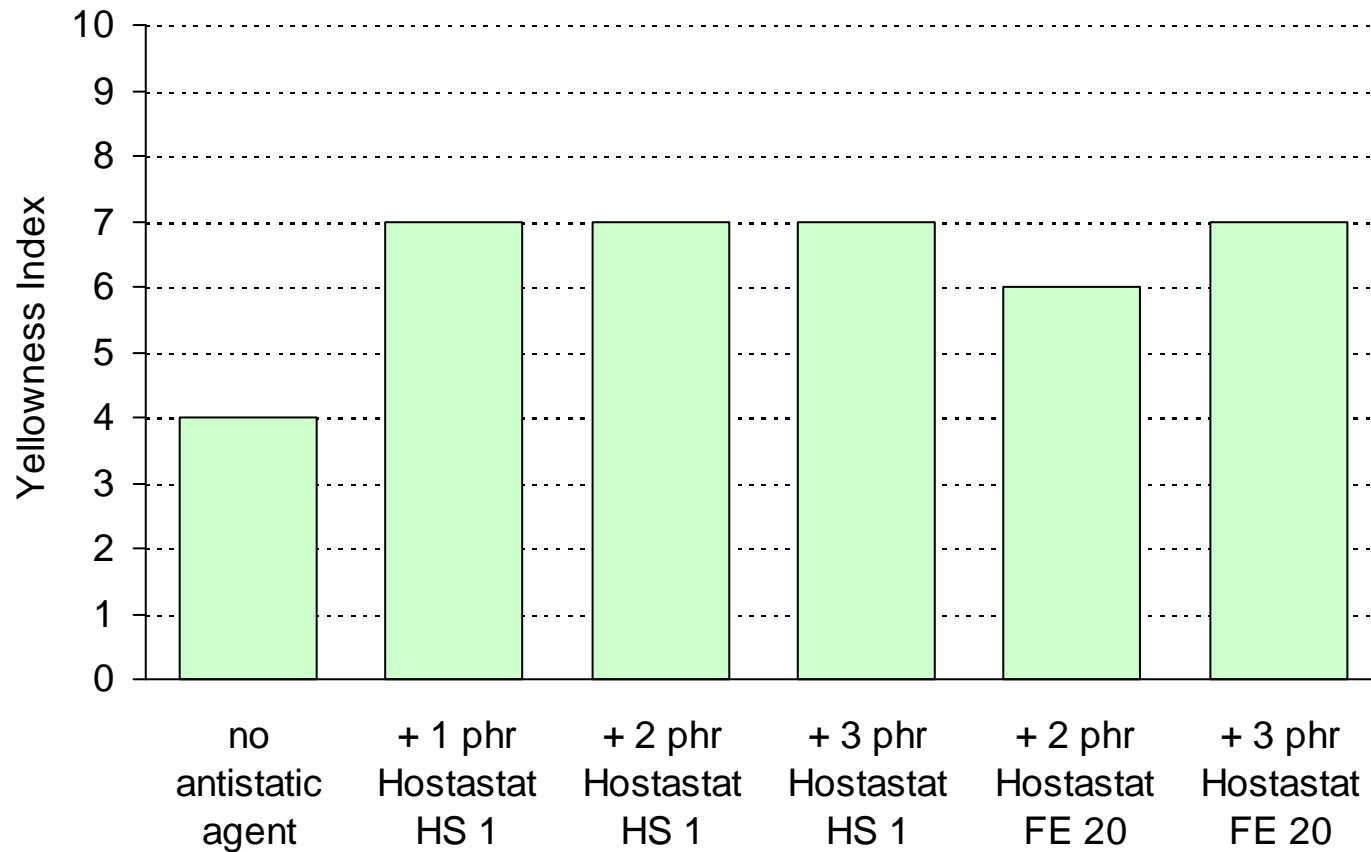
Test: 2 mm injection moulded plates, 2 days 23 °C/ 50 % rel. humidity

