

# ID N° 24582 - Contact Angle Measurement - M4<sup>d+</sup>

## Graphit/Wasser (A6)

6. dynSpeed = 0,3125 [mm/s], Beschl.g = 96 [%] d.h. ~ 21,6 [mm/s]

\*SpeedTest um 21:32:56 #Charakterisierung Sequenz A

Graphit-Elektrode, mit heißem Wasser gewaschen. OFS 940.1mg. [Repetition N°6]

• Graphit-E / Wasser : (20,0°C, 2,3', 20mm, 0,313mm/s - dynamic)

$\Theta_{M,d} = 32_{\pm 3,2}^{\circ}$  CAH  $32^{\circ}$ ,  ${}^a\bar{E}_d = 59,4_{\pm 1,3}$  mN/m  ${}^aH_d = -20,86$  mN/m,  $\bar{B}_{\%,d} = 81,4\%$

## Report

### 1. ===== Introduction =====

**Principle:** The M4 contact angle measurement using the *modified Wilhelmy method* is based on force measurements on a cuboid or cylindrical solid body brought into contact with a liquid surface. The contact line between the solid, the liquid surface, and the gas phase is called the three-phase boundary line (triple line), and the angle at which the liquid surface meets the three-phase boundary line is the contact angle  $\theta$  (theta). The relative position of the three-phase boundary line-above, on, or below the surrounding liquid level-reflects the surface energy characteristics and is indicated by the resulting curvature of the meniscus. The weight of this meniscus curvature is determined gravimetrically, taking buoyancy and kinetic forces into account, and is related to the length of the three-phase boundary line. With perfect wetting ( $\theta=0^{\circ}$ ), this specific force reaches a maximum value, which corresponds to the surface tension of the liquid; with poor wettability ( $\theta>90^{\circ}$ ), however, this wetting force becomes negative. Energetic interactions between the solid and liquid phases are thus made visible through the contact angle. When the solid body is immersed, the *triple line scans the solid surface*, yielding the advancing contact angle ( $\theta_A$ ), and when it is withdrawn, the receding contact angle ( $\theta_R$ ) is obtained - measured by force of wetting. The difference ' $\theta_A - \theta_R$ ' is called the contact angle hysteresis (CAH).

**Physically:** The Wilhelmy equation  $\cos\theta_{(A|R)} = {}^aF / (p \cdot \gamma)$  describes the relationship between the contact angle  $\theta$ , the perimeter of the solid  $p$ , the wetting force  ${}^aF$ , and the surface tension of the liquid  $\gamma$ . Adhesion tension  ${}^aE$  is defined according  ${}^aE_{A,R} = m_{meniscus} \cdot g / p = {}^aF / p = \gamma \cdot \cos\theta = \gamma_s - \gamma_{sl}$

**Practically:** In this measurement, after the position of contact of liquid and solid has been determined, the 'Graphit-E' test specimen is moved into and out of the Wasser liquid at a constant speed attended by 'CLT' (Constant-Level-Technic). This allows the determination of *most accurate dynamic contact angles*. While for each of the selected 542 measurements, the respective contact angle  $\theta_{A,d}$  or  $\theta_{R,d}$  is calculated independently.

**Information:** The IMETER M4 method description, available at <https://imeter.de/?view=article&id=46>, provides information on procedures and calculations.

### 2. ===== Collection of Measurements in this Series Graphit-E / Wasser =====

Tabelle 1.2: Conditions and Results

N°	IDN° ...erData41	$\vartheta$ [°C]	$\Delta\tau$ [min]	$\bar{v}_z$ [mm/s]	$\bar{C}_a$ [1]	$t_{eq.}$ [s]	$\Theta_M$ [°]	CAH [°]	${}^aH$ [mN/m]	${}^a\bar{E}$ [mN/m]	$\pm\sigma$ [mN/m]	$\bar{S}$ [m]/m <sup>2</sup>	$\bar{B}_{\%,Wasser...}$ [%]
1.	245760	20	-61,3	»0,0208«	-	7,48	<44>	<88>	-71,44	38,69	±0,83	-34,3	53,0%
2.	245771	20,008	-8,77	10,0	1,18E-4	27,0	<51>	<100>	-115,8	44,4	±6,2	-28,6	60,8%
3.	245782	20,031	-7,18	<3,68>	-	0,1	<27>	<53>	-38,9	63,1	±2,7	-9,90	86,4%
4.	245793	20,031	-5,68	2,50	3,21E-5	13,4	<24>	<47>	-27,3	63,0	±2,5	-10,00	86,2%
5.	245804	20,024	-4,18	1,25	1,85E-5	9,7	<27>	<53>	-32,70	60,2	±1,1	-12,8	82,4%
6.	245815	20,025	-2,43	0,625	8,79E-6	9,5	23	38	-19,37	63,7	±1,9	-9,30	87,2%
7.	<b>245826</b>	<b>20,028</b>	<b>**0**</b>	<b>0,313</b>	<b>4,15E-06</b>		<b>9,8</b>	<b>32</b>	<b>32</b>	<b>-20,86</b>	<b>59,4</b>	<b>±1,3</b>	<b>-13,6 81,4%</b>
8.	245837	20,018	+3,52	0,156	2,07E-6	12,2	32	40	-26,20	58,0	±1,2	-15,0	79,5%
9.	245848	20,014	+9,43	<0,977>	-	27,6	<23>	<46>	-28,18	64,9	±1,2	-8,10	88,9%
10.	245859	20,002	+11,5	<0,714>	1,00E-5	22,5	34	15	-9,85	60,1	±1,5	-12,9	82,4%
11.	2458610	20	+13,8	<0,365>	4,91E-6	0,2	30	28	-16,7	61,3	±1,7	-11,7	83,9%
12.	2458711	19,99	+17,1	<0,244>*	3,26E-6	20,5	32	38	-24,60	58,4	±1,9	-14,6	80,0%
13.	2458812	20,003	+21,4	<0,213>*	3,04E-6	16,0	32	41	-26,7	58,5	±2,7	-14,5	80,1%
14.	2458913	20,003	+26,0	<0,198>*	2,93E-6	10,6	31	42	-26,77	58,3	±1,2	-14,7	79,8%
15.	2459014	20,003	+30,7	<0,427>*	6,08E-6	12,9	35	33	-23,3	57,5	±2,8	-15,5	78,7%
16.	2459115	19,996	+33,7	<0,594>*	7,98E-6	13,0	36	25	-18,40	57,7	±1,4	-15,3	79,0%
17.	2459216	19,993	+36,1	<0,911>*	1,15E-5	27,3	36	9,0	-6,8	59,4	±2,0	-13,6	81,4%
18.	2459317	20	+38,2	<2,24>*	3,11E-5	26,8	<27>	<53>	-41,8	64,3	±3,0	-8,70	88,1%
19.	2459418	20	+39,9	<6,78>	9,39E-5	13,8	<39>	<78>	-86,5	58,4	±5,5	-14,6	79,9%
20.	2459519	20	+41,2	»0,0263«	-	5,16	31	45	-28,51	58,4	±1,9	-14,6	79,9%
21.	2459620	20	+72,7	»0,0208«	-	7,74	<50>	<90>	-77,3	37,4	±1,4	-35,6	51,2%

This table provides an overview of the measurements in this series. Each separate M4 measurement is referenced by IDN°. The highlighted row indicates the data set of the measurement documented below. The column labeled  $\vartheta$  shows the measurement temperature,  $\Delta\tau$  the time interval to previous/following measurements,  $\bar{v}_z$  the movement speed - where additional symbols clarify: »n« indicates static measurements, <n> represents distance-accelerated movement of the triple line, '\*' stands for continuous acceleration and a number without any symbol indicates a constant movement speed,  $\bar{C}_a$  is the capillary number,  $t_{eq.}$  is the equilibration time before turnaround - but for static measurements the number denotes the average equilibration time as a levelling time between the measurement points,  $\Theta_M$  is the mean of the advancing and receding contact angle, contact angle hysteresis is given in degrees (CAH) and in energy units ( ${}^aH$ ),  ${}^a\bar{E}$  is the mean adhesion energy, and  $\pm\sigma$  is the corresponding standard deviation,  $\bar{S}$  is the mean of the spreading parameter, and  $\bar{B}_{\%,Wasser...}$  indicates the relative wettability ( $B_{\%,lq|sl|md...} = 100 \cdot {}^aE/\gamma$ ).

Tabelle 2.2: Summary of sample weights in the individual measurements (initial weight  $W_0 = 6,3373$  g)

N°	$W_A$ [g]	$\Delta W_{A-0}$ [mg]	$W_E$ [g]	$\Delta W_{E-0}$ [mg]	$V_{E-0}$ [µL]	$\Delta V_{E-A}$ [µL]
1.	6,3373	0,0	6,3530	15,7	15,7	16
2.	6,3530	15,7	6,3680	30,7	30,8	15
3.	6,3679	30,6	6,3630	25,7	25,7	-5,0
4.	6,3629	25,6	6,3595	22,2	22,2	-3,5
5.	6,3595	22,2	6,3570	19,7	19,7	-2,5
6.	6,3570	19,7	6,3553	18,0	18,0	-1,7
7.	<b>6,3553</b>	<b>18,0</b>	<b>6,3543</b>	<b>17,0</b>	<b>17,0</b>	<b>-1,0</b>
8.	6,3544	17,1	6,3538	16,5	16,5	-0,50
9.	6,4574	120,1	6,3564	19,1	19,1	2,6
10.	6,4780	140,7	6,3553	18,0	18,0	-1,1
11.	6,4730	135,7	6,3540	16,7	16,7	-1,3
12.	6,4587	121,4	6,3537	16,4	16,4	-0,30
13.	6,4557	118,4	6,3545	17,2	17,2	0,80
14.	6,4627	125,4	6,3543	17,0	17,0	-0,20
15.	6,4623	125,0	6,3554	18,1	18,1	1,1
16.	6,4766	139,3	6,3566	19,3	19,3	1,2
17.	6,4820	144,7	6,5159	178,6	178,9	160
18.	6,4728	135,5	6,3620	24,7	24,7	-150
19.	6,4765	139,2	6,3639	26,6	26,6	1,9
20.	6,3639	26,6	6,3526	15,3	15,3	-11
21.	6,3374	0,1	6,3538	16,5	16,5	1,2

Symbols:  $W_A$ : Total weight before each measurement,  $\Delta W_{0-A}$ : Change in weight from the initial weight  $W_0$  at the start of the series,  $W_E$ : Total weight after the measurement (possibly including the weight of any adherent fluid),  $\Delta W_{E-0}$ : Change in weight from the initial weight  $W_0$  at the start of the series,  $V_{E-A}$ : Weight change interpreted as fluid volume,  $\Delta V_{E-A}$ : Fluid volume change calculated as the difference between  $W_E$  and  $W_A$ . (Automated weighings without contact to the surface of the fluid).

### 3. ===== Measurement IDN°24582: Dynamic Contact Angle =====

Graphit-E, cylindric Ø8,00mm

20mm Graphit-E \ Wasser,  $\gamma = 73 \text{ mN/m}$

$\vartheta = 20,0^\circ \text{C}$

<b>Contact Angle, CA <math>\theta_{M,d}</math></b>	<b>32 ± 3,2°</b>	$\theta_{c,d} = 32^\circ$	
<b>Contact Angle Hysteresis, CAH<sub>d</sub></b>	32°		
	<b>Advancing <math>\theta_{A,d}</math></b>	<b>Receding <math>\theta_{R,d}</math></b>	<b>Transition 1,114 mm</b>
<b>Contact Angles, <math>\theta_d</math></b>	<b>48°</b>	<b>16°</b>	88,1° <sub>adv.</sub> ⇒ 55,7° <sub>rec.</sub>
Standard deviation $\sigma_\theta$	±1°	±3°	±0,1°
Rated measurements $n_{\text{mm-range}}$	216 2,992 - 15,962mm	326 16,974 - -2,023mm	21 19,614 - 18,500mm
Linear regression, slope [°/mm]	-0,424	0,855	29,0
Correlation coefficient $r^2$	0,66	0,71	0,99981
<b>Triple line speed <math>\bar{v}_z</math> [mm/s]</b>	<b>0,313 ± 0,00124</b>	<b>-0,313 ± 0,00121</b>	
<b>Capillary number <math>Ca</math></b>	<b>4,E-06</b>	<b>-4,29E-06</b>	

Dynamic Contact Angle Measurement: The Contact Angle  $\theta_c$  is calculated from advancing and receding values according to the formula of Tadmore/Chibowski; the average value of advancing and receding Contact Angle is given by  $\theta_m$ . (Derjaguin's Law:  $e \approx 0,0054 \text{ mm}$  deposit layer). The change of the direction from advancing to receding - where the triple line may be pinned and only the angle is changing from advancing to receding - is analyzed within the column "Transition". (CA-Diagramm available)

#### Adhesion Force of the dynamic Triple Line

**Energy of Adhesion,  ${}^a\bar{E}_d = ({}^aE_A + {}^aE_R) / 2$  59,4 ± 1,3 mN/m**

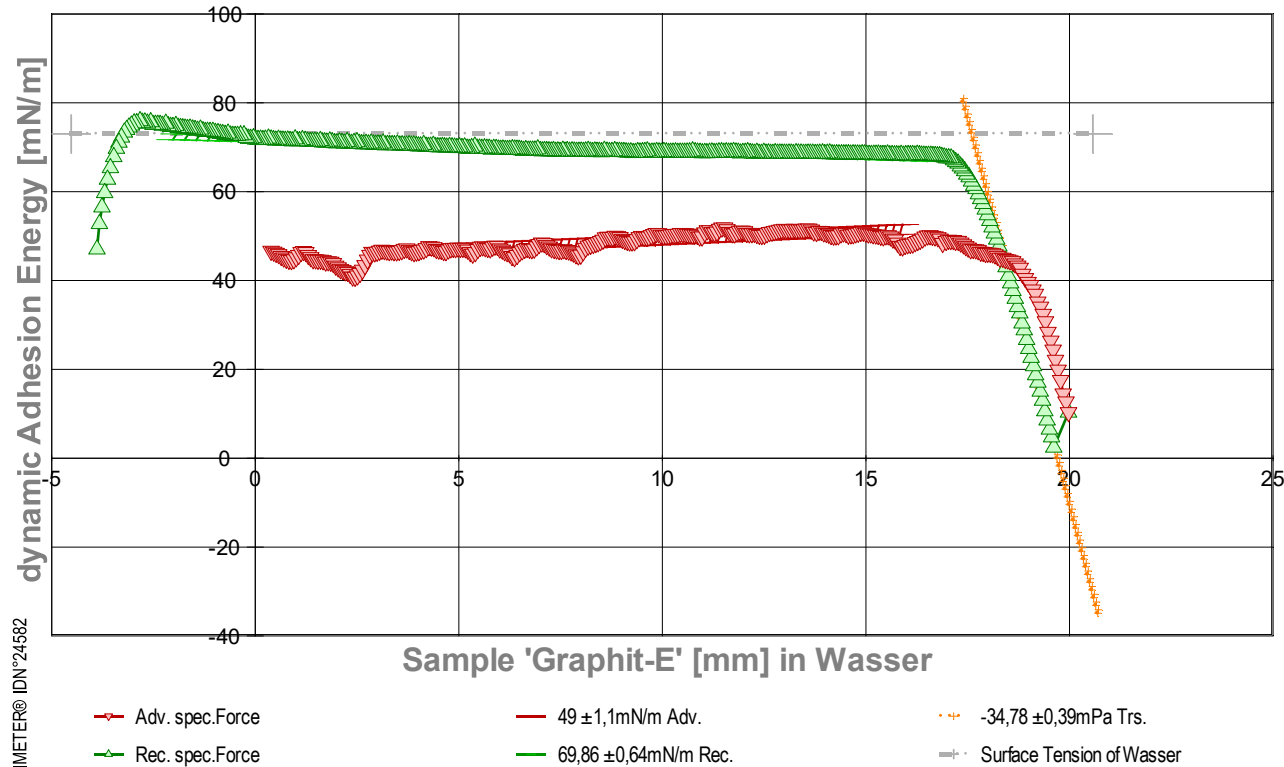
Hysteresis,  ${}^aH_d = {}^aE_A - {}^aE_R$  -20,86 mN/m

