

3.ZADATAK

RADNA MERA
TAČNOST RADA OS-A
VELIČINA ŠKARTA

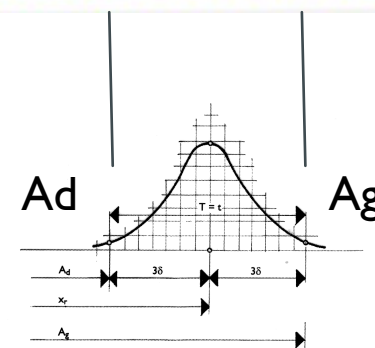
ODREĐIVANJE RADNE MERE



Predavanje br.3

VRSTE MERA

- ❖ Kotirana/nazivna mera
- ❖ Ciljana mera
- ❖ Stvarna/izmerena mera



POSTAVKA ZADATKA

ULAZNI PODACI

Utvrditi ukupnu tehnološku grešku (upisati naziv OS-a iz tabele) pri izradi partije uzoraka. Merenje se obavlja kljunastim merilom tačnosti (upisati tačnost iz tabele)mm.

Merenje je obavljeno na (upisati naziv detalja iz tabele) dimenzija datih na slici.

Nazivna mera: $x_r =$ (upisati nazivnu meru iz tabele)

Klasa tačnosti u kojoj detalj treba da bude izrađen: (upisati klasu tačnosti iz tabele)

ZADATAK

1. Odrediti toleranciju zadatog elementa veze.
2. Odrediti ciljanu meru.
3. Odrediti tačnost rada mašine.
4. Izračunati veličinu škarta.



PRIMER REŠAVANJA ZADATKA

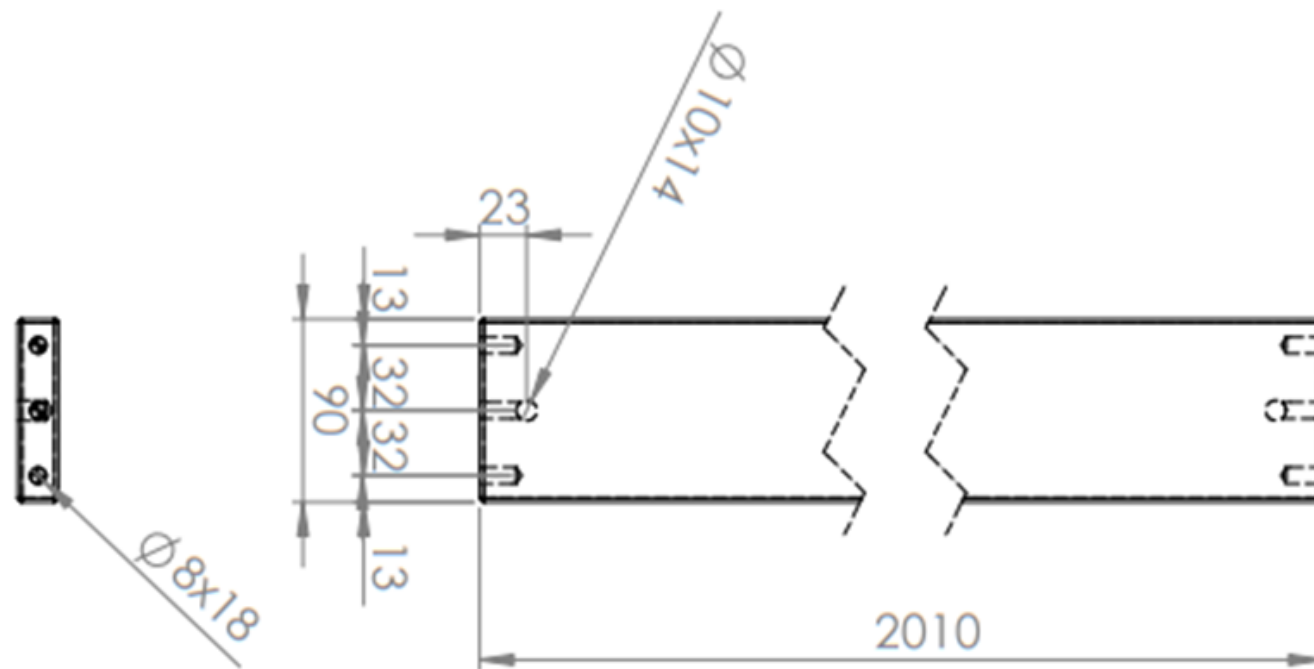
I. ODREDITI TOLERANCIJU ZADATOG ELEMENTA VEZE

Utvrditi ukupnu tehnološku grešku debljače pri izradi partije uzoraka. Merenje se obavlja kljunastim merilom tačnosti 0,05mm.

Merenje je obavljeno na debljini stranice kreveta dimenzija datih na slici.

Nazivna mera: $d_r = 19mm$ (← $25mm$)

Klasa tačnosti u kojoj detalj treba da bude izrađen: TD25



I. ODREDITI TOLERANCIJU ZADATOG ELEMENTA

Nazivna mera: $dr = 19\text{mm}$

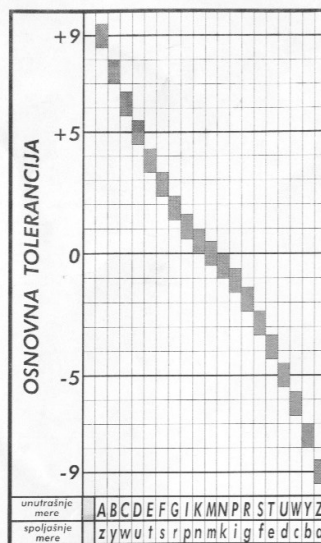
Klasa tačnosti u kojoj detalj treba da bude izrađen: TD25

TD25

$dr = 19\text{mm}$

$T_o = 0,35\text{mm}$, M/m

$dr = 19 \pm 0,175\text{mm}$



OSNOVNE TOLERANCIJE

JUS D.E1.009

| Područje nazivne mere (mm) | | Osnovne tolerancije T_o , u mm, za redove tolerancija za drvo | | | | | | | | | | |
|----------------------------|-------|---|------|------|------|------|------|-------|-------|-------|-------|-------|
| od | do | TD6 | TD10 | TD15 | TD25 | TD40 | TD60 | TD100 | TD160 | TD250 | TD400 | TD630 |
| 1 | 3 | 0,06 | 0,10 | 0,16 | 0,25 | 0,40 | 0,60 | - | - | - | - | - |
| 3 | 10 | 0,07 | 0,12 | 0,18 | 0,30 | 0,50 | 0,70 | 1,4 | 2,2 | 3,5 | - | - |
| 10 | 30 | 0,08 | 0,14 | 0,21 | 0,35 | 0,55 | 0,85 | 1,4 | 2,2 | 3,5 | - | - |
| 30 | 100 | 0,10 | 0,17 | 0,26 | 0,45 | 0,70 | 1,05 | 2,0 | 3,1 | 5,0 | 8,0 | - |
| 100 | 250 | 0,12 | 0,20 | 0,31 | 0,50 | 0,80 | 1,25 | 2,0 | 3,1 | 5,0 | 8,0 | - |
| 250 | 500 | 0,14 | 0,24 | 0,36 | 0,60 | 0,95 | 1,45 | 2,4 | 3,8 | 6,0 | 10,0 | 15,0 |
| 500 | 1000 | - | 0,28 | 0,42 | 0,70 | 1,15 | 1,70 | 2,8 | 4,5 | 7,0 | 11,0 | 18,0 |
| 1000 | 2500 | - | 0,36 | 0,54 | 0,90 | 1,45 | 2,15 | 3,6 | 5,7 | 9,0 | 14,0 | 23,0 |
| 2500 | 5000 | - | 0,46 | 0,70 | 1,15 | 1,85 | 2,80 | 4,6 | 7,4 | 11,5 | 19,0 | 29,0 |
| 5000 | 10000 | - | - | - | - | 2,45 | 3,65 | 6,1 | 9,8 | 15,5 | 24,0 | 39,0 |
| 10000 | 25000 | - | - | - | - | - | - | 9,2 | 14,7 | 23,0 | 37,0 | 58,0 |

Okvirno: TD6 i TD10 - kutijaste veze (kutije za nakit, radio, alat);
TD15 i TD25 - elementi veze kod nameštaja;
TD40 i TD60 - nameštaj, pregradna vrata, ploče stola.

