

JOINT FORCES FOR THE ADVANTAGE  
OF OUR CUSTOMERS

**WACKER PYROGENIC SILICAS - HDK<sup>®</sup>**  
**FOR ELECTROPHOTOGRAPHIC TONER**

# The right HDK<sup>®</sup>

## PYROGENIC SILICA GRADE

### FOR EVERY TONER

Clariant markets and distributes Wacker Pyrogenic Silicas. The comprehensive HDK range satisfies all charge stability and flow requirements. The following tables provide an overview of the offerings.

#### HDK WITH POSITIVE TRIBOCHARGE

HDK		H2015EP	H2050EP	H2150VP	H3050VP
Surface area (BET) hydrophobic <sup>1</sup>	[m <sup>2</sup> /g]	105 ± 25	110 ± 20	110 ± 20	115 ± 35
pH <sup>2</sup>		7 - 9	8 - 9	8 - 9	7.5 - 9
Tamped density <sup>3</sup>	[g/l]	approx. 200	approx. 200	approx. 150	approx. 130
Carbon content	[wt %]	approx. 5	approx. 7	approx. 7	approx. 7
Primary particle size distribution d <sub>50</sub> (mean) <sup>4</sup>	[nm]	12	10	10	8
Agglomerate particle size d <sub>50</sub> (mean) <sup>5</sup>	[µm]	< 20	< 20	< 20	< 20
Residual SiOH <sup>6</sup>	[%]	20	16	16	18
q/m <sup>7</sup>	[µC/g]	approx. +25	approx. +50	approx. +110	approx. +90
Surface modification		PDMS/-NR <sub>2</sub> /-NR <sub>3</sub> +	PDMS/-NR <sub>2</sub> /-NR <sub>3</sub> +	PDMS/-NR <sub>2</sub> /-NR <sub>3</sub> +	PDMS/-NR <sub>2</sub> /-NR <sub>3</sub> +

HDK		H05TA	H13TA	H30TA	H13TP
Surface area (BET) hydrophobic <sup>1</sup>	[m <sup>2</sup> /g]	50 ± 20	125 ± 15	300 ± 30	125 ± 15
pH <sup>2</sup>		7 - 9	7 - 9	7 - 9	9 - 11
Tamped density <sup>3</sup>	[g/l]	approx. 100	approx. 70	approx. 50	approx. 50
Carbon content	[wt %]	approx. 2	approx. 4	approx. 7	approx. 2.5
Primary particle size distribution d <sub>50</sub> (mean) <sup>4</sup>	[nm]	50	20	8	20
Agglomerate particle size d <sub>50</sub> (mean) <sup>5</sup>	[µm]	< 20	< 20	< 20	< 20
Residual SiOH <sup>6</sup>	[%]	< 20	< 20	< 20	< 20
q/m <sup>7</sup>	[µC/g]	approx. +50	approx. +100	approx. +200	approx. +200
Surface modification		PDMS/-NR <sub>2</sub> /-NR <sub>3</sub> +	PDMS/-NR <sub>2</sub> /-NR <sub>3</sub> +	PDMS/-NR <sub>2</sub> /-NR <sub>3</sub> +	Silane/-NR <sub>2</sub> /-NR <sub>3</sub> +

- 1 DIN ISO 9277; DIN 66131; Hydrophobic BET surface areas do not lend themselves to determinations of particle size
- 2 DIN EN ISO 787-9; 4 % in methanol/water 50:50
- 3 DIN EN ISO 787-11
- 4 Primary particles of silica do not occur as individual units
- 5 Laser diffraction; easily dispersed to submicron sized aggregates in the additive blending step
- 6 Relative silanol content with respect to hydrophilic pyrogenic silica (containing 2 SiOH/nm<sup>2</sup>)
- 7 Blow off vs. ferrite; WACKER method

**Note:** These figures are intended as a guide and should not be used in preparing specifications.

#### Abbreviations:

HMDS = Hexamethyldisilazane = Si-O-Si(CH<sub>3</sub>)<sub>3</sub>  
 PDMS = Polydimethylsiloxane = Si-O-[Si(CH<sub>3</sub>)<sub>2</sub>-O]<sub>x=3-6</sub>(10)