Parameter of spreading,  $\bar{S}_d = {}^a\bar{E} - \gamma$  -13,6 mJ/m<sup>2</sup>

relative wettability,  $\bar{B}_{\%,d} = 100 \cdot {}^a\bar{E} / \gamma$  81,4% with Wasser

	<b>Advancing <math>{}^aE_{A,d}</math></b>	<b>Receding <math>{}^aE_{R,d}</math></b>	<b>Transition 1,114 mm</b>
<b>Energy of Adhesion, <math>{}^aE_d</math> [mN/m]</b>	<b>49</b>	<b>69,86</b>	2,4 <sub>&lt;adv.&gt;</sub> ⇒ 41,1 <sub>rec.</sub>
Standard deviation ${}^a\sigma$ [mN/m]	±1,1	±0,64	±0,39
Linear regression, slope [mPa]	0,4	-0,26	-34,78
correlation coefficient $r^2$	0,66	0,84	0,9990
<b>Relative wettability, <math>B_{\%,d}</math></b>	<b>67,1%</b>	<b>95,7%</b>	

- Diagramm 1.3: 'Triple-line Force<sup>2</sup>' dynamic forces at the triple line,  $\bar{v}_z = 0,31 \text{ mm/s}$



- Das Diagramm zeigt den Verlauf der Adhäsionsenergie  ${}^aE$  entlang der Probenoberfläche. Die roten  $\nabla$ -Markierungen stehen für adv.-Messwerte (Eintauchen; von links nach rechts aufgezeichnet), grüne  $\Delta$ -Markierungen gehören zu rec.-Werten (Rückzugsbewegung; von rechts nach links laufend). Die Oberflächenspannung von Wasser ist als grau gestrichelte Horizontale bei 73 mN/m eingezeichnet; sie gibt die maximale Zugfestigkeit an, die eine flüssige Wasser-Oberfläche aushalten kann. Die Adhäsionsenergie  ${}^aE$  auf der Probenoberfläche ist kleiner als die Oberflächenspannung und verursacht Kontaktwinkel und je kleiner die Adhäsionsenergie ist, umso größer ist der Kontaktwinkel. Die orangefarben markierte Gerade misst die Steilheit der Adhäsionsenergie-Hysteresis, die mit der Umkehr der Bewegungsrichtung adv.↔rec. einher geht. Das dortige Pinning der Triple Line bedeutet, dass eine Bewegung von 0,1 mm eine Adhäsionsenergie-Änderung von 3,5 mN/m bzw. eine Kontaktwinkeländerung von 2,9° bewirkt.

### 4. ===== Details on the Measurement and Setup =====

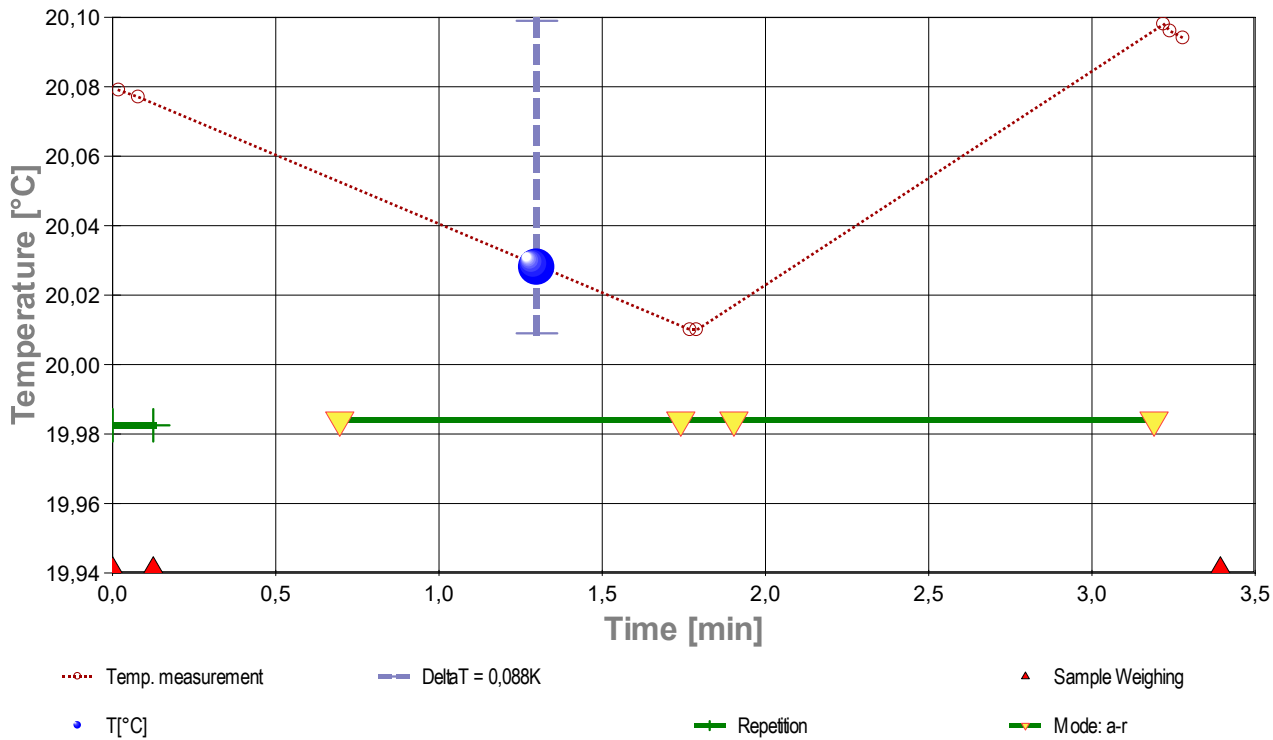
## This document is reporting the 6. Repetition of the Measurement IDN°24576

- Details of the setup, data on liquid and sample of this IDN°24582 are declared in the first measurement that is IDN°24576 of this series.

**Weight at Start:** 6,3553 g; alteration to reference 0,0180 g.

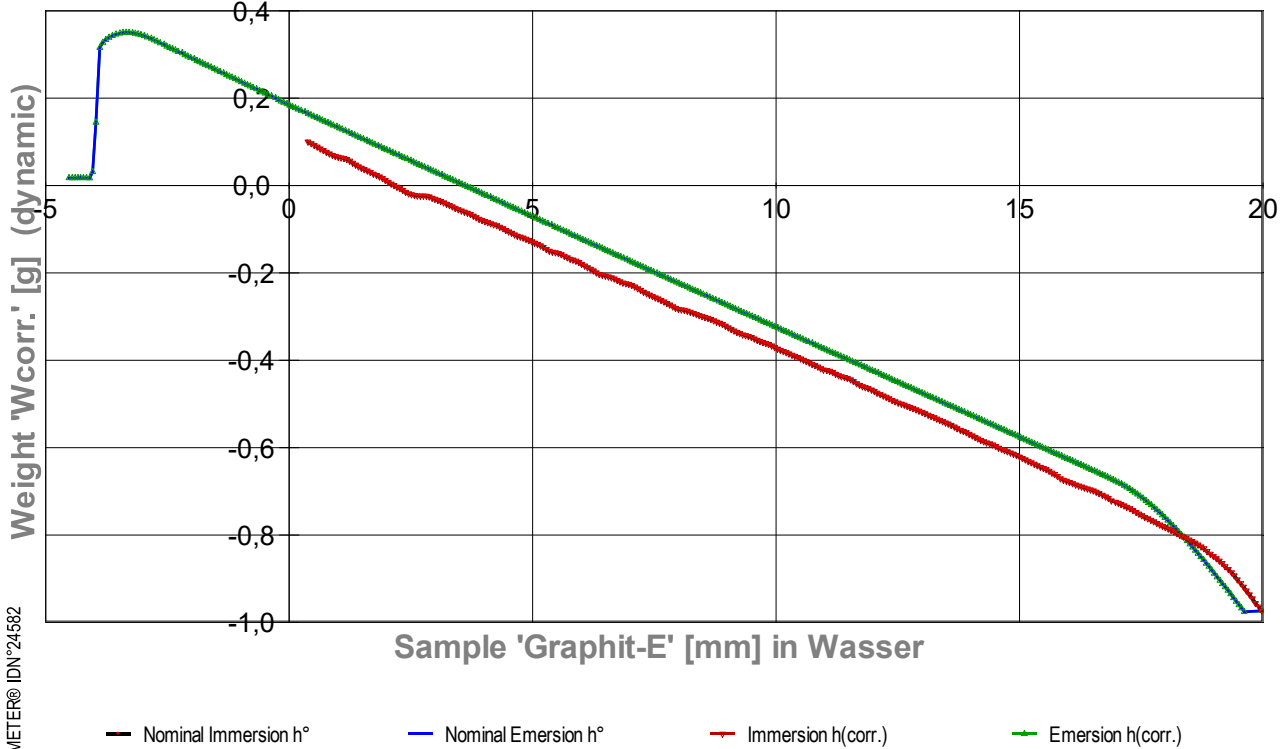
**Measurement algorithm:** dynamic CA-measurement, acquisition during constant movement. Maximum immersion of 19,976 mm and force equilibration at the inflection point for 9,8 s. Duration for immersion 1,0 min, for emersion 1,3 min. The CLT was used. - The 'CLT' Constant-Level-Technic prevents rising/falling of the Wasser-level in the vessel (surface 1452mm<sup>2</sup>) through immersion/emersion of the sample volume in the vessel by appropriate pumping of Wasser.

**Time & Temperature:** Messdauer drei Minuten; Temperaturänderung im Bereich von 20,01 bis 20,10°C. - Diagramm 2.4: 'Temperature & Events<sup>2</sup>' -- Survey on Temperature and Time



- Das Diagramm "Temperature & Events<sup>2</sup>" dokumentiert neben der Flüssigkeitstemperatur der Messfluids (Wasser) die zeitliche Abfolge der Verfahrensschritte. Die Temperaturmesswerte sind als kleine Kreise abgebildet; die kugelförmige Marke gibt die der Messung insgesamt zugeordnete Temperatur an (20,028°C). Weitere gelbe Dreiecke auf der grünen Horizontalen bezeichnen die Schaltung jeweiliger Messmodi ('a-r' bedeutet *Advancing* - und *Receding*-Bewegung). Die roten Dreiecke, unten im Diagramm, markieren die Zeitpunkte der Probenwägung von Graphit-E (ohne Kontakt zur Fluidoberfläche).

- Diagramm 3.4: 'RawData<sup>2</sup>' -- Acquired weights during immersion and emersion (raw data and immersion corrected lengths)



- Im Diagramm "RawData<sup>2</sup>" werden die Wägewerte zur dynamischen Kontaktwinkelmessung gegen die Eintauchtiefe der Probe abgebildet. Von den Roh-Wägewerten  $W_{RAW}$  wurden Proben- und Aufhängungsgewichte subtrahiert, so dass hier die *Gewichte* der Benetzungs- und Auftriebskräfte abgebildet werden ( $W_{corr.}$ ). Die Kurvenverläufe fallen mit der Eintauchtiefe  $h$  (*immersion depth*) ab, indes der Volumenauftrieb des eintauchenden Probekörpers zunimmt. Im Diagramm sind Wägewerte für die *advancing*- und *receding*-Bewegung eingetragen, sowohl für nominelle ( $h_0$ ) und für korrigierte Eintauchtiefen ( $h_{corr.}$ ). Die roten Dreiecke bezeichnen die Messwerte bei  $h_{corr.}$  bei der Vorwärtsbewegung (*adv.*), die grünen Dreiecke gehören zu Auszugsbewegungen (*rec.*). Durch 'CLT' (die *Constant-Level-Technic*) wird die Pegelveränderung besonders durch das ein- und austauschendes Probenvolumen simultan kompensiert, sodass die nominelle Eintauchtief mit der tatsächlichen identisch ist; die Kurven sind deshalb praktisch deckungsgleich. Weiterhin zeigt das Diagramm noch Werte zu *negativen Eintauchtiefen*. Diese Wertepaare gehören der *Kapillarbrücke* ( $cb = capillary bridge$ ) an, die sich beim Herausziehen der Probe über das Flüssigkeitsniveau deutlich ausbilden kann; besonders, wenn das Probenende scharfkantig ist.