Šematski prikaz položaja tolerancijaskih polja

Tabela: Položaj tolerancijaskih polja prema nultoj liniji

JUS D.E1.013

| Tolerancijasko polje | A/z | Z/a | B/y | Y/b | C/w | W/c | D/u | U/d | E/t | T/e | F/s | S/f | G/r | R/g | I/p | P/i | K/n | N/k | M/m |
|--|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|-------|
| Odstojanje sredine tolerancijaskog polja od nulte linije | 9T | -9T | 7.5T | -7.5T | 6.2T | -6.2T | 5T | -5T | 3.9T | -3.9T | 2.8T | -2.8T | 2T | -2T | 1.2T | -1.2T | 0.5T | -0.5T | 0 |
| Gornje odstupanje | 9.5T | -8.5T | 8T | -7T | 6.7T | -5.7T | 5.5T | -4.5T | 4.4T | -3.4T | 3.4T | -2.4T | 2.5T | -1.5T | 1.7T | -0.7T | 1T | 0 | 0.5T |
| Donje odstupanje | 8.5T | -9.5T | 7T | -8T | 5.7T | -6.7T | 4.5T | -5.5T | 3.4T | -4.4T | 2.4T | -3.4T | 1.5T | -2.5T | 0.7T | -1.7T | 0 | -T | -0.5T |

2. ODREDITI CILJANU MERU

formula

$$x_c = (A_g + A_d) / 2$$

primer

dc – ciljana mera

$$d_c = (18,825 + 19,175) / 2 = 19 \text{ mm}$$

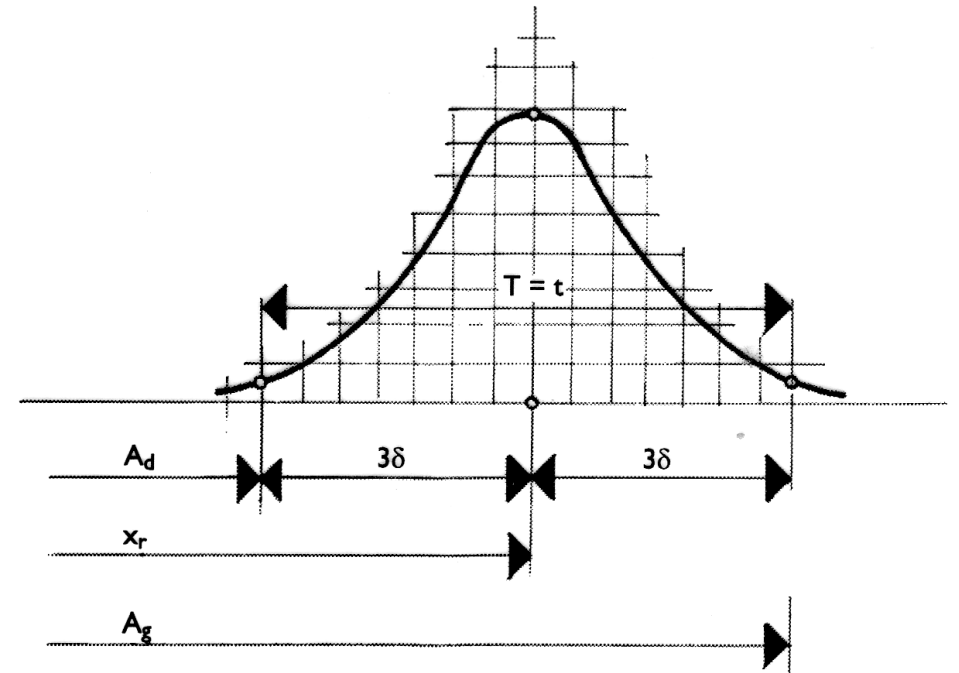
3. ODREDITI TAČNOST RADA MAŠINE

STANDARDNA DEVIJACIJA

$$\sigma = \sqrt{\frac{\sum (x_i - \bar{x})^2 \cdot f_i}{n-1}} \quad (\text{mm})$$

TAČNOST RADA MAŠINE

$$\Delta = 6 \cdot \sigma \quad (\text{mm})$$



3. ODREDITI TAČNOST RADA MAŠINE

STANDARDNA DEVIJACIJA

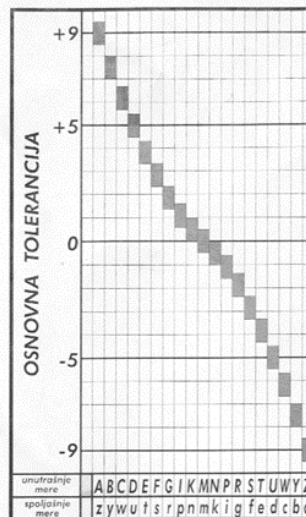
$$\sigma = 0,101 \text{ mm}$$

TAČNOST RADA MAŠINE

$$\Delta = 0,607 \text{ mm}$$



TD40



OSNOVNE TOLERANCIJE

JUS D.E1.009

| Područje nazivne mere (mm) | | Osnovne tolerancije T_o , u mm, za redove tolerancija za drvo | | | | | | | | | | |
|----------------------------|-------|---|------|------|------|------|------|-------|-------|-------|-------|-------|
| od | do | TD6 | TD10 | TD15 | TD25 | TD40 | TD60 | TD100 | TD160 | TD250 | TD400 | TD630 |
| 1 | 3 | 0,06 | 0,10 | 0,16 | 0,25 | 0,40 | 0,60 | - | - | - | - | - |
| 3 | 10 | 0,07 | 0,12 | 0,18 | 0,30 | 0,50 | 0,70 | 1,4 | 2,2 | 3,5 | - | - |
| 10 | 30 | 0,08 | 0,14 | 0,21 | 0,35 | 0,55 | 0,85 | 1,4 | 2,2 | 3,5 | - | - |
| 30 | 100 | 0,10 | 0,17 | 0,26 | 0,45 | 0,70 | 1,05 | 2,0 | 3,1 | 5,0 | 8,0 | - |
| 100 | 250 | 0,12 | 0,20 | 0,31 | 0,50 | 0,80 | 1,25 | 2,0 | 3,1 | 5,0 | 8,0 | - |
| 250 | 500 | 0,14 | 0,24 | 0,36 | 0,60 | 0,95 | 1,45 | 2,4 | 3,8 | 6,0 | 10,0 | 15,0 |
| 500 | 1000 | - | 0,28 | 0,42 | 0,70 | 1,15 | 1,70 | 2,8 | 4,5 | 7,0 | 11,0 | 18,0 |
| 1000 | 2500 | - | 0,36 | 0,54 | 0,90 | 1,45 | 2,15 | 3,6 | 5,7 | 9,0 | 14,0 | 23,0 |
| 2500 | 5000 | - | 0,46 | 0,70 | 1,15 | 1,85 | 2,80 | 4,6 | 7,4 | 11,5 | 19,0 | 29,0 |
| 5000 | 10000 | - | - | - | - | 2,45 | 3,65 | 6,1 | 9,8 | 15,5 | 24,0 | 39,0 |
| 10000 | 25000 | - | - | - | - | - | - | 9,2 | 14,7 | 23,0 | 37,0 | 58,0 |

Okvirno: TD6 i TD10 - kutijaste veze (kutije za nakit, radio, alat);
TD15 i TD25 - elementi veze kod nameštaja;
TD40 i TD60 - nameštaj, pregradna vrata, ploče stola.

