

Tolerances applicable to moulded plastic parts

French key words

plastique, tolérance

Purpose

This note defines the dimensional and geometrical tolerances together with the deviations tolerated for moulded objects made of thermosetting or thermoplastic materials. It applies to objects obtained by compression, transfer or injection.

Experts to consult

Technical Standardisation and Coordination

Modifications

Correction of table 1 with the line corresponding to PVC-P and modification of flash tolerance.

This note cancels and replaces:

- FI-67 311 (Telemecanique standard, SIC)
- T.17430.1 (Merlin Gerin standard, volume 17)

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This note is based on the NF T 58-000 standard. At the present time no ISO standards or draft standards are available on this subject.

1. Area of application

The tolerance values given by the standard are valid only for manufacturing tolerances and are applicable only if there is:

- no deformation of part shape,
- no flash,
- no side effects such as post-shrinkage, swelling, post-crystallisation or dimensional variations due to the effect of temperature or moisture.

Note:

Dimensions are measured after cooling (48 h minimum after moulding and prior to all ageing cycles for acceptance or official approval).
Reference atmosphere: $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$ and $50\% \pm 5\%$ HR.

In special cases and with the consent of the relevant parties, dimensions can be verified after a pretreatment (stabilisation, humidity regain,...).

2. Tolerance classes

2.1. Choosing the tolerance class

There are three main tolerance classes given in increasing order of precision and cost required to obtain them:

- normal tolerances,
- reduced tolerances,
- precision tolerances.

The general tolerances of a moulded plastic part must belong to the normal class.

General tolerances apply to all dimensions that have no individual (or special) tolerances.

These tolerances are obtained by current manufacturing processes. No manufacturing means or inspection procedures are required.

The special tolerances of a moulded plastic part must belong to the normal class or, in some cases, the reduced class.

Special tolerances apply to functional dimensions and to dimensions whose tolerances are clearly marked on the drawing.

The reduced class and to an even greater extent the precision class, involve extra expenses for tooling and the part.

2.2. Information to be provided on the drawing

The tolerances applicable to the functional dimensions shall be clearly written on the drawing for the relevant dimension(s), whatever class of precision is chosen. The tolerances for the other dimensions are given by the reference to the general tolerances.

The information on general tolerances on the drawing is given in or around the title box. This information must include:

- ***the term « general tolerances »,***
the number of the standard referred to (NF T 58 000),
- ***the tolerance class,***
- ***the value of the injection threshold if required.***

Examples:

For a part in injected PA66 with general tolerances in accordance with the NF T 58 000 standard, « normal » tolerance class.

general tolerances NF T 58 000 normal class.

For the same part, but with an injection threshold cut at ± 0.1 mm :

general tolerances NF T 58 000 normal class, injection threshold ± 0.1 .

3. Dimensional tolerances for lengths, diameters, radii

3.1. Choosing the right tolerance for the material

Table 1 below gives the tolerance category stipulated according to the polymer family. The materials listed are those used by Schneider.

Symbol	Material	Dimensional tolerance categories (see tables 2 to 11)
PA	Unfilled polyamides PA6, PA66, PA6/10, PA11, PA12	3
	Filled and unfilled amorphous polyamides	4
	Filled PA6, PA66, PA6/10, PA11, PA12	4
POM	Polyoxymethylene	3
	Filled polyoxymethylene	4
PBT	Unfilled poly(butylene terephthalate)	3
	Filled PBT	4
PET	Crystalline poly (ethylene terephthalate)	3
	Amorphous poly (ethylene terephthalate)	4
	Filled poly (ethylene terephthalate)	4
PP	Filled polypropylene	3
	Unfilled PP/EPDM modified polypropylene	3
PPE	Unmodified poly(phenylene ether)	4
	Unfilled modified poly(phenylene ether)	4
	Glass fiber reinforced modified poly(phenylene ether)	4
PC	Filled and unfilled polycarbonate	4
ABS	Filled and unfilled poly(acrylonitrile/butadiene/styrene)	4
PF	Phenolic plastics PF2 C3	1
	Phenolic plastics PF2 A1, PF2 D1, PF2 D3, PF3 D4	2
UP	Unsaturated polyesters (moulding compositions)	1
	Preimpregnated (unsaturated polyesters)	2
EP	Epoxydes	1
PDAP	Poly(diallyl-phtalates) (with organic fillers)	1
MF	Melamines-formaldehyde with mineral filler	1
	Melamines-formaldehyde with organic or mixed filler	2
PS	Filled polystyrenes	4
	Unfilled polystyrenes	4
S/B	Poly(styrene/butadiene)	4