## 5. ===== Table of raw data and results =====

The table below provides the data for each contact angle measuring position in this experiment ( $n=727$ ). - Within a row the column  $t$  lists the time of the CA-measurement.  $W_{RAW}$  is the original weighing data. The nominal distance between the sample bottom flatface and the liquid surface is given by  $h_0$ , whilst  $h_{corr.}$  shows the corrected immersion depth- *due to CLT the values are the same*. The sum of calculated dynamic forces are taken into account by  $F_{dyn.}$ . The  $W_{corr.}$ -values\* are the original raw weighing values when the weight of the sample and its holder ( $W_0=6,3373g$ ) is subtracted. After buoyancy- correction,  ${}^aF$  is the force exerted on the triple line. The Energy of Adhesion  ${}^aE_{A,R} = {}^aF/p$  is the force of adhesion per meter of the circumference ( $p$ ) of the sample.  $\theta$  is the Contact Angle. The last column indicates by **chr** the advancing resp. receding state; **cb** tags values of a 'capillary bridge' above the surface-level.  
*(Resolving dynamic force of wetting)  ${}^aF = (W_{Raw}-W_0-W_{Buoy.}):g + F_{Buoy.air} - F_{visc} - F_{kinet} - F_{work} = (W_{corr.}-W_{Buoy.}):g - F_{dyn.}$*

**Table 3.5: Data table**

N°	$t$ [sec]	$W_{RAW}$ [g]	$h_0$ [mm]	$h_{corr.}$ [mm]	$F_{dyn.}$ [mN]	$W_{corr.}$ [g]	${}^aF$ [mN]	${}^aE_{A,R}$ [mN/m]	$\theta$ [°deg]	chr
1.	0,00	6,4375	0,387	0,387	0	0,1002	1,1726	46,66	50,27	a
2.	0,21	6,4337	0,452	0,452	9,32E-06	0,0964	1,1673	46,44	50,49	a
3.	0,40	6,4300	0,512	0,512	9,48E-06	0,0927	1,1607	46,18	50,75	a
4.	0,61	6,4261	0,575	0,575	9,65E-06	0,0888	1,1534	45,89	51,05	a
5.	0,80	6,4219	0,638	0,638	9,81E-06	0,0846	1,1429	45,47	51,47	a
6.	1,01	6,4179	0,700	0,700	9,98E-06	0,0806	1,1343	45,13	51,81	a
7.	1,20	6,4140	0,763	0,763	1,01E-05	0,0767	1,1267	44,83	52,11	a
8.	1,41	6,4103	0,825	0,825	1,03E-05	0,0730	1,1212	44,61	52,33	a
9.	1,60	6,4070	0,887	0,887	1,05E-05	0,0697	1,1193	44,53	52,41	a
10.	1,79	6,4045	0,947	0,947	1,06E-05	0,0672	1,1241	44,73	52,21	a
11.	1,98	6,4027	1,007	1,007	1,08E-05	0,0654	1,1356	45,18	51,76	a
12.	2,17	6,4011	1,066	1,066	1,09E-05	0,0638	1,1489	45,71	51,23	a
13.	2,36	6,3998	1,125	1,125	1,11E-05	0,0625	1,1653	46,37	50,57	a
14.	2,55	6,3974	1,185	1,185	1,12E-05	0,0601	1,1710	46,59	50,34	a
15.	2,74	6,3939	1,243	1,243	1,14E-05	0,0566	1,1656	46,38	50,56	a
16.	2,93	6,3891	1,303	1,303	1,16E-05	0,0518	1,1479	45,67	51,27	a
17.	3,12	6,3849	1,363	1,363	1,17E-05	0,0476	1,1359	45,20	51,75	a
18.	3,31	6,3808	1,422	1,422	1,19E-05	0,0435	1,1246	44,75	52,20	a
19.	3,50	6,3777	1,482	1,482	1,20E-05	0,0404	1,1237	44,71	52,23	a
20.	3,69	6,3745	1,541	1,541	1,22E-05	0,0372	1,1214	44,62	52,32	a
21.	3,90	6,3714	1,604	1,604	1,24E-05	0,0341	1,1218	44,63	52,31	a
22.	4,09	6,3680	1,666	1,666	1,25E-05	0,0307	1,1189	44,52	52,42	a
23.	4,30	6,3641	1,728	1,728	1,27E-05	0,0268	1,1113	44,22	52,72	a
24.	4,49	6,3611	1,792	1,792	1,28E-05	0,0238	1,1130	44,28	52,65	a
25.	4,70	6,3577	1,854	1,854	1,30E-05	0,0204	1,1101	44,17	52,77	a
26.	4,89	6,3538	1,916	1,916	1,32E-05	0,0165	1,1026	43,87	53,06	a
27.	5,08	6,3494	1,975	1,975	1,33E-05	0,0121	1,0882	43,30	53,62	a
28.	5,27	6,3454	2,035	2,035	1,35E-05	0,0081	1,0785	42,91	54,00	a
29.	5,46	6,3414	2,094	2,094	1,36E-05	0,0041	1,0684	42,51	54,39	a
30.	5,65	6,3379	2,153	2,153	1,38E-05	0,0006	1,0630	42,30	54,59	a
31.	5,84	6,3342	2,213	2,213	1,40E-05	-0,0031	1,0561	42,02	54,86	a
32.	6,03	6,3309	2,272	2,272	1,41E-05	-0,0064	1,0528	41,89	54,98	a
33.	6,22	6,3268	2,332	2,332	1,43E-05	-0,0105	1,0417	41,45	55,41	a
34.	6,41	6,3223	2,391	2,391	1,44E-05	-0,0150	1,0268	40,86	55,97	a
35.	6,61	6,3191	2,452	2,452	1,46E-05	-0,0182	1,0253	40,80	56,02	a
36.	6,80	6,3169	2,511	2,511	1,47E-05	-0,0204	1,0326	41,09	55,75	a
37.	6,99	6,3153	2,572	2,572	1,49E-05	-0,0220	1,0472	41,66	55,20	a
38.	7,18	6,3142	2,632	2,632	1,51E-05	-0,0231	1,0654	42,39	54,50	a
39.	7,39	6,3137	2,694	2,694	1,52E-05	-0,0236	1,0913	43,42	53,50	a
40.	7,58	6,3138	2,757	2,757	1,54E-05	-0,0235	1,1231	44,69	52,26	a
41.	7,77	6,3135	2,816	2,816	1,55E-05	-0,0238	1,1492	45,73	51,22	a
42.	7,96	6,3120	2,876	2,876	1,57E-05	-0,0253	1,1637	46,30	50,63	a
43.	8,15	6,3090	2,935	2,935	1,59E-05	-0,0283	1,1634	46,29	50,64	a
44.	8,34	6,3065	2,992	2,992	1,60E-05	-0,0308	1,1669	46,43	50,50	a
45.	8,53	6,3040	3,054	3,054	1,62E-05	-0,0333	1,1728	46,66	50,27	a
46.	8,72	6,3017	3,112	3,112	1,63E-05	-0,0356	1,1784	46,89	50,04	a
47.	8,91	6,2984	3,173	3,173	1,65E-05	-0,0389	1,1760	46,79	50,13	a
48.	9,10	6,2952	3,231	3,231	1,66E-05	-0,0421	1,1735	46,69	50,24	a
49.	9,29	6,2919	3,292	3,292	1,68E-05	-0,0454	1,1707	46,58	50,35	a
50.	9,48	6,2892	3,351	3,351	1,69E-05	-0,0481	1,1734	46,69	50,24	a
51.	9,67	6,2860	3,408	3,408	1,71E-05	-0,0513	1,1700	46,55	50,38	a
52.	9,87	6,2827	3,472	3,472	1,73E-05	-0,0546	1,1688	46,51	50,43	a
53.	10,08	6,2798	3,535	3,535	1,74E-05	-0,0575	1,1716	46,62	50,31	a
54.	10,27	6,2771	3,598	3,598	1,76E-05	-0,0602	1,1758	46,78	50,14	a
55.	10,48	6,2747	3,660	3,660	1,78E-05	-0,0626	1,1829	47,06	49,86	a
56.	10,67	6,2719	3,721	3,721	1,79E-05	-0,0654	1,1854	47,16	49,75	a
57.	10,86	6,2680	3,782	3,782	1,81E-05	-0,0693	1,1771	46,84	50,09	a
58.	11,05	6,2643	3,841	3,841	1,82E-05	-0,0730	1,1697	46,54	50,39	a
59.	11,24	6,2608	3,901	3,901	1,84E-05	-0,0765	1,1648	46,34	50,59	a
60.	11,43	6,2581	3,960	3,960	1,85E-05	-0,0792	1,1675	46,45	50,48	a
61.	11,62	6,2554	4,020	4,020	1,87E-05	-0,0819	1,1703	46,56	50,37	a
62.	11,81	6,2531	4,079	4,079	1,89E-05	-0,0842	1,1768	46,82	50,10	a
63.	12,00	6,2504	4,138	4,138	1,90E-05	-0,0869	1,1794	46,93	50,00	a
64.	12,21	6,2481	4,201	4,201	1,92E-05	-0,0892	1,1875	47,25	49,66	a
65.	12,40	6,2461	4,263	4,263	1,93E-05	-0,0912	1,1985	47,69	49,21	a
66.	12,61	6,2427	4,326	4,326	1,95E-05	-0,0946	1,1959	47,58	49,32	a
67.	12,80	6,2392	4,389	4,389	1,97E-05	-0,0981	1,1924	47,44	49,46	a
68.	12,99	6,2352	4,448	4,448	1,98E-05	-0,1021	1,1823	47,04	49,88	a
69.	13,18	6,2319	4,507	4,507	2,00E-05	-0,1054	1,1788	46,90	50,02	a
70.	13,37	6,2288	4,567	4,567	2,01E-05	-0,1085	1,1779	46,87	50,06	a
71.	13,56	6,2251	4,626	4,626	2,03E-05	-0,1122	1,1709	46,59	50,34	a
72.	13,75	6,2221	4,685	4,685	2,05E-05	-0,1152	1,1702	46,56	50,37	a
73.	13,94	6,2201	4,745	4,745	2,06E-05	-0,1172	1,1800	46,95	49,97	a
74.	14,13	6,2178	4,804	4,804	2,08E-05	-0,1195	1,1866	47,21	49,70	a
75.	14,32	6,2151	4,863	4,863	2,09E-05	-0,1222	1,1891	47,31	49,60	a
76.	14,51	6,2120	4,921	4,921	2,11E-05	-0,1253	1,1871	47,23	49,68	a
77.	14,70	6,2093	4,982	4,982	2,12E-05	-0,1280	1,1906	47,37	49,54	a
78.	14,89	6,2062	5,040	5,040	2,14E-05	-0,1311	1,1886	47,29	49,62	a