Šematski prikaz položaja tolerancijskih polja

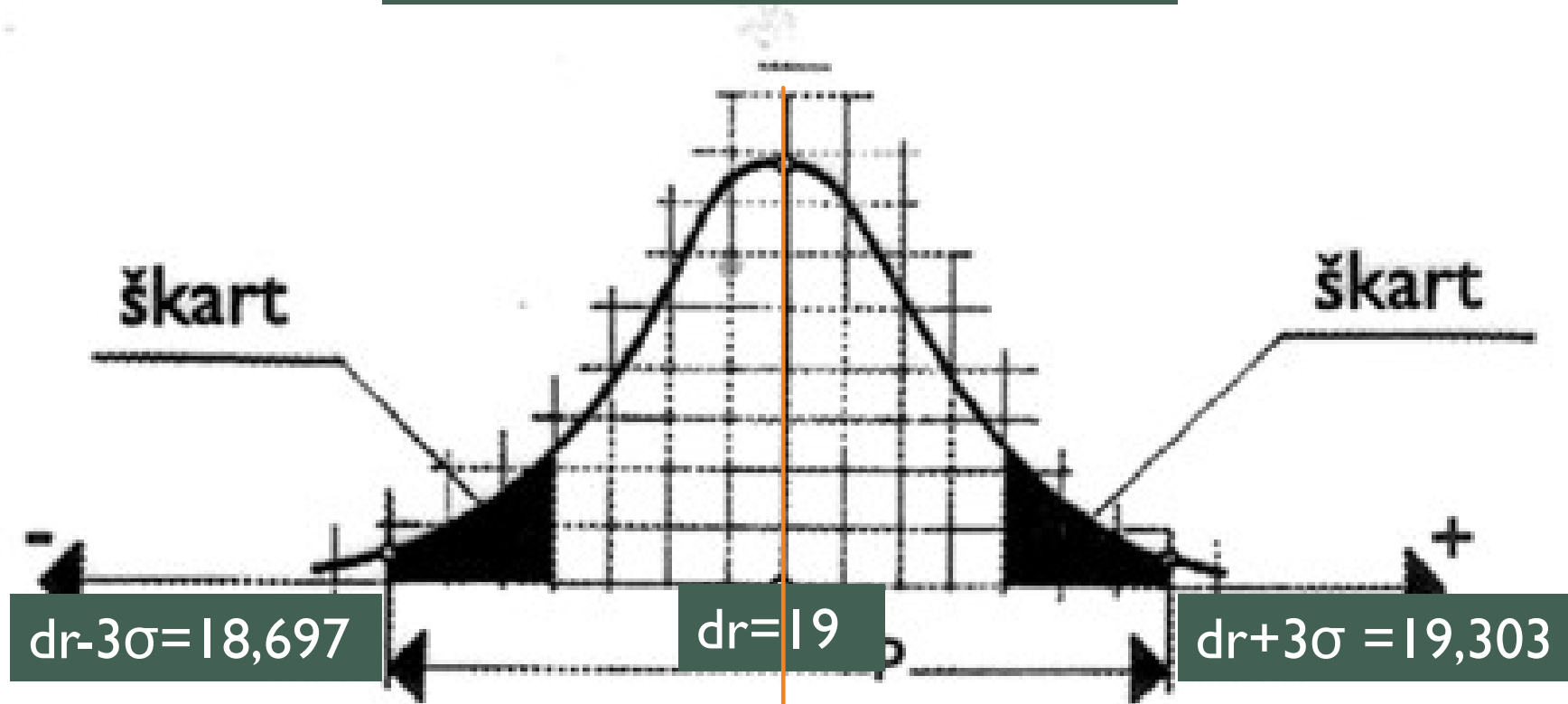
Tabela: Položaj tolerancijskih polja prema nultoj liniji

JUS D.E1.013

| Tolerancijsko polje | A/z | Z/a | B/y | Y/b | C/w | W/c | D/u | U/d | E/t | T/e | F/s | S/f | G/r | R/g | I/p | P/i | K/n | N/k | M/m |
|---|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|-------|
| Odstojanje sredine tolerancijskog polja od nulte linije | 9T | -9T | 7.5T | -7.5T | 6.2T | -6.2T | 5T | -5T | 3.9T | -3.9T | 2.8T | -2.8T | 2T | -2T | 1.2T | -1.2T | 0.5T | -0.5T | 0 |
| Gornje odstupanje | 9.5T | -8.5T | 8T | -7T | 6.7T | -5.7T | 5.5T | -4.5T | 4.4T | -3.4T | 3.4T | -2.4T | 2.5T | -1.5T | 1.7T | -0.7T | 1T | 0 | 0.5T |
| Donje odstupanje | 8.5T | -9.5T | 7T | -8T | 5.7T | -6.7T | 4.5T | -5.5T | 3.4T | -4.4T | 2.4T | -3.4T | 1.5T | -2.5T | 0.7T | -1.7T | 0 | -T | -0.5T |

Tačnost rada mašine Δ

$\sigma=0,101\text{mm}$
 $3\sigma=0,303\text{mm}$



$q=(0,5-\varphi(t))\cdot 100$ (%)
 $t=(To/2)/\sigma$

4. IZRAČUNATI VELIČINU ŠKARTA

formula

- $t = (T_0/2)/\sigma$



proračun

- $t = (0,35/2)/0,101$

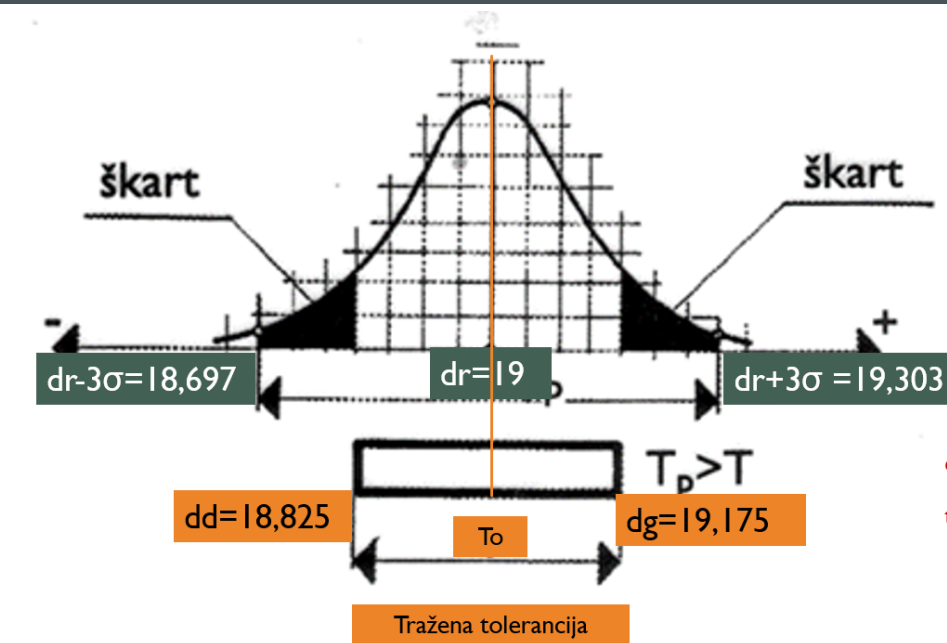
- $t = 1,73$

- Za $t = 1,73$ Laplace-ova f-ja $\phi(t) = 0,458$

- $q = (0,5 - \phi(t)) \cdot 100$ (%)