Symbol	Material	Dimensional tolerance categories (see tables 2 to 11)
SAN	Filled and unfilled poly(styrene/acrylonitrile)	4
PMMA	Poly(methylmethacrylate)	4
PUR	Thermoplastic polyurethanes Shore hardness > 50	3
PVC-U	Unplasticised poly(vinyl chloride)	4
PSU	Filled or unfilled polysulfone	4
PPS	Reinforced poly(phenylene sulphide)	4
PES	Unfilled poly(ethersulfone)	4
PUR	Thermoplastic polyurethanes Shore hardness ≤ 50 (1)	5
PE	Unfilled polyethylenes	5
PP	Unfilled polypropylenes	5
PVC-P	Plasticised poly(vinyl chloride) Shore D hardness > 50 (1)	3
	Plasticised poly(vinyl chloride) Shore D hardness ≤ 50 (1)	5
FEP	Perfluoride poly(ethylene/propylene)	5
(1) a Shore D hardness of 50 corresponds to a Shore A hardness of 93-94		

3.2. Category 1

Table 2 - Deviations for dimensions not including the parting line

Dimensions (mm)	Tolerance class		
	normal	reduced	precision
$a \leq 1$	± 0.13	± 0.06	± 0.04
$1 < a \leq 3$	± 0.15	± 0.07	± 0.05
$3 < a \leq 6$	± 0.17	± 0.08	± 0.06
$6 < a \leq 10$	± 0.20	± 0.09	± 0.07
$10 < a \leq 15$	± 0.22	± 0.10	± 0.08
$15 < a \leq 22$	± 0.25	± 0.11	± 0.09
$22 < a \leq 30$	± 0.27	± 0.13	± 0.10
$30 < a \leq 40$	± 0.30	± 0.15	± 0.11
$40 < a \leq 53$	± 0.33	± 0.17	± 0.13
$53 < a \leq 70$	± 0.38	± 0.20	± 0.15
$70 < a \leq 90$	± 0.43	± 0.24	± 0.17
$90 < a \leq 115$	± 0.50	± 0.29	± 0.20
$115 < a \leq 150$	± 0.60	± 0.35	± 0.24
$150 < a \leq 200$	± 0.75	± 0.44	± 0.30
$200 < a \leq 250$	± 0.90	± 0.55	± 0.36
$250 < a \leq 315$	± 1.10	± 0.60	± 0.44
$315 < a \leq 400$	± 1.30	± 0.85	± 0.55
$400 < a \leq 500$	± 1.50	± 1.00	± 0.65
$500 < a \leq 630$	± 1.90	± 1.20	± 0.80
$630 < a \leq 800$	± 2.40	± 1.50	± 1.00
$800 < a \leq 1\ 000$	± 2.90	± 1.90	± 1.30
$1\ 000 < a \leq 1\ 300$	± 3.60	± 2.40	± 1.70
$1\ 300 < a \leq 1\ 600$	± 4.40	± 3.10	± 2.20
$1\ 600 < a \leq 2\ 000$	± 5.40	± 3.90	± 2.70