79.	15,08	6,2033	5,099	5,099	2,15E-05	-0,1340	1,1893	47,32	49,59	a
80.	15,27	6,1999	5,161	5,161	2,17E-05	-0,1374	1,1862	47,20	49,72	a
81.	15,46	6,1963	5,218	5,218	2,19E-05	-0,1410	1,1788	46,90	50,02	a
82.	15,65	6,1918	5,280	5,280	2,20E-05	-0,1455	1,1651	46,36	50,58	a
83.	15,86	6,1878	5,342	5,342	2,22E-05	-0,1495	1,1563	46,01	50,93	a
84.	16,05	6,1855	5,404	5,404	2,23E-05	-0,1518	1,1644	46,33	50,60	a
85.	16,26	6,1842	5,467	5,467	2,25E-05	-0,1531	1,1825	47,05	49,87	a
86.	16,45	6,1824	5,529	5,529	2,27E-05	-0,1549	1,1951	47,55	49,35	a
87.	16,64	6,1797	5,587	5,587	2,28E-05	-0,1576	1,1973	47,64	49,26	a
88.	16,84	6,1761	5,650	5,650	2,30E-05	-0,1612	1,1926	47,45	49,45	a
89.	17,03	6,1726	5,711	5,711	2,32E-05	-0,1647	1,1885	47,29	49,62	a
90.	17,22	6,1694	5,770	5,770	2,33E-05	-0,1679	1,1861	47,19	49,72	a
91.	17,41	6,1674	5,829	5,829	2,35E-05	-0,1699	1,1954	47,56	49,34	a
92.	17,60	6,1650	5,889	5,889	2,36E-05	-0,1723	1,2013	47,80	49,10	a
93.	17,79	6,1619	5,948	5,948	2,38E-05	-0,1754	1,2000	47,75	49,15	a
94.	17,98	6,1576	6,005	6,005	2,39E-05	-0,1797	1,1858	47,18	49,73	a
95.	18,17	6,1538	6,067	6,067	2,41E-05	-0,1835	1,1789	46,91	50,02	a
96.	18,36	6,1499	6,126	6,126	2,42E-05	-0,1874	1,1698	46,55	50,39	a
97.	18,56	6,1463	6,187	6,187	2,44E-05	-0,1910	1,1644	46,33	50,61	a
98.	18,75	6,1426	6,248	6,248	2,46E-05	-0,1947	1,1580	46,08	50,86	a
99.	18,94	6,1381	6,307	6,307	2,47E-05	-0,1992	1,1427	45,47	51,48	a
100.	19,15	6,1344	6,368	6,368	2,49E-05	-0,2029	1,1364	45,22	51,73	a
101.	19,34	6,1324	6,433	6,433	2,50E-05	-0,2049	1,1485	45,70	51,25	a
102.	19,55	6,1309	6,495	6,495	2,52E-05	-0,2064	1,1645	46,33	50,60	a
103.	19,74	6,1289	6,556	6,556	2,54E-05	-0,2084	1,1745	46,73	50,20	a
104.	19,93	6,1267	6,617	6,617	2,55E-05	-0,2106	1,1832	47,08	49,84	a
105.	20,12	6,1242	6,676	6,676	2,57E-05	-0,2131	1,1878	47,26	49,65	a
106.	20,31	6,1208	6,736	6,736	2,58E-05	-0,2165	1,1835	47,09	49,83	a
107.	20,50	6,1177	6,793	6,793	2,60E-05	-0,2196	1,1813	47,00	49,92	a
108.	20,69	6,1150	6,854	6,854	2,62E-05	-0,2223	1,1845	47,13	49,79	a
109.	20,88	6,1133	6,914	6,914	2,63E-05	-0,2240	1,1977	47,66	49,25	a
110.	21,07	6,1117	6,973	6,973	2,65E-05	-0,2256	1,2107	48,17	48,71	a
111.	21,28	6,1094	7,036	7,036	2,66E-05	-0,2279	1,2191	48,51	48,36	a
112.	21,47	6,1060	7,097	7,097	2,68E-05	-0,2313	1,2156	48,37	48,51	a
113.	21,66	6,1018	7,158	7,158	2,70E-05	-0,2355	1,2044	47,92	48,97	a
114.	21,86	6,0979	7,219	7,219	2,71E-05	-0,2394	1,1961	47,59	49,31	a
115.	22,05	6,0940	7,278	7,278	2,73E-05	-0,2433	1,1867	47,22	49,70	a
116.	22,25	6,0904	7,341	7,341	2,74E-05	-0,2469	1,1824	47,04	49,88	a
117.	22,44	6,0872	7,399	7,399	2,76E-05	-0,2501	1,1799	46,94	49,98	a
118.	22,63	6,0838	7,461	7,461	2,78E-05	-0,2535	1,1768	46,83	50,10	a
119.	22,82	6,0809	7,519	7,519	2,79E-05	-0,2564	1,1767	46,82	50,11	a
120.	23,01	6,0784	7,578	7,578	2,81E-05	-0,2589	1,1810	46,99	49,93	a
121.	23,20	6,0750	7,637	7,637	2,82E-05	-0,2623	1,1768	46,82	50,10	a
122.	23,39	6,0716	7,699	7,699	2,84E-05	-0,2657	1,1738	46,70	50,22	a
123.	23,58	6,0681	7,758	7,758	2,85E-05	-0,2692	1,1685	46,49	50,44	a
124.	23,77	6,0646	7,815	7,815	2,87E-05	-0,2727	1,1623	46,25	50,69	a
125.	23,96	6,0605	7,877	7,877	2,88E-05	-0,2768	1,1525	45,86	51,09	a
126.	24,15	6,0570	7,934	7,934	2,90E-05	-0,2803	1,1461	45,60	51,34	a
127.	24,34	6,0544	7,995	7,995	2,92E-05	-0,2829	1,1506	45,78	51,16	a
128.	24,53	6,0533	8,056	8,056	2,93E-05	-0,2840	1,1695	46,53	50,40	a
129.	24,72	6,0524	8,114	8,114	2,95E-05	-0,2849	1,1894	47,32	49,59	a
130.	24,93	6,0505	8,177	8,177	2,96E-05	-0,2868	1,2016	47,81	49,08	a
131.	25,12	6,0479	8,238	8,238	2,98E-05	-0,2894	1,2061	47,99	48,90	a
132.	25,33	6,0452	8,302	8,302	3,00E-05	-0,2921	1,2110	48,18	48,70	a
133.	25,52	6,0426	8,364	8,364	3,01E-05	-0,2947	1,2160	48,38	48,49	a
134.	25,71	6,0402	8,421	8,421	3,03E-05	-0,2971	1,2206	48,57	48,29	a
135.	25,90	6,0379	8,481	8,481	3,04E-05	-0,2994	1,2272	48,83	48,02	a
136.	26,09	6,0357	8,541	8,541	3,06E-05	-0,3016	1,2351	49,14	47,69	a
137.	26,28	6,0340	8,602	8,602	3,08E-05	-0,3033	1,2483	49,67	47,13	a
138.	26,47	6,0314	8,661	8,661	3,09E-05	-0,3059	1,2518	49,81	46,98	a
139.	26,66	6,0283	8,720	8,720	3,11E-05	-0,3090	1,2507	49,76	47,02	a
140.	26,85	6,0253	8,780	8,780	3,12E-05	-0,3120	1,2505	49,75	47,03	a
141.	27,04	6,0230	8,840	8,840	3,14E-05	-0,3143	1,2572	50,02	46,74	a
142.	27,23	6,0198	8,899	8,899	3,15E-05	-0,3175	1,2550	49,93	46,84	a
143.	27,42	6,0163	8,958	8,958	3,17E-05	-0,3210	1,2497	49,72	47,07	a
144.	27,61	6,0123	9,018	9,018	3,18E-05	-0,3250	1,2397	49,32	47,49	a
145.	27,80	6,0087	9,077	9,077	3,20E-05	-0,3286	1,2337	49,09	47,75	a
146.	27,99	6,0052	9,136	9,136	3,22E-05	-0,3321	1,2283	48,87	47,97	a
147.	28,18	6,0019	9,196	9,196	3,23E-05	-0,3354	1,2252	48,75	48,10	a
148.	28,37	5,9990	9,253	9,253	3,25E-05	-0,3383	1,2250	48,74	48,11	a
149.	28,56	5,9961	9,314	9,314	3,26E-05	-0,3412	1,2265	48,80	48,05	a
150.	28,75	5,9943	9,374	9,374	3,28E-05	-0,3430	1,2380	49,26	47,57	a
151.	28,94	5,9926	9,431	9,431	3,29E-05	-0,3447	1,2495	49,71	47,08	a
152.	29,13	5,9902	9,493	9,493	3,31E-05	-0,3471	1,2563	49,99	46,79	a
153.	29,32	5,9868	9,552	9,552	3,32E-05	-0,3505	1,2517	49,81	46,98	a
154.	29,51	5,9838	9,612	9,612	3,34E-05	-0,3535	1,2520	49,82	46,97	a
155.	29,70	5,9811	9,669	9,669	3,36E-05	-0,3562	1,2533	49,87	46,91	a
156.	29,89	5,9788	9,730	9,730	3,37E-05	-0,3585	1,2608	50,16	46,59	a
157.	30,08	5,9764	9,790	9,790	3,39E-05	-0,3609	1,2667	50,40	46,34	a
158.	30,27	5,9742	9,847	9,847	3,40E-05	-0,3631	1,2731	50,65	46,06	a
159.	30,46	5,9710	9,908	9,908	3,42E-05	-0,3663	1,2717	50,60	46,12	a
160.	30,66	5,9670	9,970	9,970	3,43E-05	-0,3703	1,2628	50,25	46,50	a
161.	30,85	5,9637	10,030	10,030	3,45E-05	-0,3736	1,2599	50,13	46,63	a
162.	31,04	5,9607	10,089	10,089	3,47E-05	-0,3766	1,2596	50,12	46,64	a
163.	31,23	5,9579	10,149	10,149	3,48E-05	-0,3794	1,2616	50,20	46,55	a
164.	31,42	5,9553	10,208	10,208	3,50E-05	-0,3820	1,2650	50,33	46,41	a
165.	31,61	5,9526	10,266	10,266	3,51E-05	-0,3847	1,2669	50,41	46,33	a
166.	31,80	5,9496	10,327	10,327	3,53E-05	-0,3877	1,2676	50,44	46,30	a
167.	31,99	5,9468	10,384	10,384	3,54E-05	-0,3905	1,2683	50,46	46,27	a
168.	32,18	5,9442	10,446	10,446	3,56E-05	-0,3931	1,2730	50,65	46,06	a
169.	32,37	5,9412	10,505	10,505	3,58E-05	-0,3961	1,2726	50,64	46,08	a
170.	32,55	5,9382	10,562	10,562	3,59E-05	-0,3991	1,2713	50,59	46,14	a
171.	32,74	5,9351	10,620	10,620	3,61E-05	-0,4022	1,2691	50,50	46,23	a
172.	32,94	5,9318	10,681	10,681	3,62E-05	-0,4055	1,2669	50,41	46,33	a
173.	33,12	5,9287	10,739	10,739	3,64E-05	-0,4086	1,2650	50,33	46,41	a
174.	33,31	5,9258	10,799	10,799	3,65E-05	-0,4115	1,2657	50,36	46,38	a
175.	33,50	5,9225	10,859	10,859	3,67E-05	-0,4148	1,2629	50,25	46,50	a
176.	33,68	5,9186	10,917	10,917	3,68E-05	-0,4187	1,2530	49,86	46,93	a
177.	33,88	5,9157	10,975	10,975	3,70E-05	-0,4216	1,2531	49,86	46,92	a
178.	34,10	5,9146	11,044	11,044	3,72E-05	-0,4227	1,2763	50,78	45,92	a
179.	34,29	5,9129	11,103	11,103	3,73E-05	-0,4244	1,2886	51,27	45,38	a
180.	34,47	5,9099	11,163	11,163	3,75E-05	-0,4274	1,2887	51,28	45,38	a
181.	34,66	5,9059	11,222	11,222	3,76E-05	-0,4314	1,2784	50,87	45,83	a

182.	34,87	5,9026	11,282	11,282	3,78E-05	-0,4347	1,2757	50,76	45,95	a
183.	35,05	5,9002	11,342	11,342	3,80E-05	-0,4371	1,2812	50,98	45,71	a
184.	35,25	5,8986	11,404	11,404	3,81E-05	-0,4387	1,2964	51,58	45,04	a
185.	35,45	5,8964	11,464	11,464	3,83E-05	-0,4409	1,3039	51,88	44,71	a
186.	35,65	5,8932	11,528	11,528	3,84E-05	-0,4441	1,3043	51,90	44,69	a
187.	35,83	5,8892	11,588	11,588	3,86E-05	-0,4481	1,2945	51,51	45,13	a
188.	36,05	5,8843	11,654	11,654	3,88E-05	-0,4530	1,2787	50,88	45,82	a
189.	36,24	5,8805	11,716	11,716	3,89E-05	-0,4568	1,2716	50,60	46,12	a
190.	36,43	5,8774	11,775	11,775	3,91E-05	-0,4599	1,2703	50,54	46,18	a
191.	36,62	5,8753	11,833	11,833	3,92E-05	-0,4620	1,2783	50,86	45,83	a
192.	36,82	5,8730	11,893	11,893	3,94E-05	-0,4643	1,2853	51,14	45,53	a
193.	37,03	5,8699	11,958	11,958	3,96E-05	-0,4674	1,2868	51,20	45,46	a
194.	37,20	5,8666	12,016	12,016	3,97E-05	-0,4707	1,2830	51,05	45,63	a
195.	37,40	5,8627	12,075	12,075	3,99E-05	-0,4746	1,2733	50,66	46,05	a
196.	37,60	5,8593	12,138	12,138	4,00E-05	-0,4780	1,2709	50,57	46,15	a
197.	37,80	5,8562	12,201	12,201	4,02E-05	-0,4811	1,2714	50,59	46,13	a
198.	37,99	5,8534	12,261	12,261	4,04E-05	-0,4839	1,2734	50,67	46,05	a
199.	38,18	5,8498	12,321	12,321	4,05E-05	-0,4875	1,2676	50,44	46,30	a
200.	38,38	5,8462	12,382	12,382	4,07E-05	-0,4911	1,2626	50,24	46,51	a
201.	38,58	5,8430	12,445	12,445	4,09E-05	-0,4943	1,2617	50,20	46,55	a
202.	38,78	5,8400	12,508	12,508	4,10E-05	-0,4973	1,2633	50,27	46,48	a
203.	38,99	5,8376	12,573	12,573	4,12E-05	-0,4997	1,2719	50,61	46,11	a
204.	39,18	5,8353	12,632	12,632	4,13E-05	-0,5020	1,2781	50,85	45,84	a
205.	39,37	5,8324	12,693	12,693	4,15E-05	-0,5049	1,2799	50,93	45,76	a
206.	39,55	5,8299	12,751	12,751	4,17E-05	-0,5074	1,2838	51,08	45,59	a
207.	39,75	5,8272	12,811	12,811	4,18E-05	-0,5101	1,2866	51,19	45,47	a
208.	39,96	5,8245	12,873	12,873	4,20E-05	-0,5128	1,2909	51,36	45,29	a
209.	40,15	5,8217	12,934	12,934	4,21E-05	-0,5156	1,2933	51,46	45,18	a
210.	40,35	5,8188	12,998	12,998	4,23E-05	-0,5185	1,2962	51,57	45,05	a
211.	40,54	5,8156	13,057	13,057	4,25E-05	-0,5217	1,2939	51,48	45,15	a
212.	40,75	5,8123	13,123	13,123	4,26E-05	-0,5250	1,2936	51,47	45,16	a
213.	40,95	5,8092	13,184	13,184	4,28E-05	-0,5281	1,2935	51,47	45,17	a
214.	41,14	5,8065	13,246	13,246	4,30E-05	-0,5308	1,2970	51,61	45,01	a
215.	41,32	5,8034	13,301	13,301	4,31E-05	-0,5339	1,2938	51,48	45,15	a
216.	41,51	5,8004	13,362	13,362	4,33E-05	-0,5369	1,2943	51,50	45,13	a
217.	41,70	5,7974	13,421	13,421	4,34E-05	-0,5399	1,2941	51,49	45,14	a
218.	41,89	5,7945	13,479	13,479	4,36E-05	-0,5428	1,2941	51,49	45,14	a
219.	42,07	5,7921	13,535	13,535	4,37E-05	-0,5452	1,2981	51,65	44,97	a
220.	42,26	5,7891	13,595	13,595	4,39E-05	-0,5482	1,2980	51,65	44,97	a
221.	42,47	5,7853	13,660	13,660	4,41E-05	-0,5520	1,2926	51,43	45,21	a
222.	42,66	5,7813	13,718	13,718	4,42E-05	-0,5560	1,2818	51,00	45,68	a
223.	42,87	5,7776	13,786	13,786	4,44E-05	-0,5597	1,2787	50,88	45,82	a
224.	43,06	5,7752	13,846	13,846	4,45E-05	-0,5621	1,2850	51,13	45,54	a
225.	43,26	5,7721	13,907	13,907	4,47E-05	-0,5652	1,2843	51,10	45,57	a
226.	43,45	5,7684	13,965	13,965	4,49E-05	-0,5689	1,2765	50,79	45,91	a
227.	43,64	5,7649	14,028	14,028	4,50E-05	-0,5724	1,2733	50,66	46,05	a
228.	43,83	5,7615	14,087	14,087	4,52E-05	-0,5758	1,2687	50,48	46,25	a
229.	44,02	5,7579	14,143	14,143	4,53E-05	-0,5794	1,2612	50,18	46,58	a
230.	44,22	5,7545	14,205	14,205	4,55E-05	-0,5828	1,2581	50,06	46,71	a
231.	44,40	5,7516	14,265	14,265	4,56E-05	-0,5857	1,2590	50,10	46,67	a
232.	44,59	5,7488	14,322	14,322	4,58E-05	-0,5885	1,2598	50,13	46,63	a
233.	44,80	5,7467	14,387	14,387	4,60E-05	-0,5906	1,2711	50,57	46,15	a
234.	44,99	5,7442	14,447	14,447	4,61E-05	-0,5931	1,2758	50,76	45,94	a
235.	45,19	5,7406	14,512	14,512	4,63E-05	-0,5967	1,2723	50,62	46,09	a
236.	45,38	5,7368	14,569	14,569	4,64E-05	-0,6005	1,2633	50,26	46,48	a
237.	45,58	5,7338	14,634	14,634	4,66E-05	-0,6035	1,2654	50,35	46,39	a
238.	45,77	5,7310	14,690	14,690	4,68E-05	-0,6063	1,2659	50,37	46,37	a
239.	45,95	5,7285	14,750	14,750	4,69E-05	-0,6088	1,2706	50,56	46,17	a
240.	46,15	5,7258	14,811	14,811	4,71E-05	-0,6115	1,2743	50,70	46,01	a
241.	46,35	5,7232	14,874	14,874	4,72E-05	-0,6141	1,2794	50,91	45,78	a
242.	46,55	5,7201	14,937	14,937	4,74E-05	-0,6172	1,2798	50,92	45,77	a
243.	46,74	5,7165	14,998	14,998	4,76E-05	-0,6208	1,2749	50,72	45,98	a
244.	46,94	5,7130	15,059	15,059	4,77E-05	-0,6243	1,2703	50,54	46,18	a
245.	47,13	5,7100	15,119	15,119	4,79E-05	-0,6273	1,2704	50,55	46,18	a
246.	47,33	5,7066	15,178	15,178	4,80E-05	-0,6307	1,2658	50,37	46,37	a
247.	47,54	5,7033	15,241	15,241	4,82E-05	-0,6340	1,2644	50,31	46,44	a
248.	47,72	5,7000	15,302	15,302	4,84E-05	-0,6373	1,2621	50,22	46,53	a
249.	47,92	5,6964	15,365	15,365	4,85E-05	-0,6409	1,2575	50,03	46,73	a
250.	48,12	5,6929	15,428	15,428	4,87E-05	-0,6444	1,2542	49,90	46,88	a
251.	48,32	5,6904	15,490	15,490	4,89E-05	-0,6469	1,2601	50,14	46,62	a
252.	48,51	5,6875	15,547	15,547	4,90E-05	-0,6498	1,2598	50,13	46,63	a
253.	48,69	5,6839	15,606	15,606	4,92E-05	-0,6534	1,2534	49,87	46,91	a
254.	48,87	5,6798	15,664	15,664	4,93E-05	-0,6575	1,2415	49,40	47,41	a
255.	49,06	5,6765	15,719	15,719	4,95E-05	-0,6608	1,2363	49,19	47,63	a
256.	49,24	5,6717	15,778	15,778	4,96E-05	-0,6656	1,2184	48,48	48,39	a
257.	49,44	5,6668	15,839	15,839	4,98E-05	-0,6705	1,2001	47,75	49,15	a
258.	49,64	5,6634	15,900	15,900	4,99E-05	-0,6739	1,1967	47,62	49,29	a
259.	49,84	5,6612	15,962	15,962	5,01E-05	-0,6761	1,2058	47,98	48,91	a
260.	50,03	5,6584	16,025	16,025	5,03E-05	-0,6789	1,2092	48,11	48,77	a
261.	50,24	5,6554	16,090	16,090	5,04E-05	-0,6819	1,2115	48,20	48,68	a
262.	50,44	5,6525	16,152	16,152	5,06E-05	-0,6848	1,2133	48,28	48,60	a
263.	50,64	5,6502	16,214	16,214	5,08E-05	-0,6871	1,2214	48,60	48,26	a
264.	50,83	5,6479	16,273	16,273	5,09E-05	-0,6894	1,2279	48,86	47,99	a
265.	51,02	5,6456	16,332	16,332	5,11E-05	-0,6917	1,2341	49,10	47,73	a
266.	51,21	5,6433	16,393	16,393	5,12E-05	-0,6940	1,2419	49,41	47,40	a
267.	51,41	5,6414	16,454	16,454	5,14E-05	-0,6959	1,2528	49,85	46,94	a
268.	51,60	5,6389	16,516	16,516	5,16E-05	-0,6984	1,2587	50,08	46,68	a
269.	51,79	5,6361	16,575	16,575	5,17E-05	-0,7012	1,2602	50,14	46,62	a
270.	51,99	5,6327	16,635	16,635	5,19E-05	-0,7046	1,2564	49,99	46,78	a
271.	52,19	5,6292	16,699	16,699	5,20E-05	-0,7081	1,2536	49,88	46,90	a
272.	52,40	5,6253	16,767	16,767	5,22E-05	-0,7120	1,2488	49,69	47,10	a
273.	52,59	5,6217	16,823	16,823	5,24E-05	-0,7156	1,2410	49,38	47,44	a
274.	52,78	5,6161	16,885	16,885	5,25E-05	-0,7212	1,2162	48,39	48,48	a
275.	53,06	5,6130	16,970	16,970	5,28E-05	-0,7243	1,2277	48,85	48,00	a
276.	53,24	5,6108	17,028	17,028	5,29E-05	-0,7265	1,2347	49,13	47,70	a
277.	53,42	5,6078	17,085	17,085	5,31E-05	-0,7295	1,2331	49,06	47,77	a
278.	53,62	5,6047	17,146	17,146	5,32E-05	-0,7326	1,2330	49,06	47,78	a
279.	53,81	5,6014	17,203	17,203	5,34E-05	-0,7359	1,2281	48,87	47,98	a
280.	54,01	5,5982	17,267	17,267	5,35E-05	-0,7391	1,2283	48,87	47,97	a
281.	54,20	5,5941	17,329	17,329	5,37E-05	-0,7432	1,2186	48,49	48,38	a
282.	54,42	5,5898	17,395	17,395	5,39E-05	-0,7475	1,2086	48,09	48,79	a
283.	54,60	5,5859	17,452	17,452	5,40E-05	-0,7514	1,1986	47,69	49,21	a
284.	54,78	5,5821	17,511	17,511	5,42E-05	-0,7552	1,1902	47,36	49,55	a