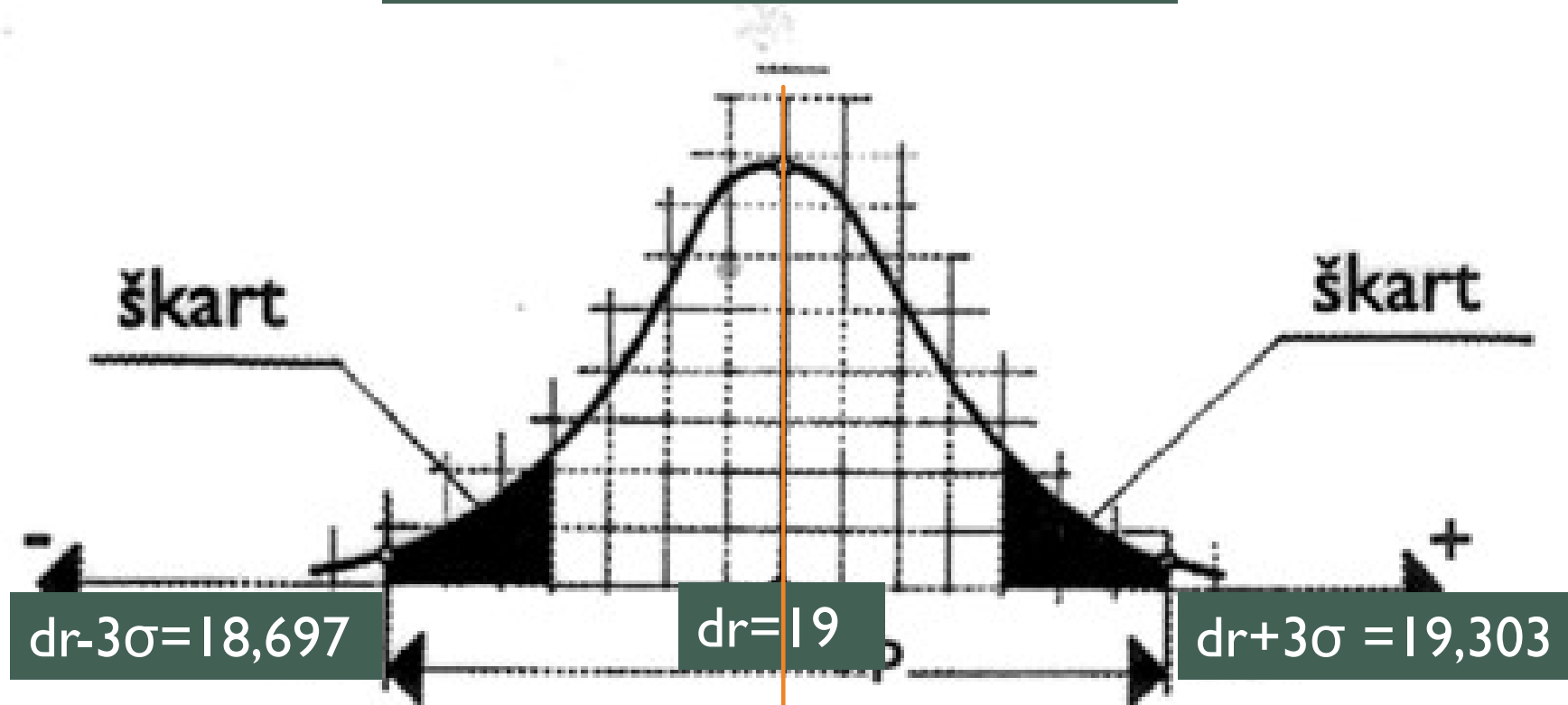


- $q = (0,5 - 0,458) \cdot 100 = 4,2\%$



Tačnost rada mašine Δ

$\sigma=0,101\text{mm}$
 $3\sigma=0,303\text{mm}$



$$q=(0,5-\varphi(t)) \cdot 100 (\%)$$

$$t=(To/2)/\sigma$$

| t | 2φ(t) | φ(t) | t | 2φ(t) | φ(t) | t | 2φ(t) | φ(t) |
|------|--------|--------|------|--------|--------|------|--------|--------|
| 0.00 | 0.0000 | 0.0000 | 0.50 | 0.3830 | 0.1915 | 1.00 | 0.6826 | 0.3413 |
| 0.01 | 0.0080 | 0.0040 | 0.51 | 0.3900 | 0.1950 | 1.01 | 0.6880 | 0.3440 |
| 0.02 | 0.0160 | 0.0080 | 0.52 | 0.3970 | 0.1985 | 1.02 | 0.6920 | 0.3460 |
| 0.03 | 0.0240 | 0.0120 | 0.53 | 0.4040 | 0.2020 | 1.03 | 0.6970 | 0.3485 |
| 0.04 | 0.0320 | 0.0160 | 0.54 | 0.4110 | 0.2055 | 1.04 | 0.7020 | 0.3510 |
| 0.05 | 0.0400 | 0.0200 | 0.55 | 0.4180 | 0.2090 | 1.05 | 0.7060 | 0.3530 |
| 0.06 | 0.0420 | 0.0210 | 0.56 | 0.4250 | 0.2125 | 1.06 | 0.7110 | 0.3555 |
| 0.07 | 0.0560 | 0.0280 | 0.57 | 0.4310 | 0.2155 | 1.07 | 0.7150 | 0.3575 |
| 0.08 | 0.0640 | 0.0320 | 0.58 | 0.4380 | 0.2190 | 1.08 | 0.7200 | 0.3600 |
| 0.09 | 0.0720 | 0.0360 | 0.59 | 0.4450 | 0.2225 | 1.09 | 0.7240 | 0.3620 |
| 0.10 | 0.0800 | 0.0400 | 0.60 | 0.4510 | 0.2255 | 1.10 | 0.7290 | 0.3645 |
| 0.11 | 0.0880 | 0.0440 | 0.61 | 0.4580 | 0.2290 | 1.11 | 0.7330 | 0.3665 |
| 0.12 | 0.0960 | 0.0480 | 0.62 | 0.4650 | 0.2325 | 1.12 | 0.7370 | 0.3685 |
| 0.13 | 0.1030 | 0.0515 | 0.63 | 0.4710 | 0.2355 | 1.13 | 0.7420 | 0.3710 |
| 0.14 | 0.1110 | 0.0555 | 0.64 | 0.4780 | 0.2390 | 1.14 | 0.7460 | 0.3730 |
| 0.15 | 0.1190 | 0.0595 | 0.65 | 0.4840 | 0.2420 | 1.15 | 0.7500 | 0.3750 |
| 0.16 | 0.1270 | 0.0635 | 0.66 | 0.4910 | 0.2455 | 1.16 | 0.7540 | 0.3770 |
| 0.17 | 0.1350 | 0.0675 | 0.67 | 0.4970 | 0.2485 | 1.17 | 0.7580 | 0.3790 |
| 0.18 | 0.1430 | 0.0715 | 0.68 | 0.5040 | 0.2520 | 1.18 | 0.7620 | 0.3810 |
| 0.19 | 0.1510 | 0.0755 | 0.69 | 0.5100 | 0.2550 | 1.19 | 0.7660 | 0.3830 |
| 0.20 | 0.1590 | 0.0795 | 0.70 | 0.5160 | 0.2580 | 1.20 | 0.7700 | 0.3850 |