Table 3 - Deviations for dimensions including the parting or sliding line

Dimensions (mm)	Tolerance class		
	normal	reduced	precision
$a \leq 1$	± 0.23	± 0.16	± 0.14
$1 < a \leq 3$	± 0.25	± 0.17	± 0.15
$3 < a \leq 6$	± 0.27	± 0.18	± 0.16
$6 < a \leq 10$	± 0.30	± 0.19	± 0.17
$10 < a \leq 15$	± 0.32	± 0.20	± 0.18
$15 < a \leq 22$	± 0.35	± 0.21	± 0.19
$22 < a \leq 30$	± 0.37	± 0.23	± 0.20
$30 < a \leq 40$	± 0.40	± 0.25	± 0.21
$40 < a \leq 53$	± 0.43	± 0.27	± 0.23
$53 < a \leq 70$	± 0.48	± 0.30	± 0.25
$70 < a \leq 90$	± 0.55	± 0.34	± 0.27
$90 < a \leq 115$	± 0.60	± 0.39	± 0.30
$115 < a \leq 150$	± 0.70	± 0.45	± 0.34
$150 < a \leq 200$	± 0.85	± 0.55	± 0.40
$200 < a \leq 250$	± 1.00	± 0.65	± 0.46
$250 < a \leq 315$	± 1.20	± 0.70	± 0.55
$315 < a \leq 400$	± 1.40	± 0.95	± 0.65
$400 < a \leq 500$	± 1.60	± 1.10	± 0.75
$500 < a \leq 630$	± 2.00	± 1.30	± 0.90
$630 < a \leq 800$	± 2.50	± 1.60	± 1.10
$800 < a \leq 1\ 000$	± 3.00	± 2.00	± 1.40
$1\ 000 < a \leq 1\ 300$	± 3.70	± 2.50	± 1.80
$1\ 300 < a \leq 1\ 600$	± 4.50	± 3.20	± 2.30
$1\ 600 < a \leq 2\ 000$	± 5.50	± 4.00	± 2.80

3.3. Category 2

Table 4 - Deviations for dimensions not including the parting line

Dimensions (mm)	Tolerance class		
	normal	reduced	precision
$a \leq 1$	± 0.13	± 0.08	± 0.06
$1 < a \leq 3$	± 0.15	± 0.09	± 0.07
$3 < a \leq 6$	± 0.17	± 0.10	± 0.08
$6 < a \leq 10$	± 0.20	± 0.11	± 0.09
$10 < a \leq 15$	± 0.22	± 0.13	± 0.10
$15 < a \leq 22$	± 0.25	± 0.15	± 0.11
$22 < a \leq 30$	± 0.28	± 0.17	± 0.13
$30 < a \leq 40$	± 0.32	± 0.20	± 0.15
$40 < a \leq 53$	± 0.37	± 0.24	± 0.17
$53 < a \leq 70$	± 0.44	± 0.28	± 0.20
$70 < a \leq 90$	± 0.50	± 0.34	± 0.24
$90 < a \leq 115$	± 0.60	± 0.41	± 0.29
$115 < a \leq 150$	± 0.75	± 0.50	± 0.35
$150 < a \leq 200$	± 0.95	± 0.65	± 0.45
$200 < a \leq 250$	± 1.15	± 0.80	± 0.55
$250 < a \leq 315$	± 1.40	± 1.00	± 0.70
$315 < a \leq 400$	± 1.75	± 1.20	± 0.85
$400 < a \leq 500$	± 2.20	± 1.50	± 1.00
$500 < a \leq 630$	± 2.80	± 1.90	± 1.20
$630 < a \leq 800$	± 3.50	± 2.40	± 1.50
$800 < a \leq 1\,000$	± 4.40	± 2.90	± 1.90