285.	54,98	5,5781	17,572	17,572	5,43E-05	-0,7592	1,1810	46,99	49,93	a
286.	55,19	5,5751	17,635	17,635	5,45E-05	-0,7622	1,1826	47,06	49,86	a
287.	55,39	5,5718	17,697	17,697	5,47E-05	-0,7655	1,1805	46,97	49,95	a
288.	55,58	5,5683	17,757	17,757	5,48E-05	-0,7690	1,1756	46,78	50,15	a
289.	55,78	5,5643	17,819	17,819	5,50E-05	-0,7730	1,1668	46,43	50,51	a
290.	55,97	5,5611	17,881	17,881	5,52E-05	-0,7762	1,1658	46,38	50,55	a
291.	56,15	5,5577	17,937	17,937	5,53E-05	-0,7796	1,1602	46,16	50,78	a
292.	56,33	5,5550	17,994	17,994	5,54E-05	-0,7823	1,1615	46,22	50,72	a
293.	56,52	5,5519	18,054	18,054	5,56E-05	-0,7854	1,1605	46,17	50,76	a
294.	56,71	5,5487	18,112	18,112	5,58E-05	-0,7886	1,1580	46,08	50,86	a
295.	56,90	5,5452	18,170	18,170	5,59E-05	-0,7921	1,1521	45,84	51,10	a
296.	57,10	5,5412	18,232	18,232	5,61E-05	-0,7961	1,1433	45,49	51,45	a
297.	57,30	5,5371	18,293	18,293	5,62E-05	-0,8002	1,1329	45,08	51,87	a
298.	57,52	5,5336	18,363	18,363	5,64E-05	-0,8037	1,1327	45,07	51,87	a
299.	57,71	5,5299	18,423	18,423	5,66E-05	-0,8074	1,1263	44,81	52,13	a
300.	57,90	5,5266	18,483	18,483	5,67E-05	-0,8107	1,1231	44,69	52,26	a
301.	58,10	5,5231	18,542	18,542	5,69E-05	-0,8142	1,1177	44,47	52,47	a
302.	58,29	5,5195	18,605	18,605	5,71E-05	-0,8178	1,1135	44,30	52,63	a
303.	58,48	5,5152	18,665	18,665	5,72E-05	-0,8221	1,1007	43,80	53,13	a
304.	58,68	5,5108	18,728	18,728	5,74E-05	-0,8265	1,0885	43,31	53,61	a
305.	58,87	5,5066	18,788	18,788	5,75E-05	-0,8307	1,0765	42,83	54,07	a
306.	59,07	5,5000	18,850	18,850	5,77E-05	-0,8373	1,0423	41,47	55,38	a
307.	59,29	5,4941	18,918	18,918	5,79E-05	-0,8432	1,0181	40,51	56,30	a
308.	59,50	5,4887	18,982	18,982	5,80E-05	-0,8486	0,9964	39,65	57,11	a
309.	59,69	5,4839	19,042	19,042	5,82E-05	-0,8534	0,9790	38,95	57,75	a
310.	59,87	5,4783	19,102	19,102	5,84E-05	-0,8590	0,9532	37,93	58,70	a
311.	60,06	5,4729	19,161	19,161	5,85E-05	-0,8644	0,9293	36,98	59,57	a
312.	60,26	5,4654	19,220	19,220	5,87E-05	-0,8719	0,8848	35,21	61,17	a
313.	60,48	5,4591	19,288	19,288	5,89E-05	-0,8782	0,8564	34,08	62,17	a
314.	60,68	5,4516	19,355	19,355	5,90E-05	-0,8857	0,8155	32,45	63,61	a
315.	60,86	5,4446	19,409	19,409	5,92E-05	-0,8927	0,7737	30,79	65,06	a
316.	61,05	5,4354	19,471	19,471	5,93E-05	-0,9019	0,7139	28,41	67,10	a
317.	61,28	5,4268	19,541	19,541	5,95E-05	-0,9105	0,6640	26,42	68,78	a
318.	61,46	5,4188	19,598	19,598	5,97E-05	-0,9185	0,6135	24,41	70,47	a
319.	61,65	5,4100	19,656	19,656	5,98E-05	-0,9273	0,5557	22,11	72,37	a
320.	61,85	5,4011	19,720	19,720	6,00E-05	-0,9362	0,4997	19,88	74,19	a
321.	62,06	5,3920	19,782	19,782	6,02E-05	-0,9453	0,4410	17,55	76,09	a
322.	62,26	5,3812	19,844	19,844	6,03E-05	-0,9561	0,3652	14,53	78,52	a
323.	62,48	5,3730	19,916	19,916	6,05E-05	-0,9643	0,3201	12,74	79,95	a
324.	62,68	5,3638	19,976	19,976	6,07E-05	-0,9735	0,2594	10,32	81,87	a
325.	72,44	5,3617	19,614	19,614	0	-0,9756	0,0611	2,43	88,09	r
326.	72,61	5,3699	19,561	19,561	-0,00376	-0,9674	0,1192	4,74	86,28	r
327.	72,78	5,3771	19,507	19,507	-0,00375	-0,9602	0,1633	6,50	84,89	r
328.	72,96	5,3852	19,449	19,449	-0,00374	-0,9521	0,2146	8,54	83,28	r
329.	73,14	5,3933	19,394	19,394	-0,00373	-0,9440	0,2670	10,62	81,63	r
330.	73,32	5,4022	19,338	19,338	-0,00372	-0,9351	0,3265	12,99	79,75	r
331.	73,51	5,4103	19,281	19,281	-0,00371	-0,9270	0,3780	15,04	78,11	r
332.	73,69	5,4183	19,224	19,224	-0,00369	-0,9190	0,4284	17,05	76,50	r
333.	73,87	5,4254	19,168	19,168	-0,00368	-0,9119	0,4707	18,73	75,13	r
334.	74,03	5,4332	19,116	19,116	-0,00367	-0,9041	0,5216	20,75	73,48	r
335.	74,22	5,4410	19,057	19,057	-0,00366	-0,8963	0,5693	22,65	71,92	r
336.	74,40	5,4490	19,000	19,000	-0,00365	-0,8883	0,6197	24,66	70,26	r
337.	74,57	5,4568	18,948	18,948	-0,00364	-0,8805	0,6706	26,68	68,56	r
338.	74,76	5,4653	18,889	18,889	-0,00363	-0,8720	0,7251	28,85	66,72	r
339.	74,93	5,4720	18,834	18,834	-0,00362	-0,8653	0,7637	30,39	65,40	r
340.	75,11	5,4805	18,780	18,780	-0,00361	-0,8568	0,8205	32,65	63,43	r
341.	75,30	5,4871	18,721	18,721	-0,00360	-0,8502	0,8563	34,07	62,18	r
342.	75,47	5,4946	18,667	18,667	-0,00359	-0,8427	0,9035	35,95	60,50	r
343.	75,64	5,5019	18,611	18,611	-0,00358	-0,8354	0,9474	37,69	58,91	r
344.	75,82	5,5091	18,555	18,555	-0,00357	-0,8282	0,9906	39,41	57,32	r
345.	76,00	5,5162	18,500	18,500	-0,00356	-0,8211	1,0330	41,10	55,74	r
346.	76,19	5,5241	18,441	18,441	-0,00354	-0,8132	1,0817	43,04	53,87	r
347.	76,37	5,5318	18,382	18,382	-0,00353	-0,8055	1,1280	44,88	52,06	r
348.	76,57	5,5380	18,322	18,322	-0,00352	-0,7993	1,1595	46,14	50,80	r
349.	76,74	5,5448	18,267	18,267	-0,00351	-0,7925	1,1991	47,71	49,19	r
350.	76,92	5,5514	18,214	18,214	-0,00350	-0,7859	1,2380	49,26	47,56	r
351.	77,11	5,5579	18,155	18,155	-0,00349	-0,7794	1,2727	50,64	46,08	r
352.	77,29	5,5643	18,097	18,097	-0,00348	-0,7730	1,3071	52,01	44,57	r
353.	77,46	5,5707	18,044	18,044	-0,00347	-0,7666	1,3438	53,47	42,91	r
354.	77,65	5,5769	17,986	17,986	-0,00346	-0,7604	1,3761	54,75	41,40	r
355.	77,82	5,5829	17,932	17,932	-0,00345	-0,7544	1,4081	56,03	39,87	r
356.	77,99	5,5888	17,878	17,878	-0,00344	-0,7485	1,4395	57,27	38,32	r
357.	78,17	5,5945	17,820	17,820	-0,00343	-0,7428	1,4669	58,36	36,92	r
358.	78,37	5,6001	17,763	17,763	-0,00341	-0,7372	1,4942	59,45	35,47	r
359.	78,55	5,6061	17,704	17,704	-0,00340	-0,7312	1,5239	60,63	33,84	r
360.	78,72	5,6108	17,648	17,648	-0,00339	-0,7265	1,5426	61,38	32,78	r
361.	78,90	5,6159	17,595	17,595	-0,00338	-0,7214	1,5664	62,33	31,37	r
362.	79,09	5,6213	17,536	17,536	-0,00337	-0,7160	1,5905	63,29	29,90	r
363.	79,26	5,6257	17,479	17,479	-0,00336	-0,7116	1,6056	63,88	28,94	r
364.	79,43	5,6304	17,425	17,425	-0,00335	-0,7069	1,6253	64,67	27,64	r
365.	79,61	5,6347	17,371	17,371	-0,00334	-0,7026	1,6409	65,29	26,57	r
366.	79,78	5,6384	17,320	17,320	-0,00333	-0,6989	1,6521	65,73	25,78	r
367.	79,96	5,6429	17,263	17,263	-0,00332	-0,6944	1,6682	66,38	24,59	r
368.	80,14	5,6467	17,204	17,204	-0,00331	-0,6906	1,6767	66,71	23,95	r
369.	80,32	5,6504	17,151	17,151	-0,00330	-0,6869	1,6869	67,12	23,16	r
370.	80,50	5,6543	17,094	17,094	-0,00329	-0,6830	1,6971	67,53	22,33	r
371.	80,70	5,6576	17,031	17,031	-0,00327	-0,6797	1,6983	67,57	22,23	r
372.	80,88	5,6604	16,974	16,974	-0,00326	-0,6769	1,6981	67,56	22,25	r
373.	81,05	5,6635	16,922	16,922	-0,00325	-0,6738	1,7028	67,75	21,85	r
374.	81,23	5,6667	16,864	16,864	-0,00324	-0,6706	1,7058	67,87	21,61	r
375.	81,41	5,6698	16,810	16,810	-0,00323	-0,6675	1,7097	68,03	21,27	r
376.	81,58	5,6725	16,756	16,756	-0,00322	-0,6648	1,7093	68,01	21,31	r
377.	81,75	5,6753	16,703	16,703	-0,00321	-0,6620	1,7109	68,08	21,17	r
378.	81,93	5,6781	16,646	16,646	-0,00320	-0,6592	1,7106	68,06	21,19	r
379.	82,10	5,6810	16,593	16,593	-0,00319	-0,6563	1,7129	68,16	20,99	r
380.	82,29	5,6838	16,537	16,537	-0,00318	-0,6535	1,7126	68,14	21,02	r
381.	82,47	5,6867	16,477	16,477	-0,00317	-0,6506	1,7116	68,10	21,10	r
382.	82,65	5,6896	16,422	16,422	-0,00316	-0,6477	1,7130	68,16	20,98	r
383.	82,83	5,6924	16,367	16,367	-0,00315	-0,6449	1,7137	68,19	20,92	r
384.	83,00	5,6953	16,313	16,313	-0,00314	-0,6420	1,7156	68,26	20,76	r
385.	83,17	5,6982	16,260	16,260	-0,00313	-0,6391	1,7180	68,36	20,54	r
386.	83,35	5,7007	16,202	16,202	-0,00311	-0,6366	1,7139	68,19	20,91	r
387.	83,53	5,7037	16,148	16,148	-0,00310	-0,6336	1,7167	68,31	20,66	r