| 0.21 | 0.1660 | 0.0830 | 0.71 | 0.5220 | 0.2610 | 1.21 | 0.7740 | 0.3870 |
| 0.22 | 0.1740 | 0.0870 | 0.72 | 0.5280 | 0.2640 | 1.22 | 0.7780 | 0.3890 |
| 0.23 | 0.1820 | 0.0910 | 0.73 | 0.5350 | 0.2675 | 1.23 | 0.7810 | 0.3905 |
| 0.24 | 0.1900 | 0.0950 | 0.74 | 0.5410 | 0.2705 | 1.24 | 0.7850 | 0.3925 |
| 0.25 | 0.1970 | 0.0985 | 0.75 | 0.5470 | 0.2735 | 1.25 | 0.7890 | 0.3945 |
| 0.26 | 0.2050 | 0.1025 | 0.76 | 0.5512 | 0.2756 | 1.26 | 0.7920 | 0.3960 |
| 0.27 | 0.2130 | 0.1065 | 0.77 | 0.5590 | 0.2795 | 1.27 | 0.7960 | 0.3980 |
| 0.28 | 0.2210 | 0.1105 | 0.78 | 0.5650 | 0.2825 | 1.28 | 0.8000 | 0.4000 |
| 0.29 | 0.2280 | 0.1140 | 0.79 | 0.5700 | 0.2850 | 1.29 | 0.8030 | 0.4015 |
| 0.30 | 0.2360 | 0.1180 | 0.80 | 0.5760 | 0.2880 | 1.30 | 0.8060 | 0.4030 |
| 0.31 | 0.2430 | 0.1215 | 0.81 | 0.5820 | 0.2910 | 1.31 | 0.8100 | 0.4050 |
| 0.32 | 0.2510 | 0.1255 | 0.82 | 0.5880 | 0.2940 | 1.32 | 0.8130 | 0.4065 |
| 0.33 | 0.2590 | 0.1295 | 0.83 | 0.5930 | 0.2965 | 1.33 | 0.8160 | 0.4080 |
| 0.34 | 0.2660 | 0.1330 | 0.84 | 0.5990 | 0.2995 | 1.34 | 0.8200 | 0.4100 |
| 0.35 | 0.2740 | 0.1370 | 0.85 | 0.6050 | 0.3025 | 1.35 | 0.8230 | 0.4115 |
| 0.36 | 0.2810 | 0.1405 | 0.86 | 0.6100 | 0.3050 | 1.36 | 0.8260 | 0.4130 |
| 0.37 | 0.2890 | 0.1445 | 0.87 | 0.6160 | 0.3080 | 1.37 | 0.8290 | 0.4145 |
| 0.38 | 0.2960 | 0.1480 | 0.88 | 0.6210 | 0.3105 | 1.38 | 0.8320 | 0.4160 |
| 0.39 | 0.3030 | 0.1515 | 0.89 | 0.6270 | 0.3135 | 1.39 | 0.8350 | 0.4175 |
| 0.40 | 0.3110 | 0.1555 | 0.90 | 0.6320 | 0.3160 | 1.40 | 0.8380 | 0.4190 |
| 0.41 | 0.3180 | 0.1590 | 0.91 | 0.6370 | 0.3185 | 1.41 | 0.8410 | 0.4205 |
| 0.42 | 0.3260 | 0.1630 | 0.92 | 0.6420 | 0.3210 | 1.42 | 0.8440 | 0.4220 |
| 0.43 | 0.3330 | 0.1665 | 0.93 | 0.6480 | 0.3240 | 1.43 | 0.8470 | 0.4235 |
| 0.44 | 0.3400 | 0.1700 | 0.94 | 0.6530 | 0.3265 | 1.44 | 0.8500 | 0.4250 |
| 0.45 | 0.3470 | 0.1735 | 0.95 | 0.6580 | 0.3290 | 1.45 | 0.8530 | 0.4265 |