Hostastat HS 1 & FE 20 in PBT



Test: 2 mm injection moulded plates, 2 days 23 °C/ 50 % rel. humidity

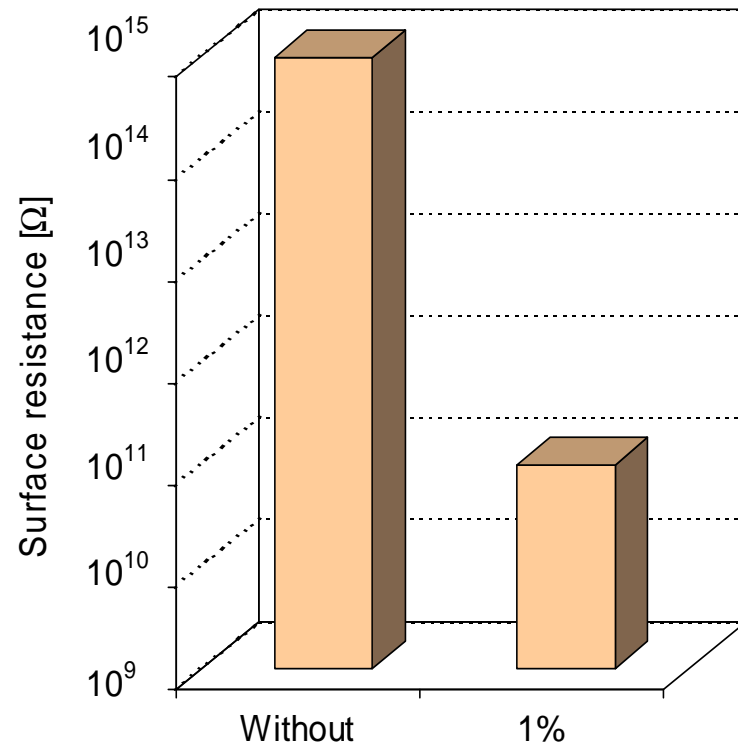
Impact of Antistats on Colour of PBT



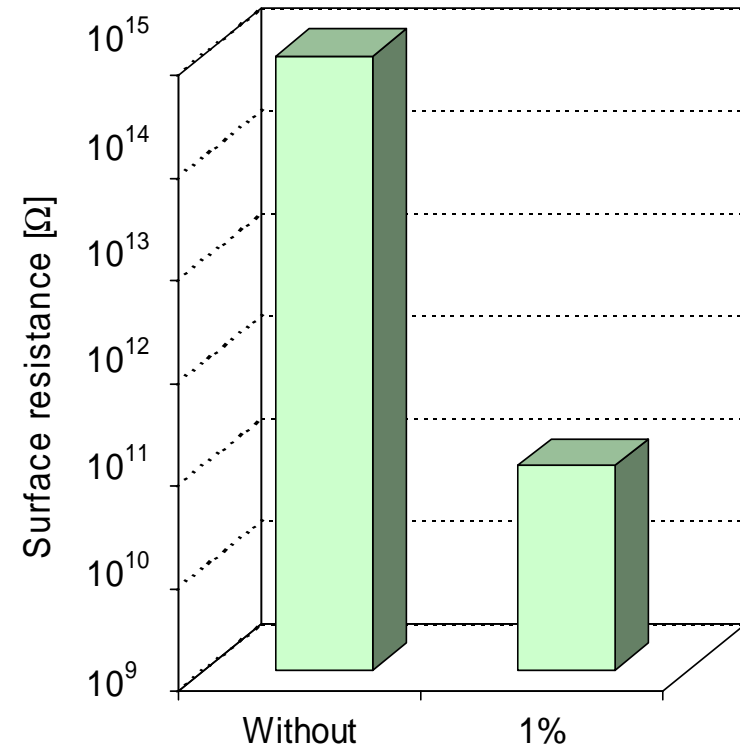
Test: 2 mm injection moulded plates, 2 days 23 °C/ 50 % rel. humidity

Hostastat HS 1 in TPU

Polyether based TPU



Polyester based TPU



Test: 1 mm injection moulded plates, standardized storage (24h @ 23°C/ 50% rel. humidity)

Remarks

For Further Information, Such as:

Testing Methods, Food Approvals,
Antistats for Engineering Resins,
Basic Principles of Electrostatic
Charging and Competition

Please refer to the Presentation
Antistats - Introduction