388.	83,71	5,7065	16,090	16,090	-0,00309	-0,6308	1,7156	68,26	20,75	r
389.	83,89	5,7093	16,035	16,035	-0,00308	-0,6280	1,7164	68,29	20,68	r
390.	84,07	5,7121	15,979	15,979	-0,00307	-0,6252	1,7161	68,28	20,71	r
391.	84,25	5,7147	15,920	15,920	-0,00306	-0,6226	1,7130	68,16	20,98	r
392.	84,43	5,7179	15,866	15,866	-0,00305	-0,6194	1,7177	68,34	20,57	r
393.	84,61	5,7204	15,809	15,809	-0,00304	-0,6169	1,7140	68,20	20,90	r
394.	84,78	5,7231	15,757	15,757	-0,00303	-0,6142	1,7150	68,24	20,81	r
395.	84,96	5,7259	15,701	15,701	-0,00302	-0,6114	1,7149	68,23	20,82	r
396.	85,14	5,7288	15,644	15,644	-0,00301	-0,6085	1,7157	68,27	20,74	r
397.	85,32	5,7317	15,586	15,586	-0,00300	-0,6056	1,7154	68,25	20,78	r
398.	85,51	5,7349	15,531	15,531	-0,00299	-0,6024	1,7200	68,44	20,36	r
399.	85,69	5,7376	15,470	15,470	-0,00297	-0,5997	1,7164	68,30	20,68	r
400.	85,86	5,7402	15,419	15,419	-0,00296	-0,5971	1,7168	68,31	20,65	r
401.	86,04	5,7430	15,363	15,363	-0,00295	-0,5943	1,7169	68,31	20,65	r
402.	86,22	5,7461	15,307	15,307	-0,00294	-0,5912	1,7196	68,42	20,40	r
403.	86,40	5,7488	15,251	15,251	-0,00293	-0,5885	1,7184	68,37	20,51	r
404.	86,58	5,7516	15,194	15,194	-0,00292	-0,5857	1,7183	68,37	20,52	r
405.	86,77	5,7545	15,134	15,134	-0,00291	-0,5828	1,7172	68,32	20,62	r
406.	86,95	5,7574	15,076	15,076	-0,00290	-0,5799	1,7173	68,33	20,61	r
407.	87,13	5,7602	15,022	15,022	-0,00289	-0,5771	1,7178	68,35	20,56	r
408.	87,31	5,7633	14,964	14,964	-0,00288	-0,5740	1,7200	68,44	20,36	r
409.	87,50	5,7662	14,908	14,908	-0,00287	-0,5711	1,7210	68,48	20,28	r
410.	87,68	5,7690	14,848	14,848	-0,00286	-0,5683	1,7190	68,40	20,46	r
411.	87,86	5,7718	14,794	14,794	-0,00285	-0,5655	1,7200	68,44	20,37	r
412.	88,04	5,7747	14,736	14,736	-0,00283	-0,5626	1,7199	68,43	20,37	r
413.	88,22	5,7775	14,682	14,682	-0,00282	-0,5598	1,7206	68,46	20,32	r
414.	88,40	5,7803	14,623	14,623	-0,00281	-0,5570	1,7190	68,40	20,45	r
415.	88,58	5,7832	14,569	14,569	-0,00280	-0,5541	1,7212	68,48	20,26	r
416.	88,76	5,7860	14,512	14,512	-0,00279	-0,5513	1,7207	68,47	20,30	r
417.	88,94	5,7888	14,456	14,456	-0,00278	-0,5485	1,7207	68,46	20,31	r
418.	89,12	5,7916	14,400	14,400	-0,00277	-0,5457	1,7206	68,46	20,31	r
419.	89,32	5,7947	14,339	14,339	-0,00276	-0,5426	1,7207	68,46	20,30	r
420.	89,50	5,7976	14,282	14,282	-0,00275	-0,5397	1,7211	68,48	20,26	r
421.	89,68	5,8004	14,223	14,223	-0,00274	-0,5369	1,7199	68,43	20,37	r
422.	89,86	5,8032	14,169	14,169	-0,00273	-0,5341	1,7208	68,47	20,29	r
423.	90,04	5,8066	14,111	14,111	-0,00271	-0,5307	1,7257	68,66	19,85	r
424.	90,25	5,8095	14,050	14,050	-0,00270	-0,5278	1,7242	68,60	19,99	r
425.	90,43	5,8123	13,989	13,989	-0,00269	-0,5250	1,7217	68,50	20,21	r
426.	90,61	5,8155	13,935	13,935	-0,00268	-0,5218	1,7263	68,69	19,79	r
427.	90,83	5,8187	13,866	13,866	-0,00267	-0,5186	1,7242	68,60	19,99	r
428.	91,01	5,8215	13,809	13,809	-0,00266	-0,5158	1,7236	68,58	20,04	r
429.	91,19	5,8242	13,753	13,753	-0,00265	-0,5131	1,7225	68,54	20,14	r
430.	91,38	5,8274	13,694	13,694	-0,00263	-0,5099	1,7249	68,63	19,93	r
431.	91,57	5,8303	13,635	13,635	-0,00262	-0,5070	1,7241	68,60	19,99	r
432.	91,75	5,8332	13,578	13,578	-0,00261	-0,5041	1,7248	68,63	19,93	r
433.	91,93	5,8359	13,522	13,522	-0,00260	-0,5014	1,7237	68,59	20,03	r
434.	92,11	5,8387	13,466	13,466	-0,00259	-0,4986	1,7236	68,58	20,04	r
435.	92,30	5,8419	13,406	13,406	-0,00258	-0,4954	1,7255	68,66	19,87	r
436.	92,51	5,8451	13,342	13,342	-0,00257	-0,4922	1,7255	68,65	19,87	r
437.	92,69	5,8482	13,283	13,283	-0,00256	-0,4891	1,7270	68,72	19,72	r
438.	92,89	5,8510	13,219	13,219	-0,00254	-0,4863	1,7228	68,55	20,12	r
439.	93,07	5,8538	13,166	13,166	-0,00253	-0,4835	1,7246	68,62	19,95	r
440.	93,25	5,8567	13,110	13,110	-0,00252	-0,4806	1,7251	68,64	19,90	r
441.	93,43	5,8595	13,051	13,051	-0,00251	-0,4778	1,7241	68,60	20,00	r
442.	93,62	5,8623	12,996	12,996	-0,00250	-0,4750	1,7242	68,60	19,99	r
443.	93,79	5,8652	12,939	12,939	-0,00249	-0,4721	1,7247	68,62	19,94	r
444.	93,97	5,8680	12,884	12,884	-0,00248	-0,4693	1,7254	68,65	19,88	r
445.	94,15	5,8707	12,828	12,828	-0,00247	-0,4666	1,7243	68,61	19,98	r
446.	94,33	5,8738	12,772	12,772	-0,00246	-0,4635	1,7270	68,71	19,73	r
447.	94,51	5,8763	12,714	12,714	-0,00245	-0,4610	1,7232	68,56	20,08	r
448.	94,69	5,8792	12,658	12,658	-0,00244	-0,4581	1,7238	68,59	20,02	r
449.	94,87	5,8821	12,604	12,604	-0,00243	-0,4552	1,7258	68,67	19,84	r
450.	95,05	5,8849	12,545	12,545	-0,00241	-0,4524	1,7245	68,61	19,96	r
451.	95,22	5,8880	12,493	12,493	-0,00240	-0,4493	1,7291	68,80	19,53	r
452.	95,41	5,8904	12,433	12,433	-0,00239	-0,4469	1,7232	68,56	20,08	r
453.	95,59	5,8933	12,376	12,376	-0,00238	-0,4440	1,7239	68,59	20,01	r
454.	95,77	5,8965	12,323	12,323	-0,00237	-0,4408	1,7290	68,79	19,54	r
455.	95,96	5,8990	12,263	12,263	-0,00236	-0,4383	1,7241	68,60	20,00	r
456.	96,13	5,9018	12,210	12,210	-0,00235	-0,4355	1,7258	68,67	19,84	r
457.	96,30	5,9047	12,156	12,156	-0,00234	-0,4326	1,7278	68,75	19,65	r
458.	96,50	5,9082	12,096	12,096	-0,00233	-0,4291	1,7326	68,94	19,21	r
459.	96,69	5,9110	12,034	12,034	-0,00232	-0,4263	1,7295	68,82	19,49	r
460.	96,87	5,9138	11,976	11,976	-0,00230	-0,4235	1,7284	68,77	19,59	r
461.	97,05	5,9163	11,920	11,920	-0,00229	-0,4210	1,7256	68,66	19,86	r
462.	97,23	5,9195	11,865	11,865	-0,00228	-0,4178	1,7298	68,83	19,47	r
463.	97,41	5,9224	11,809	11,809	-0,00227	-0,4149	1,7309	68,87	19,37	r
464.	97,60	5,9258	11,748	11,748	-0,00226	-0,4115	1,7341	69,00	19,06	r
465.	97,81	5,9286	11,685	11,685	-0,00225	-0,4087	1,7306	68,86	19,39	r
466.	97,99	5,9314	11,628	11,628	-0,00224	-0,4059	1,7300	68,83	19,45	r
467.	98,19	5,9346	11,568	11,568	-0,00223	-0,4027	1,7322	68,92	19,25	r
468.	98,37	5,9373	11,509	11,509	-0,00222	-0,4000	1,7297	68,82	19,48	r
469.	98,55	5,9404	11,453	11,453	-0,00220	-0,3969	1,7324	68,93	19,22	r
470.	98,75	5,9435	11,390	11,390	-0,00219	-0,3938	1,7319	68,91	19,27	r
471.	98,95	5,9463	11,329	11,329	-0,00218	-0,3910	1,7292	68,80	19,53	r
472.	99,13	5,9491	11,270	11,270	-0,00217	-0,3882	1,7279	68,75	19,65	r
473.	99,31	5,9522	11,215	11,215	-0,00216	-0,3851	1,7315	68,89	19,31	r
474.	99,50	5,9550	11,156	11,156	-0,00215	-0,3823	1,7298	68,83	19,47	r
475.	99,69	5,9578	11,095	11,095	-0,00214	-0,3795	1,7270	68,72	19,73	r
476.	99,87	5,9606	11,041	11,041	-0,00213	-0,3767	1,7283	68,77	19,61	r
477.	100,05	5,9634	10,982	10,982	-0,00211	-0,3739	1,7266	68,70	19,77	r
478.	100,24	5,9665	10,926	10,926	-0,00210	-0,3708	1,7294	68,81	19,50	r
479.	100,43	5,9696	10,865	10,865	-0,00209	-0,3677	1,7301	68,84	19,44	r
480.	100,62	5,9728	10,806	10,806	-0,00208	-0,3645	1,7324	68,93	19,23	r
481.	100,82	5,9765	10,742	10,742	-0,00207	-0,3608	1,7375	69,13	18,73	r
482.	101,06	5,9796	10,669	10,669	-0,00205	-0,3577	1,7316	68,90	19,30	r
483.	101,26	5,9825	10,609	10,609	-0,00204	-0,3548	1,7309	68,87	19,37	r
484.	101,44	5,9854	10,550	10,550	-0,00203	-0,3519	1,7300	68,84	19,44	r
485.	101,62	5,9882	10,493	10,493	-0,00202	-0,3491	1,7300	68,83	19,45	r
486.	101,80	5,9910	10,438	10,438	-0,00201	-0,3463	1,7300	68,84	19,45	r
487.	101,99	5,9938	10,380	10,380	-0,00200	-0,3435	1,7290	68,79	19,54	r
488.	102,17	5,9969	10,323	10,323	-0,00199	-0,3404	1,7315	68,90	19,30	r
489.	102,36	5,9998	10,262	10,262	-0,00198	-0,3375	1,7301	68,84	19,44	r
490.	102,54	6,0027	10,204	10,204	-0,00196	-0,3346	1,7299	68,83	19,46	r