| t | 2φ(t) | φ(t) | t | 2φ(t) | φ(t) | t | 2φ(t) | φ(t) |
|------|--------|--------|------|--------|--------|------|--------|--------|
| 0.46 | 0.3540 | 0.1770 | 0.96 | 0.6630 | 0.3315 | 1.46 | 0.8560 | 0.4280 |
| 0.47 | 0.3620 | 0.1810 | 0.97 | 0.6680 | 0.3340 | 1.47 | 0.8580 | 0.4290 |
| 0.48 | 0.3690 | 0.1845 | 0.98 | 0.6730 | 0.3365 | 1.48 | 0.8610 | 0.4305 |
| 0.49 | 0.3760 | 0.1880 | 0.99 | 0.6780 | 0.3390 | 1.49 | 0.8640 | 0.4320 |
| 1.50 | 0.8660 | 0.4330 | 2.00 | 0.9550 | 0.4775 | 2.50 | 0.9880 | 0.4940 |
| 1.51 | 0.8670 | 0.4335 | 2.01 | 0.9560 | 0.4780 | 2.51 | 0.9880 | 0.4940 |
| 1.52 | 0.8710 | 0.4355 | 2.02 | 0.9570 | 0.4785 | 2.52 | 0.9880 | 0.4940 |
| 1.53 | 0.8740 | 0.4370 | 2.03 | 0.9580 | 0.4790 | 2.53 | 0.9890 | 0.4945 |
| 1.54 | 0.8760 | 0.4380 | 2.04 | 0.9590 | 0.4795 | 2.54 | 0.9890 | 0.4945 |
| 1.55 | 0.8790 | 0.4395 | 2.05 | 0.9600 | 0.4800 | 2.55 | 0.9890 | 0.4945 |
| 1.56 | 0.8810 | 0.4405 | 2.06 | 0.9610 | 0.4805 | 2.56 | 0.9900 | 0.4950 |
| 1.57 | 0.8840 | 0.4420 | 2.07 | 0.9620 | 0.4810 | 2.57 | 0.9900 | 0.4950 |
| 1.58 | 0.8860 | 0.4430 | 2.08 | 0.9624 | 0.4812 | 2.58 | 0.9900 | 0.4950 |
| 1.59 | 0.8880 | 0.4440 | 2.09 | 0.9630 | 0.4815 | 2.59 | 0.9900 | 0.4950 |
| 1.60 | 0.8900 | 0.4450 | 2.10 | 0.9640 | 0.4820 | 2.60 | 0.9910 | 0.4955 |
| 1.61 | 0.8930 | 0.4465 | 2.11 | 0.9650 | 0.4825 | 2.61 | 0.9910 | 0.4955 |
| 1.62 | 0.8950 | 0.4475 | 2.12 | 0.9660 | 0.4830 | 2.62 | 0.9910 | 0.4955 |
| 1.63 | 0.8970 | 0.4485 | 2.13 | 0.9670 | 0.4835 | 2.63 | 0.9910 | 0.4955 |
| 1.64 | 0.8990 | 0.4495 | 2.14 | 0.9680 | 0.4840 | 2.64 | 0.9920 | 0.4960 |
| 1.65 | 0.9010 | 0.4505 | 2.15 | 0.9680 | 0.4840 | 2.65 | 0.9920 | 0.4960 |
| 1.66 | 0.9030 | 0.4515 | 2.16 | 0.9690 | 0.4845 | 2.66 | 0.9920 | 0.4960 |
| 1.67 | 0.9052 | 0.4526 | 2.17 | 0.9700 | 0.4850 | 2.67 | 0.9920 | 0.4960 |
| 1.68 | 0.9070 | 0.4535 | 2.18 | 0.9710 | 0.4855 | 2.68 | 0.9930 | 0.4965 |
| 1.69 | 0.9090 | 0.4545 | 2.19 | 0.9710 | 0.4855 | 2.69 | 0.9930 | 0.4965 |
| 1.70 | 0.9110 | 0.4555 | 2.20 | 0.9720 | 0.4860 | 2.70 | 0.9930 | 0.4965 |
| 1.71 | 0.9130 | 0.4565 | 2.21 | 0.9730 | 0.4865 | 2.71 | 0.9930 | 0.4965 |
| 1.72 | 0.9150 | 0.4575 | 2.22 | 0.9740 | 0.4870 | 2.72 | 0.9930 | 0.4965 |
| 1.73 | 0.9160 | 0.4580 | 2.23 | 0.9740 | 0.4870 | 2.73 | 0.9930 | 0.4965 |
| 1.74 | 0.9180 | 0.4590 | 2.24 | 0.9750 | 0.4875 | 2.74 | 0.9940 | 0.4970 |
| 1.75 | 0.9200 | 0.4600 | 2.25 | 0.9760 | 0.4880 | 2.75 | 0.9940 | 0.4970 |
| 1.76 | 0.9220 | 0.4610 | 2.26 | 0.9760 | 0.4880 | 2.76 | 0.9940 | 0.4970 |
| 1.77 | 0.9230 | 0.4615 | 2.27 | 0.9770 | 0.4885 | 2.77 | 0.9940 | 0.4970 |
| 1.78 | 0.9250 | 0.4625 | 2.28 | 0.9770 | 0.4885 | 2.78 | 0.9950 | 0.4975 |
| 1.79 | 0.9270 | 0.4635 | 2.29 | 0.9780 | 0.4890 | 2.79 | 0.9950 | 0.4975 |
| 1.80 | 0.9280 | 0.4640 | 2.30 | 0.9790 | 0.4895 | 2.80 | 0.9950 | 0.4975 |
| 1.81 | 0.9300 | 0.4650 | 2.31 | 0.9790 | 0.4895 | 2.81 | 0.9950 | 0.4975 |
| 1.82 | 0.9310 | 0.4655 | 2.32 | 0.9800 | 0.4900 | 2.82 | 0.9950 | 0.4975 |
| 1.83 | 0.9330 | 0.4665 | 2.33 | 0.9800 | 0.4900 | 2.83 | 0.9950 | 0.4975 |
| 1.84 | 0.9340 | 0.4670 | 2.34 | 0.9810 | 0.4905 | 2.84 | 0.9950 | 0.4975 |
| 1.85 | 0.9360 | 0.4680 | 2.35 | 0.9810 | 0.4905 | 2.85 | 0.9950 | 0.4975 |
| 1.86 | 0.9370 | 0.4685 | 2.36 | 0.9820 | 0.4910 | 2.86 | 0.9960 | 0.4980 |
| 1.87 | 0.9390 | 0.4695 | 2.37 | 0.9820 | 0.4910 | 2.87 | 0.9960 | 0.4980 |
| 1.88 | 0.9400 | 0.4700 | 2.38 | 0.9830 | 0.4915 | 2.88 | 0.9960 | 0.4980 |
| 1.89 | 0.9410 | 0.4705 | 2.39 | 0.9830 | 0.4915 | 2.89 | 0.9960 | 0.4980 |
| 1.90 | 0.9430 | 0.4715 | 2.40 | 0.9840 | 0.4920 | 2.90 | 0.9960 | 0.4980 |
| 1.91 | 0.9440 | 0.4720 | 2.41 | 0.9840 | 0.4920 | 2.91 | 0.9960 | 0.4980 |
| 1.92 | 0.9450 | 0.4725 | 2.42 | 0.9840 | 0.4920 | 2.92 | 0.9960 | 0.4980 |

| t | 2φ(t) | φ(t) | t | 2φ(t) | φ(t) | t | 2φ(t) | φ(t) |
|------|--------|--------|------|--------|--------|------|--------|--------|
| 1.93 | 0.9460 | 0.4730 | 2.43 | 0.9850 | 0.4925 | 2.93 | 0.9960 | 0.4980 |
| 1.94 | 0.9480 | 0.4740 | 2.44 | 0.9850 | 0.4925 | 2.94 | 0.9970 | 0.4985 |
| 1.95 | 0.9490 | 0.4745 | 2.45 | 0.9860 | 0.4930 | 2.95 | 0.9970 | 0.4985 |
| 1.96 | 0.9500 | 0.4750 | 2.46 | 0.9860 | 0.4930 | 2.96 | 0.9970 | 0.4985 |
| 1.97 | 0.9510 | 0.4755 | 2.47 | 0.9860 | 0.4930 | 2.97 | 0.9970 | 0.4985 |
| 1.98 | 0.9520 | 0.4760 | 2.48 | 0.9870 | 0.4935 | 2.98 | 0.9970 | 0.4985 |
| 1.99 | 0.9530 | 0.4765 | 2.49 | 0.9870 | 0.4935 | 2.99 | 0.9970 | 0.4985 |
| 3.00 | 0.9972 | 0.4986 | | | | | | |
| 3.10 | 0.9972 | 0.4986 | | | | | | |
| 3.20 | 0.9986 | 0.4993 | | | | | | |
| 3.30 | 0.9986 | 0.4993 | | | | | | |
| 3.40 | 0.9999 | 0.4995 | | | | | | |
| 3.50 | 0.9999 | 0.4995 | | | | | | |
| 3.60 | 0.9999 | 0.4995 | | | | | | |
| 3.70 | 0.9999 | 0.4990 | | | | | | |
| 3.80 | 0.9999 | 0.4990 | | | | | | |
| 3.90 | 0.9999 | 0.4990 | | | | | | |
| 4.00 | 0.9999 | 0.4990 | | | | | | |