\* Available only in Japan

**HDK WITH NEGATIVE TRIBOCHARGE**

<b>HDK</b>		<b>H1303VP</b>	<b>H2000/4 M*</b>	<b>H2000T</b>	<b>H3004</b>
Surface area (BET) hydrophobic <sup>1</sup>	[m <sup>2</sup> /g]	120 ± 30	120 ± 20	140 ± 30	210 ± 40
pH <sup>2</sup>		6 - 8.5	7 - 9	6 - 8	6 - 8
Tamped density <sup>3</sup>	[g/l]	approx. 180	approx. 220	approx. 200	approx. 120
Carbon content	[wt %]	approx. 2.5	approx. 2.8	approx. 2.8	approx. 4
Primary particle size distribution d <sub>50</sub> (mean) <sup>4</sup>	[nm]	20	18	12	8
Agglomerate particle size d <sub>50</sub> (mean) <sup>5</sup>	[µm]	< 20	< 20	< 20	< 20
Residual SiOH <sup>6</sup>	[%]	18	30	18	20
q/m <sup>7</sup>	[µC/g]	approx. - 350	approx. - 200	approx. - 380	approx. - 410
Surface modification		HMDS	HMDS	HMDS	HMDS

<b>HDK</b>		<b>H05TD</b>	<b>H13TD</b>	<b>H30TD</b>
Surface area (BET) hydrophobic <sup>1</sup>	[m <sup>2</sup> /g]	50 ± 20	125 ± 15	300 ± 30
pH <sup>2</sup>		4 - 7	4 - 7	4 - 7
Tamped density <sup>3</sup>	[g/l]	approx. 100	approx. 70	approx. 50
Carbon content	[wt %]	approx. 1	approx. 3	approx. 6
Primary particle size distribution d <sub>50</sub> (mean) <sup>4</sup>	[nm]	50	20	8
Agglomerate particle size d <sub>50</sub> (mean) <sup>5</sup>	[µm]	< 20	< 20	< 20
Residual SiOH <sup>6</sup>	[%]	< 20	< 20	< 20
q/m <sup>7</sup>	[µC/g]	approx. - 400	approx. - 500	approx. - 550
Surface modification		PDMS	PDMS	PDMS

<b>HDK</b>		<b>H05TM</b>	<b>H13TM</b>	<b>H20TM</b>	<b>H30TM</b>
Surface area (BET) hydrophobic <sup>1</sup>	[m <sup>2</sup> /g]	50 ± 20	125 ± 15	200 ± 30	300 ± 30
pH <sup>2</sup>		5 - 8	5 - 8	5 - 8	5 - 8
Tamped density <sup>3</sup>	[g/l]	approx. 100	approx. 70	approx. 50	approx. 50
Carbon content	[wt %]	approx. 1	approx. 2	approx. 3	approx. 4
Primary particle size distribution d <sub>50</sub> (mean) <sup>4</sup>	[nm]	50	20	12	8
Agglomerate particle size d <sub>50</sub> (mean) <sup>5</sup>	[µm]	< 20	< 20	< 20	< 20
Residual SiOH <sup>6</sup>	[%]	< 20	< 20	< 20	< 20
q/m <sup>7</sup>	[µC/g]	approx. - 450	approx. - 500	approx. - 530	approx. - 550
Surface modification		HMDS	HMDS	HMDS	HMDS

<b>HDK</b>		<b>H05TX</b>	<b>H13TX</b>
Surface area (BET) hydrophobic <sup>1</sup>	[m <sup>2</sup> /g]	50 ± 20	125 ± 15
pH <sup>2</sup>		5 - 8	5 - 8
Tamped density <sup>3</sup>	[g/l]	approx. 100	approx. 70
Carbon content	[wt %]	approx. 1	approx. 3
Primary particle size distribution d <sub>50</sub> (mean) <sup>4</sup>	[nm]	50	20
Agglomerate particle size d <sub>50</sub> (mean) <sup>5</sup>	[µm]	< 20	< 20
Residual SiOH <sup>6</sup>	[%]	< 20	< 20
q/m <sup>7</sup>	[µC/g]	approx. - 450	approx. - 500
Surface modification		HMDS/PDMS	HMDS/PDMS

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