491.	102,71	6,0051	10,153	10,153	-0,00196	-0,3322	1,7287	68,78	19,57	r
492.	102,88	6,0082	10,097	10,097	-0,00194	-0,3291	1,7316	68,90	19,30	r
493.	103,08	6,0114	10,037	10,037	-0,00193	-0,3259	1,7335	68,98	19,11	r
494.	103,29	6,0143	9,972	9,972	-0,00192	-0,3230	1,7299	68,83	19,46	r
495.	103,46	6,0172	9,918	9,918	-0,00191	-0,3201	1,7320	68,91	19,26	r
496.	103,64	6,0203	9,860	9,860	-0,00190	-0,3170	1,7338	68,99	19,09	r
497.	103,84	6,0230	9,800	9,800	-0,00189	-0,3143	1,7305	68,85	19,40	r
498.	104,02	6,0258	9,743	9,743	-0,00188	-0,3115	1,7302	68,84	19,43	r
499.	104,20	6,0286	9,685	9,685	-0,00187	-0,3087	1,7292	68,80	19,52	r
500.	104,38	6,0321	9,632	9,632	-0,00186	-0,3052	1,7373	69,12	18,75	r
501.	104,58	6,0349	9,569	9,569	-0,00184	-0,3024	1,7340	68,99	19,07	r
502.	104,77	6,0378	9,509	9,509	-0,00183	-0,2995	1,7328	68,95	19,18	r
503.	104,96	6,0406	9,449	9,449	-0,00182	-0,2967	1,7309	68,87	19,37	r
504.	105,14	6,0436	9,394	9,394	-0,00181	-0,2937	1,7331	68,96	19,15	r
505.	105,32	6,0460	9,336	9,336	-0,00180	-0,2913	1,7284	68,77	19,60	r
506.	105,50	6,0487	9,280	9,280	-0,00179	-0,2886	1,7275	68,73	19,69	r
507.	105,68	6,0519	9,225	9,225	-0,00178	-0,2854	1,7315	68,90	19,30	r
508.	105,87	6,0548	9,164	9,164	-0,00177	-0,2825	1,7301	68,84	19,44	r
509.	106,05	6,0577	9,109	9,109	-0,00175	-0,2796	1,7318	68,91	19,28	r
510.	106,22	6,0606	9,055	9,055	-0,00174	-0,2767	1,7336	68,98	19,11	r
511.	106,40	6,0634	8,999	8,999	-0,00173	-0,2739	1,7336	68,98	19,11	r
512.	106,58	6,0663	8,944	8,944	-0,00172	-0,2710	1,7350	69,03	18,98	r
513.	106,76	6,0691	8,886	8,886	-0,00171	-0,2682	1,7341	69,00	19,06	r
514.	106,94	6,0724	8,830	8,830	-0,00170	-0,2649	1,7387	69,18	18,62	r
515.	107,16	6,0753	8,761	8,761	-0,00169	-0,2620	1,7335	68,98	19,11	r
516.	107,37	6,0785	8,698	8,698	-0,00168	-0,2588	1,7336	68,98	19,11	r
517.	107,56	6,0816	8,639	8,639	-0,00166	-0,2557	1,7354	69,05	18,94	r
518.	107,76	6,0854	8,574	8,574	-0,00165	-0,2519	1,7407	69,26	18,42	r
519.	107,98	6,0880	8,505	8,505	-0,00164	-0,2493	1,7324	68,93	19,23	r
520.	108,16	6,0911	8,449	8,449	-0,00163	-0,2462	1,7353	69,04	18,95	r
521.	108,34	6,0939	8,394	8,394	-0,00162	-0,2434	1,7353	69,05	18,94	r
522.	108,51	6,0967	8,340	8,340	-0,00161	-0,2406	1,7366	69,10	18,82	r
523.	108,69	6,0992	8,284	8,284	-0,00160	-0,2381	1,7332	68,96	19,14	r
524.	108,86	6,1021	8,231	8,231	-0,00159	-0,2352	1,7357	69,06	18,91	r
525.	109,03	6,1052	8,177	8,177	-0,00158	-0,2321	1,7400	69,23	18,49	r
526.	109,23	6,1081	8,113	8,113	-0,00156	-0,2292	1,7370	69,11	18,78	r
527.	109,40	6,1106	8,059	8,059	-0,00155	-0,2267	1,7346	69,02	19,02	r
528.	109,58	6,1134	8,006	8,006	-0,00154	-0,2239	1,7360	69,07	18,88	r
529.	109,75	6,1161	7,951	7,951	-0,00153	-0,2212	1,7355	69,05	18,92	r
530.	109,94	6,1189	7,894	7,894	-0,00152	-0,2184	1,7349	69,03	18,98	r
531.	110,13	6,1220	7,834	7,834	-0,00151	-0,2153	1,7362	69,08	18,86	r
532.	110,30	6,1249	7,779	7,779	-0,00150	-0,2124	1,7374	69,13	18,74	r
533.	110,50	6,1277	7,718	7,718	-0,00149	-0,2096	1,7351	69,04	18,97	r
534.	110,69	6,1309	7,662	7,662	-0,00148	-0,2064	1,7388	69,19	18,60	r
535.	110,85	6,1334	7,607	7,607	-0,00147	-0,2039	1,7363	69,09	18,85	r
536.	111,02	6,1365	7,555	7,555	-0,00146	-0,2008	1,7411	69,28	18,38	r
537.	111,24	6,1393	7,485	7,485	-0,00144	-0,1980	1,7345	69,01	19,02	r
538.	111,41	6,1422	7,433	7,433	-0,00143	-0,1951	1,7372	69,12	18,76	r
539.	111,58	6,1447	7,379	7,379	-0,00142	-0,1926	1,7350	69,03	18,97	r
540.	111,75	6,1479	7,324	7,324	-0,00141	-0,1894	1,7396	69,21	18,53	r
541.	111,94	6,1504	7,268	7,268	-0,00140	-0,1869	1,7367	69,10	18,81	r
542.	112,11	6,1533	7,212	7,212	-0,00139	-0,1840	1,7377	69,14	18,72	r
543.	112,29	6,1561	7,158	7,158	-0,00138	-0,1812	1,7387	69,18	18,62	r
544.	112,47	6,1589	7,104	7,104	-0,00137	-0,1784	1,7392	69,20	18,56	r
545.	112,64	6,1614	7,050	7,050	-0,00136	-0,1759	1,7373	69,13	18,75	r
546.	112,81	6,1643	6,997	6,997	-0,00135	-0,1730	1,7396	69,22	18,52	r
547.	112,99	6,1681	6,939	6,939	-0,00134	-0,1692	1,7485	69,57	17,63	r
548.	113,21	6,1709	6,870	6,870	-0,00133	-0,1664	1,7420	69,31	18,29	r
549.	113,40	6,1738	6,812	6,812	-0,00131	-0,1635	1,7422	69,32	18,28	r
550.	113,58	6,1767	6,754	6,754	-0,00130	-0,1606	1,7422	69,32	18,27	r
551.	113,75	6,1792	6,702	6,702	-0,00129	-0,1581	1,7411	69,28	18,38	r
552.	113,93	6,1824	6,645	6,645	-0,00128	-0,1549	1,7445	69,41	18,04	r
553.	114,12	6,1849	6,587	6,587	-0,00127	-0,1524	1,7404	69,25	18,45	r
554.	114,28	6,1878	6,535	6,535	-0,00126	-0,1495	1,7433	69,36	18,16	r
555.	114,46	6,1908	6,481	6,481	-0,00125	-0,1465	1,7462	69,48	17,87	r
556.	114,63	6,1936	6,426	6,426	-0,00124	-0,1437	1,7470	69,51	17,79	r
557.	114,80	6,1964	6,372	6,372	-0,00123	-0,1409	1,7478	69,54	17,70	r
558.	114,98	6,1995	6,314	6,314	-0,00122	-0,1378	1,7494	69,61	17,54	r
559.	115,19	6,2024	6,249	6,249	-0,00121	-0,1349	1,7462	69,48	17,87	r
560.	115,37	6,2049	6,197	6,197	-0,00120	-0,1324	1,7450	69,43	17,99	r
561.	115,55	6,2077	6,141	6,141	-0,00119	-0,1296	1,7451	69,43	17,98	r
562.	115,73	6,2108	6,084	6,084	-0,00117	-0,1265	1,7474	69,53	17,75	r
563.	115,90	6,2134	6,029	6,029	-0,00116	-0,1239	1,7459	69,47	17,90	r
564.	116,08	6,2163	5,974	5,974	-0,00115	-0,1210	1,7475	69,53	17,74	r
565.	116,26	6,2195	5,918	5,918	-0,00114	-0,1178	1,7513	69,68	17,34	r
566.	116,45	6,2226	5,857	5,857	-0,00113	-0,1147	1,7516	69,69	17,31	r
567.	116,64	6,2251	5,797	5,797	-0,00112	-0,1122	1,7468	69,50	17,81	r
568.	116,81	6,2283	5,745	5,745	-0,00111	-0,1090	1,7524	69,72	17,23	r
569.	117,00	6,2311	5,688	5,688	-0,00110	-0,1062	1,7522	69,72	17,24	r
570.	117,18	6,2343	5,629	5,629	-0,00109	-0,1030	1,7545	69,81	17,00	r
571.	117,39	6,2372	5,565	5,565	-0,00108	-0,1001	1,7516	69,69	17,31	r
572.	117,56	6,2401	5,510	5,510	-0,00106	-0,0972	1,7530	69,75	17,16	r
573.	117,76	6,2430	5,451	5,451	-0,00105	-0,0943	1,7525	69,73	17,21	r
574.	117,93	6,2471	5,393	5,393	-0,00104	-0,0902	1,7640	70,19	15,95	r
575.	118,18	6,2502	5,315	5,315	-0,00103	-0,0871	1,7561	69,87	16,83	r
576.	118,38	6,2527	5,255	5,255	-0,00102	-0,0846	1,7514	69,68	17,33	r
577.	118,55	6,2555	5,203	5,203	-0,00101	-0,0818	1,7529	69,75	17,17	r
578.	118,75	6,2592	5,142	5,142	-9,94E-04	-0,0781	1,7596	70,01	16,45	r
579.	118,95	6,2621	5,077	5,077	-9,82E-04	-0,0752	1,7562	69,88	16,82	r
580.	119,13	6,2655	5,018	5,018	-9,70E-04	-0,0718	1,7602	70,04	16,38	r
581.	119,35	6,2683	4,953	4,953	-9,58E-04	-0,0690	1,7559	69,86	16,85	r
582.	119,54	6,2715	4,895	4,895	-9,47E-04	-0,0658	1,7587	69,98	16,54	r
583.	119,74	6,2747	4,833	4,833	-9,35E-04	-0,0626	1,7599	70,02	16,42	r
584.	119,93	6,2782	4,770	4,770	-9,23E-04	-0,0591	1,7629	70,14	16,08	r
585.	120,15	6,2811	4,703	4,703	-9,10E-04	-0,0562	1,7586	69,97	16,56	r
586.	120,32	6,2840	4,649	4,649	-9,00E-04	-0,0533	1,7604	70,04	16,37	r
587.	120,49	6,2869	4,595	4,595	-8,89E-04	-0,0504	1,7624	70,12	16,13	r
588.	120,66	6,2894	4,541	4,541	-8,79E-04	-0,0479	1,7603	70,04	16,37	r
589.	120,85	6,2922	4,485	4,485	-8,68E-04	-0,0451	1,7606	70,05	16,34	r
590.	121,03	6,2952	4,428	4,428	-8,57E-04	-0,0421	1,7618	70,10	16,20	r
591.	121,20	6,2987	4,373	4,373	-8,47E-04	-0,0386	1,7692	70,39	15,36	r
592.	121,41	6,3015	4,306	4,306	-8,34E-04	-0,0358	1,7637	70,17	15,99	r
593.	121,60	6,3043	4,248	4,248	-8,23E-04	-0,0330	1,7628	70,14	16,09	r