| t | $2\varphi(t)$ | $\varphi(t)$ | t | $2\varphi(t)$ | $\varphi(t)$ | t | $2\varphi(t)$ | $\varphi(t)$ |
|------|---------------|--------------|------|---------------|--------------|------|---------------|--------------|
| 0.00 | 0.0000 | 0.0000 | 0.50 | 0.3830 | 0.1915 | 1.00 | 0.6826 | 0.3413 |
| 0.01 | 0.0080 | 0.0040 | 0.51 | 0.3900 | 0.1950 | 1.01 | 0.6880 | 0.3440 |
| 0.02 | 0.0160 | 0.0080 | 0.52 | 0.3970 | 0.1985 | 1.02 | 0.6920 | 0.3460 |
| 0.03 | 0.0240 | 0.0120 | 0.53 | 0.4040 | 0.2020 | 1.03 | 0.6970 | 0.3485 |
| 0.04 | 0.0320 | 0.0160 | 0.54 | 0.4110 | 0.2055 | 1.04 | 0.7020 | 0.3510 |
| 0.05 | 0.0400 | 0.0200 | 0.55 | 0.4180 | 0.2090 | 1.05 | 0.7060 | 0.3530 |
| 0.06 | 0.0420 | 0.0210 | 0.56 | 0.4250 | 0.2125 | 1.06 | 0.7110 | 0.3555 |
| 0.07 | 0.0560 | 0.0280 | 0.57 | 0.4310 | 0.2155 | 1.07 | 0.7150 | 0.3575 |
| 0.08 | 0.0640 | 0.0320 | 0.58 | 0.4380 | 0.2190 | 1.08 | 0.7200 | 0.3600 |
| 0.09 | 0.0720 | 0.0360 | 0.59 | 0.4450 | 0.2225 | 1.09 | 0.7240 | 0.3620 |
| 0.10 | 0.0800 | 0.0400 | 0.60 | 0.4510 | 0.2255 | 1.10 | 0.7290 | 0.3645 |
| 0.11 | 0.0880 | 0.0440 | 0.61 | 0.4580 | 0.2290 | 1.11 | 0.7330 | 0.3665 |
| 0.12 | 0.0960 | 0.0480 | 0.62 | 0.4650 | 0.2325 | 1.12 | 0.7370 | 0.3685 |
| 0.13 | 0.1030 | 0.0515 | 0.63 | 0.4710 | 0.2355 | 1.13 | 0.7420 | 0.3710 |
| 0.14 | 0.1110 | 0.0555 | 0.64 | 0.4780 | 0.2390 | 1.14 | 0.7460 | 0.3730 |
| 0.15 | 0.1190 | 0.0595 | 0.65 | 0.4840 | 0.2420 | 1.15 | 0.7500 | 0.3750 |
| 0.16 | 0.1270 | 0.0635 | 0.66 | 0.4910 | 0.2455 | 1.16 | 0.7540 | 0.3770 |
| 0.17 | 0.1350 | 0.0675 | 0.67 | 0.4970 | 0.2485 | 1.17 | 0.7580 | 0.3790 |
| 0.18 | 0.1430 | 0.0715 | 0.68 | 0.5040 | 0.2520 | 1.18 | 0.7620 | 0.3810 |
| 0.19 | 0.1510 | 0.0755 | 0.69 | 0.5100 | 0.2550 | 1.19 | 0.7660 | 0.3830 |
| 0.20 | 0.1590 | 0.0795 | 0.70 | 0.5160 | 0.2580 | 1.20 | 0.7700 | 0.3850 |
| 0.21 | 0.1660 | 0.0830 | 0.71 | 0.5220 | 0.2610 | 1.21 | 0.7740 | 0.3870 |
| 0.22 | 0.1740 | 0.0870 | 0.72 | 0.5280 | 0.2640 | 1.22 | 0.7780 | 0.3890 |
| 0.23 | 0.1820 | 0.0910 | 0.73 | 0.5350 | 0.2675 | 1.23 | 0.7810 | 0.3905 |
| 0.24 | 0.1900 | 0.0950 | 0.74 | 0.5410 | 0.2705 | 1.24 | 0.7850 | 0.3925 |
| 0.25 | 0.1970 | 0.0985 | 0.75 | 0.5470 | 0.2735 | 1.25 | 0.7890 | 0.3945 |
| 0.26 | 0.2050 | 0.1025 | 0.76 | 0.5512 | 0.2756 | 1.26 | 0.7920 | 0.3960 |
| 0.27 | 0.2130 | 0.1065 | 0.77 | 0.5590 | 0.2795 | 1.27 | 0.7960 | 0.3980 |
| 0.28 | 0.2210 | 0.1105 | 0.78 | 0.5650 | 0.2825 | 1.28 | 0.8000 | 0.4000 |
| 0.29 | 0.2280 | 0.1140 | 0.79 | 0.5700 | 0.2850 | 1.29 | 0.8030 | 0.4015 |
| 0.30 | 0.2360 | 0.1180 | 0.80 | 0.5760 | 0.2880 | 1.30 | 0.8060 | 0.4030 |
| 0.31 | 0.2430 | 0.1215 | 0.81 | 0.5820 | 0.2910 | 1.31 | 0.8100 | 0.4050 |
| 0.32 | 0.2510 | 0.1255 | 0.82 | 0.5880 | 0.2940 | 1.32 | 0.8130 | 0.4065 |
| 0.33 | 0.2590 | 0.1295 | 0.83 | 0.5930 | 0.2965 | 1.33 | 0.8160 | 0.4080 |
| 0.34 | 0.2660 | 0.1330 | 0.84 | 0.5990 | 0.2995 | 1.34 | 0.8200 | 0.4100 |
| 0.35 | 0.2740 | 0.1370 | 0.85 | 0.6050 | 0.3025 | 1.35 | 0.8230 | 0.4115 |
| 0.36 | 0.2810 | 0.1405 | 0.86 | 0.6100 | 0.3050 | 1.36 | 0.8260 | 0.4130 |
| 0.37 | 0.2890 | 0.1445 | 0.87 | 0.6160 | 0.3080 | 1.37 | 0.8290 | 0.4145 |
| 0.38 | 0.2960 | 0.1480 | 0.88 | 0.6210 | 0.3105 | 1.38 | 0.8320 | 0.4160 |
| 0.39 | 0.3030 | 0.1515 | 0.89 | 0.6270 | 0.3135 | 1.39 | 0.8350 | 0.4175 |
| 0.40 | 0.3110 | 0.1555 | 0.90 | 0.6320 | 0.3160 | 1.40 | 0.8380 | 0.4190 |
| 0.41 | 0.3180 | 0.1590 | 0.91 | 0.6370 | 0.3185 | 1.41 | 0.8410 | 0.4205 |
| 0.42 | 0.3260 | 0.1630 | 0.92 | 0.6420 | 0.3210 | 1.42 | 0.8440 | 0.4220 |
| 0.43 | 0.3330 | 0.1665 | 0.93 | 0.6480 | 0.3240 | 1.43 | 0.8470 | 0.4235 |
| 0.44 | 0.3400 | 0.1700 | 0.94 | 0.6530 | 0.3265 | 1.44 | 0.8500 | 0.4250 |
| 0.45 | 0.3470 | 0.1735 | 0.95 | 0.6580 | 0.3290 | 1.45 | 0.8530 | 0.4265 |

| τ | $2\varphi(\tau)$ | $\varphi(\tau)$ | τ | $2\varphi(\tau)$ | $\varphi(\tau)$ | τ | $2\varphi(\tau)$ | $\varphi(\tau)$ |
|--------|------------------|-----------------|--------|------------------|-----------------|--------|------------------|-----------------|
| 0.46 | 0.3540 | 0.1770 | 0.96 | 0.6630 | 0.3315 | 1.46 | 0.8560 | 0.4280 |
| 0.47 | 0.3620 | 0.1810 | 0.97 | 0.6680 | 0.3340 | 1.47 | 0.8580 | 0.4290 |
| 0.48 | 0.3690 | 0.1845 | 0.98 | 0.6730 | 0.3365 | 1.48 | 0.8610 | 0.4305 |
| 0.49 | 0.3760 | 0.1880 | 0.99 | 0.6780 | 0.3390 | 1.49 | 0.8640 | 0.4320 |
| 1.50 | 0.8660 | 0.4330 | 2.00 | 0.9550 | 0.4775 | 2.50 | 0.9880 | 0.4940 |
| 1.51 | 0.8670 | 0.4335 | 2.01 | 0.9560 | 0.4780 | 2.51 | 0.9880 | 0.4940 |
| 1.52 | 0.8710 | 0.4355 | 2.02 | 0.9570 | 0.4785 | 2.52 | 0.9880 | 0.4940 |
| 1.53 | 0.8740 | 0.4370 | 2.03 | 0.9580 | 0.4790 | 2.53 | 0.9890 | 0.4945 |
| 1.54 | 0.8760 | 0.4380 | 2.04 | 0.9590 | 0.4795 | 2.54 | 0.9890 | 0.4945 |
| 1.55 | 0.8790 | 0.4395 | 2.05 | 0.9600 | 0.4800 | 2.55 | 0.9890 | 0.4945 |
| 1.56 | 0.8810 | 0.4405 | 2.06 | 0.9610 | 0.4805 | 2.56 | 0.9900 | 0.4950 |
| 1.57 | 0.8640 | 0.4320 | 2.07 | 0.9620 | 0.4810 | 2.57 | 0.9900 | 0.4950 |
| 1.58 | 0.8860 | 0.4430 | 2.08 | 0.9624 | 0.4812 | 2.58 | 0.9900 | 0.4950 |
| 1.59 | 0.8880 | 0.4440 | 2.09 | 0.9630 | 0.4815 | 2.59 | 0.9900 | 0.4950 |
| 1.60 | 0.8900 | 0.4450 | 2.10 | 0.9640 | 0.4820 | 2.60 | 0.9910 | 0.4955 |
| 1.61 | 0.8930 | 0.4465 | 2.11 | 0.9650 | 0.4825 | 2.61 | 0.9910 | 0.4955 |
| 1.62 | 0.8950 | 0.4475 | 2.12 | 0.9660 | 0.4830 | 2.62 | 0.9910 | 0.4955 |
| 1.63 | 0.8970 | 0.4485 | 2.13 | 0.9670 | 0.4835 | 2.63 | 0.9910 | 0.4955 |
| 1.64 | 0.8990 | 0.4495 | 2.14 | 0.9680 | 0.4840 | 2.64 | 0.9920 | 0.4960 |
| 1.65 | 0.9010 | 0.4505 | 2.15 | 0.9680 | 0.4840 | 2.65 | 0.9920 | 0.4960 |
| 1.66 | 0.9030 | 0.4515 | 2.16 | 0.9690 | 0.4845 | 2.66 | 0.9920 | 0.4960 |
| 1.67 | 0.9052 | 0.4526 | 2.17 | 0.9700 | 0.4850 | 2.67 | 0.9920 | 0.4960 |
| 1.68 | 0.9070 | 0.4535 | 2.18 | 0.9710 | 0.4855 | 2.68 | 0.9930 | 0.4965 |
| 1.69 | 0.9090 | 0.4545 | 2.19 | 0.9710 | 0.4855 | 2.69 | 0.9930 | 0.4965 |
| 1.70 | 0.9110 | 0.4555 | 2.20 | 0.9720 | 0.4860 | 2.70 | 0.9930 | 0.4965 |
| 1.71 | 0.9130 | 0.4565 | 2.21 | 0.9730 | 0.4865 | 2.71 | 0.9930 | 0.4965 |
| 1.72 | 0.9150 | 0.4575 | 2.22 | 0.9740 | 0.4870 | 2.72 | 0.9930 | 0.4965 |
| 1.73 | 0.9160 | 0.4580 | 2.23 | 0.9740 | 0.4870 | 2.73 | 0.9930 | 0.4965 |
| 1.74 | 0.9180 | 0.4590 | 2.24 | 0.9750 | 0.4875 | 2.74 | 0.9940 | 0.4970 |
| 1.75 | 0.9200 | 0.4600 | 2.25 | 0.9760 | 0.4880 | 2.75 | 0.9940 | 0.4970 |
| 1.76 | 0.9220 | 0.4610 | 2.26 | 0.9760 | 0.4880 | 2.76 | 0.9940 | 0.4970 |
| 1.77 | 0.9230 | 0.4615 | 2.27 | 0.9770 | 0.4885 | 2.77 | 0.9940 | 0.4970 |
| 1.78 | 0.9250 | 0.4625 | 2.28 | 0.9770 | 0.4885 | 2.78 | 0.9950 | 0.4975 |
| 1.79 | 0.9270 | 0.4635 | 2.29 | 0.9780 | 0.4890 | 2.79 | 0.9950 | 0.4975 |
| 1.80 | 0.9280 | 0.4640 | 2.30 | 0.9790 | 0.4895 | 2.80 | 0.9950 | 0.4975 |
| 1.81 | 0.9300 | 0.4650 | 2.31 | 0.9790 | 0.4895 | 2.81 | 0.9950 | 0.4975 |
| 1.82 | 0.9310 | 0.4655 | 2.32 | 0.9800 | 0.4900 | 2.82 | 0.9950 | 0.4975 |
| 1.83 | 0.9330 | 0.4665 | 2.33 | 0.9800 | 0.4900 | 2.83 | 0.9950 | 0.4975 |
| 1.84 | 0.9340 | 0.4670 | 2.34 | 0.9810 | 0.4905 | 2.84 | 0.9950 | 0.4975 |
| 1.85 | 0.9360 | 0.4680 | 2.35 | 0.9810 | 0.4905 | 2.85 | 0.9950 | 0.4975 |
| 1.86 | 0.9370 | 0.4685 | 2.36 | 0.9820 | 0.4910 | 2.86 | 0.9960 | 0.4980 |
| 1.87 | 0.9390 | 0.4695 | 2.37 | 0.9820 | 0.4910 | 2.87 | 0.9960 | 0.4980 |
| 1.88 | 0.9400 | 0.4700 | 2.38 | 0.9830 | 0.4915 | 2.88 | 0.9960 | 0.4980 |
| 1.89 | 0.9410 | 0.4705 | 2.39 | 0.9830 | 0.4915 | 2.89 | 0.9960 | 0.4980 |
| 1.90 | 0.9430 | 0.4715 | 2.40 | 0.9840 | 0.4920 | 2.90 | 0.9960 | 0.4980 |
| 1.91 | 0.9440 | 0.4720 | 2.41 | 0.9840 | 0.4920 | 2.91 | 0.9960 | 0.4980 |
| 1.92 | 0.9450 | 0.4725 | 2.42 | 0.9840 | 0.4920 | 2.92 | 0.9960 | 0.4980 |

| t | $2\varphi(t)$ | $\varphi(t)$ | t | $2\varphi(t)$ | $\varphi(t)$ | t | $2\varphi(t)$ | $\varphi(t)$ |
|------|---------------|--------------|------|---------------|--------------|------|---------------|--------------|
| 1.93 | 0.9460 | 0.4730 | 2.43 | 0.9850 | 0.4925 | 2.93 | 0.9960 | 0.4980 |
| 1.94 | 0.9480 | 0.4740 | 2.44 | 0.9850 | 0.4925 | 2.94 | 0.9970 | 0.4985 |
| 1.95 | 0.9490 | 0.4745 | 2.45 | 0.9860 | 0.4930 | 2.95 | 0.9970 | 0.4985 |
| 1.96 | 0.9500 | 0.4750 | 2.46 | 0.9860 | 0.4930 | 2.96 | 0.9970 | 0.4985 |
| 1.97 | 0.9510 | 0.4755 | 2.47 | 0.9860 | 0.4930 | 2.97 | 0.9970 | 0.4985 |
| 1.98 | 0.9520 | 0.4760 | 2.48 | 0.9870 | 0.4935 | 2.98 | 0.9970 | 0.4985 |
| 1.99 | 0.9530 | 0.4765 | 2.49 | 0.9870 | 0.4935 | 2.99 | 0.9970 | 0.4985 |
| 3.00 | 0.9972 | 0.4986 | | | | | | |
| 3.10 | 0.9972 | 0.4986 | | | | | | |
| 3.20 | 0.9986 | 0.4993 | | | | | | |
| 3.30 | 0.9986 | 0.4993 | | | | | | |
| 3.40 | 0.9999 | 0.4995 | | | | | | |
| 3.50 | 0.9999 | 0.4995 | | | | | | |
| 3.60 | 0.9999 | 0.4995 | | | | | | |
| 3.70 | 0.9999 | 0.4990 | | | | | | |
| 3.80 | 0.9999 | 0.4990 | | | | | | |
| 3.90 | 0.9999 | 0.4990 | | | | | | |
| 4.00 | 0.9999 | 0.4990 | | | | | | |