594.	121,78	6,3072	4,192	4,192	-8,12E-04	-0,0301	1,7639	70,18	15,97	r
595.	121,96	6,3110	4,136	4,136	-8,01E-04	-0,0263	1,7735	70,57	14,84	r
596.	122,20	6,3139	4,061	4,061	-7,87E-04	-0,0234	1,7652	70,23	15,82	r
597.	122,38	6,3167	4,006	4,006	-7,76E-04	-0,0206	1,7657	70,25	15,77	r
598.	122,55	6,3196	3,952	3,952	-7,66E-04	-0,0177	1,7674	70,32	15,57	r
599.	122,73	6,3229	3,894	3,894	-7,55E-04	-0,0144	1,7711	70,47	15,13	r
600.	122,93	6,3257	3,835	3,835	-7,43E-04	-0,0116	1,7697	70,41	15,30	r
601.	123,11	6,3288	3,778	3,778	-7,33E-04	-0,0085	1,7722	70,51	15,00	r
602.	123,30	6,3317	3,716	3,716	-7,21E-04	-0,0056	1,7701	70,43	15,25	r
603.	123,47	6,3342	3,662	3,662	-7,10E-04	-0,0031	1,7683	70,36	15,46	r
604.	123,65	6,3373	3,608	3,608	-7,00E-04	0,0000	1,7720	70,50	15,02	r
605.	123,84	6,3401	3,549	3,549	-6,89E-04	0,0028	1,7704	70,44	15,22	r
606.	124,04	6,3437	3,489	3,489	-6,77E-04	0,0064	1,7764	70,68	14,48	r
607.	124,25	6,3469	3,417	3,417	-6,63E-04	0,0096	1,7722	70,51	14,99	r
608.	124,45	6,3498	3,359	3,359	-6,52E-04	0,0125	1,7724	70,52	14,97	r
609.	124,62	6,3526	3,303	3,303	-6,42E-04	0,0153	1,7724	70,52	14,97	r
610.	124,81	6,3555	3,248	3,248	-6,31E-04	0,0182	1,7740	70,58	14,78	r
611.	124,97	6,3580	3,193	3,193	-6,20E-04	0,0207	1,7715	70,48	15,09	r
612.	125,16	6,3618	3,138	3,138	-6,10E-04	0,0245	1,7816	70,89	13,82	r
613.	125,38	6,3647	3,066	3,066	-5,96E-04	0,0274	1,7745	70,61	14,71	r
614.	125,56	6,3676	3,011	3,011	-5,86E-04	0,0303	1,7762	70,67	14,50	r
615.	125,73	6,3701	2,958	2,958	-5,75E-04	0,0328	1,7743	70,60	14,74	r
616.	125,90	6,3729	2,904	2,904	-5,65E-04	0,0356	1,7756	70,65	14,58	r
617.	126,09	6,3764	2,847	2,847	-5,54E-04	0,0391	1,7816	70,89	13,81	r
618.	126,30	6,3793	2,778	2,778	-5,41E-04	0,0420	1,7765	70,69	14,46	r
619.	126,49	6,3825	2,720	2,720	-5,30E-04	0,0452	1,7794	70,80	14,10	r
620.	126,67	6,3850	2,665	2,665	-5,19E-04	0,0477	1,7768	70,70	14,43	r
621.	126,84	6,3879	2,610	2,610	-5,09E-04	0,0506	1,7781	70,75	14,26	r
622.	127,01	6,3908	2,556	2,556	-4,98E-04	0,0535	1,7800	70,82	14,03	r
623.	127,21	6,3946	2,498	2,498	-4,87E-04	0,0573	1,7890	71,18	12,82	r
624.	127,43	6,3978	2,425	2,425	-4,73E-04	0,0605	1,7845	71,00	13,44	r
625.	127,63	6,4003	2,365	2,365	-4,62E-04	0,0630	1,7794	70,80	14,11	r
626.	127,80	6,4032	2,311	2,311	-4,51E-04	0,0659	1,7815	70,88	13,83	r
627.	127,99	6,4070	2,253	2,253	-4,40E-04	0,0697	1,7904	71,24	12,62	r
628.	128,20	6,4095	2,185	2,185	-4,27E-04	0,0722	1,7811	70,87	13,88	r
629.	128,40	6,4127	2,128	2,128	-4,16E-04	0,0754	1,7848	71,02	13,39	r
630.	128,59	6,4162	2,065	2,065	-4,04E-04	0,0789	1,7880	71,14	12,96	r
631.	128,78	6,4187	2,005	2,005	-3,93E-04	0,0814	1,7830	70,94	13,63	r
632.	128,95	6,4215	1,951	1,951	-3,82E-04	0,0842	1,7838	70,98	13,53	r
633.	129,15	6,4250	1,891	1,891	-3,71E-04	0,0877	1,7888	71,17	12,84	r
634.	129,33	6,4285	1,830	1,830	-3,59E-04	0,0912	1,7934	71,36	12,18	r
635.	129,56	6,4314	1,759	1,759	-3,45E-04	0,0941	1,7868	71,09	13,12	r
636.	129,74	6,4343	1,704	1,704	-3,35E-04	0,0970	1,7884	71,16	12,90	r
637.	129,92	6,4370	1,649	1,649	-3,24E-04	0,0997	1,7876	71,13	13,00	r
638.	130,08	6,4405	1,596	1,596	-3,14E-04	0,1032	1,7961	71,46	11,78	r
639.	130,32	6,4436	1,523	1,523	-3,00E-04	0,1063	1,7906	71,24	12,59	r
640.	130,52	6,4468	1,462	1,462	-2,89E-04	0,1095	1,7922	71,31	12,35	r
641.	130,71	6,4497	1,403	1,403	-2,77E-04	0,1124	1,7916	71,28	12,45	r
642.	130,89	6,4525	1,346	1,346	-2,66E-04	0,1152	1,7908	71,25	12,56	r
643.	131,07	6,4557	1,285	1,285	-2,55E-04	0,1184	1,7923	71,31	12,34	r
644.	131,27	6,4592	1,225	1,225	-2,43E-04	0,1219	1,7970	71,50	11,64	r
645.	131,50	6,4631	1,155	1,155	-2,30E-04	0,1258	1,8012	71,67	10,97	r
646.	131,72	6,4659	1,087	1,087	-2,16E-04	0,1286	1,7950	71,42	11,95	r
647.	131,89	6,4685	1,033	1,033	-2,06E-04	0,1312	1,7943	71,39	12,04	r
648.	132,06	6,4723	0,979	0,979	-1,96E-04	0,1350	1,8050	71,82	10,32	r
649.	132,29	6,4748	0,907	0,907	-1,82E-04	0,1375	1,7938	71,37	12,12	r
650.	132,46	6,4777	0,853	0,853	-1,72E-04	0,1404	1,7959	71,46	11,80	r
651.	132,64	6,4808	0,797	0,797	-1,61E-04	0,1435	1,7987	71,57	11,37	r
652.	132,84	6,4837	0,735	0,735	-1,49E-04	0,1464	1,7966	71,49	11,69	r
653.	133,02	6,4866	0,679	0,679	-1,38E-04	0,1493	1,7976	71,53	11,53	r
654.	133,19	6,4894	0,625	0,625	-1,28E-04	0,1521	1,7985	71,56	11,40	r
655.	133,37	6,4926	0,570	0,570	-1,17E-04	0,1553	1,8030	71,74	10,66	r
656.	133,58	6,4954	0,503	0,503	-1,05E-04	0,1581	1,7978	71,53	11,50	r
657.	133,77	6,4986	0,446	0,446	-9,37E-05	0,1613	1,8011	71,66	10,97	r
658.	133,94	6,5018	0,389	0,389	-8,28E-05	0,1645	1,8045	71,80	10,40	r
659.	134,15	6,5056	0,324	0,324	-7,03E-05	0,1683	1,8098	72,01	9,44	r
660.	134,40	6,5088	0,247	0,247	-5,55E-05	0,1715	1,8034	71,76	10,59	r
661.	134,60	6,5116	0,187	0,187	-4,39E-05	0,1743	1,8011	71,66	10,97	r
662.	134,78	6,5148	0,128	0,128	-3,27E-05	0,1775	1,8038	71,77	10,53	r
663.	134,98	6,5177	0,067	0,067	-2,09E-05	0,1804	1,8020	71,70	10,84	r
664.	135,16	6,5207	0,011	0,011	-1,02E-05	0,1834	1,8040	71,78	10,50	r
665.	135,34	6,5243	-0,045	-0,045	5,72E-07	0,1870	1,8117	72,09	9,08	cb
666.	135,55	6,5273	-0,113	-0,113	1,35E-05	0,1900	1,8081	71,94	9,77	cb
667.	135,72	6,5300	-0,166	-0,166	2,37E-05	0,1927	1,8084	71,95	9,71	cb
668.	135,90	6,5333	-0,221	-0,221	3,42E-05	0,1960	1,8138	72,17	8,66	cb
669.	136,08	6,5377	-0,279	-0,279	4,53E-05	0,2004	1,8285	72,75	4,72	cb
670.	136,36	6,5419	-0,362	-0,362	6,14E-05	0,2046	1,8285	72,75	4,72	cb
671.	136,58	6,5452	-0,435	-0,435	7,53E-05	0,2079	1,8250	72,61	5,90	cb
672.	136,78	6,5482	-0,496	-0,496	8,69E-05	0,2109	1,8247	72,60	6,00	cb
673.	136,96	6,5511	-0,553	-0,553	9,78E-05	0,2138	1,8252	72,62	5,84	cb
674.	137,14	6,5541	-0,608	-0,608	1,09E-04	0,2168	1,8272	72,70	5,20	cb
675.	137,34	6,5582	-0,669	-0,669	1,20E-04	0,2209	1,8377	73,12	0	cb
676.	137,57	6,5612	-0,743	-0,743	1,34E-04	0,2239	1,8307	72,84	3,78	cb
677.	137,76	6,5646	-0,801	-0,801	1,45E-04	0,2273	1,8354	73,03	0	cb
678.	137,94	6,5676	-0,859	-0,859	1,57E-04	0,2303	1,8365	73,07	0	cb
679.	138,12	6,5709	-0,917	-0,917	1,68E-04	0,2336	1,8403	73,22	0	cb
680.	138,33	6,5743	-0,982	-0,982	1,80E-04	0,2370	1,8416	73,28	0	cb
681.	138,53	6,5780	-1,043	-1,043	1,92E-04	0,2407	1,8481	73,53	0	cb
682.	138,74	6,5813	-1,110	-1,110	2,05E-04	0,2440	1,8474	73,51	0	cb
683.	138,95	6,5846	-1,174	-1,174	2,17E-04	0,2473	1,8484	73,54	0	cb
684.	139,12	6,5872	-1,229	-1,229	2,28E-04	0,2499	1,8467	73,48	0	cb
685.	139,31	6,5905	-1,286	-1,286	2,38E-04	0,2532	1,8511	73,65	0	cb
686.	139,50	6,5945	-1,347	-1,347	2,50E-04	0,2572	1,8602	74,01	0	cb
687.	139,74	6,5975	-1,420	-1,420	2,64E-04	0,2602	1,8539	73,77	0	cb
688.	139,93	6,6009	-1,479	-1,479	2,75E-04	0,2636	1,8581	73,93	0	cb
689.	140,12	6,6042	-1,539	-1,539	2,87E-04	0,2669	1,8609	74,04	0	cb
690.	140,32	6,6079	-1,602	-1,602	2,99E-04	0,2706	1,8661	74,25	0	cb
691.	140,53	6,6109	-1,667	-1,667	3,11E-04	0,2736	1,8638	74,16	0	cb
692.	140,71	6,6140	-1,725	-1,725	3,23E-04	0,2767	1,8658	74,24	0	cb
693.	140,89	6,6170	-1,781	-1,781	3,33E-04	0,2797	1,8676	74,31	0	cb
694.	141,07	6,6200	-1,837	-1,837	3,44E-04	0,2827	1,8695	74,39	0	cb
695.	141,25	6,6229	-1,893	-1,893	3,55E-04	0,2856	1,8702	74,41	0	cb
696.	141,43	6,6269	-1,950	-1,950	3,66E-04	0,2896	1,8815	74,86	0	cb

697.	141,67	6,6299	-2,023	-2,023	3,80E-04	0,2926	1,8750	74,60	0	cb
698.	141,85	6,6329	-2,081	-2,081	3,91E-04	0,2956	1,8757	74,63	0	cb
699.	142,04	6,6362	-2,139	-2,139	4,02E-04	0,2989	1,8797	74,79	0	cb
700.	142,23	6,6406	-2,198	-2,198	4,13E-04	0,3033	1,8939	75,36	0	cb
701.	142,49	6,6436	-2,282	-2,282	4,29E-04	0,3063	1,8822	74,89	0	cb
702.	142,67	6,6469	-2,338	-2,338	4,40E-04	0,3096	1,8870	75,08	0	cb
703.	142,85	6,6499	-2,396	-2,396	4,51E-04	0,3126	1,8879	75,12	0	cb
704.	143,04	6,6528	-2,454	-2,454	4,63E-04	0,3155	1,8875	75,10	0	cb
705.	143,23	6,6557	-2,513	-2,513	4,74E-04	0,3184	1,8873	75,09	0	cb
706.	143,41	6,6600	-2,568	-2,568	4,84E-04	0,3227	1,9021	75,68	0	cb
707.	143,67	6,6633	-2,650	-2,650	5,00E-04	0,3260	1,8941	75,36	0	cb
708.	143,87	6,6671	-2,712	-2,712	5,12E-04	0,3298	1,9009	75,63	0	cb
709.	144,07	6,6701	-2,775	-2,775	5,24E-04	0,3328	1,8994	75,57	0	cb
710.	144,25	6,6738	-2,831	-2,831	5,35E-04	0,3365	1,9081	75,92	0	cb
711.	144,51	6,6767	-2,913	-2,913	5,50E-04	0,3394	1,8965	75,46	0	cb
712.	144,71	6,6798	-2,976	-2,976	5,63E-04	0,3425	1,8958	75,43	0	cb
713.	144,93	6,6819	-3,044	-3,044	5,76E-04	0,3446	1,8830	74,92	0	cb
714.	145,12	6,6837	-3,102	-3,102	5,87E-04	0,3464	1,8721	74,49	0	cb
715.	145,30	6,6852	-3,159	-3,159	5,98E-04	0,3479	1,8586	73,95	0	cb
716.	145,48	6,6865	-3,216	-3,216	6,09E-04	0,3492	1,8435	73,35	0	cb
717.	145,71	6,6872	-3,288	-3,288	6,22E-04	0,3499	1,8150	72,22	8,40	cb
718.	145,91	6,6874	-3,350	-3,350	6,34E-04	0,3501	1,7865	71,08	13,17	cb
719.	146,11	6,6870	-3,412	-3,412	6,46E-04	0,3497	1,7522	69,72	17,25	cb
720.	146,31	6,6854	-3,476	-3,476	6,58E-04	0,3481	1,7051	67,84	21,66	cb
721.	146,57	6,6832	-3,559	-3,559	6,74E-04	0,3459	1,6427	65,36	26,45	cb
722.	146,80	6,6801	-3,630	-3,630	6,88E-04	0,3428	1,5771	62,75	30,73	cb
723.	147,03	6,6759	-3,700	-3,700	7,01E-04	0,3386	1,5015	59,74	35,07	cb
724.	147,24	6,6709	-3,766	-3,766	7,14E-04	0,3336	1,4200	56,50	39,29	cb
725.	147,44	6,6644	-3,828	-3,828	7,26E-04	0,3271	1,3258	52,75	43,73	cb
726.	147,63	6,6528	-3,889	-3,889	7,38E-04	0,3155	1,1821	47,03	49,89	cb
727.	147,89	6,4815	-3,969	-3,969	7,53E-04	0,1442	-0,5374	-	107,03	cb

**Temperaturangaben** beziehen sich auf die Skala der ITS-90. **Standardabweichungen:** Verschiedentlich werden Regressionsfunktionen mit Standardabweichungen bzw. Varianzen qualifiziert. Diese Angaben werden berechnet aus der Summe der Quadrate der Abweichungen der Einzelwerte zu jeweils berechneten Funktionswerten dividiert durch die Anzahl der Werte weniger 1. Sofern nicht anders bezeichnet, werden für  $\pm$ (Standardmess-)Unsicherheiten einfache Standardabweichungen - ohne Erweiterungsfaktoren - angegeben, d.h. die Überdeckung betrifft 67% der Werte.

## Programm

Data created during execution of the IMPro "ContactAngle\_atConstantLevel", type 4/4. Automatic self-repetition of the IMPro - the 6. Repetition. IMPro finished as projected.

(the digital twin of process IDN°24582 provides on demand reports with more details, audit-log protocol and structured raw data)

## Prüfmittel

Die Kraftmesseinrichtung (WZA224) wurde 11,3 Stunden vor dieser Messung von Labor justiert.

**IMETER ID23903733: Technische Daten:** Auflösung des Wägesystems 0,1 mg, Messunsicherheit (Linearität) 0,2 mg, Dichte der Justiermasse  $\rho_{cal}$  8,00 g/cm<sup>3</sup>, Luftdichte  $\rho_{air}$  1,15927 kg/m<sup>3</sup>; Schwerebeschleunigung  $g$  9,80769 m/s<sup>2</sup>. Pt100-Temperaturmessung: Auflösung 0,001 K, Messunsicherheit  $\pm 0,005$  K,  $R^\circ$  100.0056  $\Omega$ , Kalibrierintervall 30 min (BN°2, -25/152°C, 3S, FS15,8). Die Messauflösung der sekundären Temperaturmessung beträgt 0,01 K, die Unsicherheit 0,03 K. Akquisitions-Softwareversion IMETER 7.5.24, LizenzN° \*3037-4759\*, W. 6.2,9200- Betriebssystem auf PC Ser.N° 6995684 (C, SSD).