Table 5 - Deviations for dimensions including the parting or sliding line

Dimensions (mm)	Tolerance class		
	normal	reduced	precision
$a \leq 1$	± 0.23	± 0.18	± 0.16
$1 < a \leq 3$	± 0.25	± 0.19	± 0.17
$3 < a \leq 6$	± 0.27	± 0.20	± 0.18
$6 < a \leq 10$	± 0.29	± 0.21	± 0.19
$10 < a \leq 15$	± 0.32	± 0.23	± 0.20
$15 < a \leq 22$	± 0.35	± 0.25	± 0.21
$22 < a \leq 30$	± 0.38	± 0.27	± 0.23
$30 < a \leq 40$	± 0.42	± 0.30	± 0.25
$40 < a \leq 53$	± 0.47	± 0.34	± 0.27
$53 < a \leq 70$	± 0.55	± 0.38	± 0.30
$70 < a \leq 90$	± 0.60	± 0.44	± 0.34
$90 < a \leq 115$	± 0.70	± 0.50	± 0.39
$115 < a \leq 150$	± 0.85	± 0.60	± 0.45
$150 < a \leq 200$	± 1.10	± 0.75	± 0.55
$200 < a \leq 250$	± 1.30	± 0.90	± 0.65
$250 < a \leq 315$	± 1.50	± 1.10	± 0.80
$315 < a \leq 400$	± 1.90	± 1.30	± 0.95
$400 < a \leq 500$	± 2.30	± 1.60	± 1.10
$500 < a \leq 630$	± 2.90	± 2.00	± 1.30
$630 < a \leq 800$	± 3.60	± 2.50	± 1.60
$800 < a \leq 1\,000$	± 4.50	± 3.00	± 2.40

3.4. Category 3

Table 6 - Deviations for dimensions not including the parting line

Dimensions (mm)	Tolerance class		
	normal	reduced	precision
$a \leq 1$	± 0.13	± 0.08	± 0.06
$1 < a \leq 3$	± 0.15	± 0.09	± 0.07
$3 < a \leq 6$	± 0.17	± 0.10	± 0.08
$6 < a \leq 10$	± 0.20	± 0.11	± 0.09
$10 < a \leq 15$	± 0.22	± 0.13	± 0.10
$15 < a \leq 22$	± 0.25	± 0.15	± 0.11
$22 < a \leq 30$	± 0.28	± 0.17	± 0.13
$30 < a \leq 40$	± 0.32	± 0.20	± 0.15
$40 < a \leq 53$	± 0.37	± 0.24	± 0.17
$53 < a \leq 70$	± 0.44	± 0.28	± 0.20
$70 < a \leq 90$	± 0.50	± 0.34	± 0.24
$90 < a \leq 115$	± 0.60	± 0.41	± 0.29
$115 < a \leq 150$	± 0.75	± 0.50	± 0.35
$150 < a \leq 200$	± 0.95	± 0.65	± 0.45
$200 < a \leq 250$	± 1.20	± 0.80	± 0.55
$250 < a \leq 315$	± 1.40	± 0.95	± 0.66
$315 < a \leq 400$	± 1.80	± 1.20	± 0.82
$400 < a \leq 500$	± 2.20	± 1.50	± 1.00
$500 < a \leq 630$	± 2.80	± 1.90	± 1.20
$630 < a \leq 800$	± 3.50	± 2.40	± 1.50
$800 < a \leq 1\,000$	± 4.40	± 2.90	± 1.90

Table 7 - Deviations for dimensions including the parting or sliding line

Dimensions (mm)	Tolerance class		
	normal	reduced	precision
$a \leq 1$	± 0.16	± 0.11	± 0.09
$1 < a \leq 3$	± 0.18	± 0.12	± 0.10
$3 < a \leq 6$	± 0.20	± 0.13	± 0.11
$6 < a \leq 10$	± 0.22	± 0.14	± 0.12
$10 < a \leq 15$	± 0.25	± 0.16	± 0.13
$15 < a \leq 22$	± 0.28	± 0.18	± 0.14
$22 < a \leq 30$	± 0.31	± 0.20	± 0.16
$30 < a \leq 40$	± 0.35	± 0.23	± 0.18
$40 < a \leq 53$	± 0.40	± 0.27	± 0.20
$53 < a \leq 70$	± 0.47	± 0.31	± 0.23
$70 < a \leq 90$	± 0.55	± 0.37	± 0.27
$90 < a \leq 115$	± 0.65	± 0.44	± 0.32
$115 < a \leq 150$	± 0.80	± 0.55	± 0.38
$150 < a \leq 200$	± 1.00	± 0.70	± 0.48
$200 < a \leq 250$	± 1.30	± 0.85	± 0.60
$250 < a \leq 315$	± 1.50	± 1.00	± 0.70
$315 < a \leq 400$	± 1.90	± 1.30	± 0.85
$400 < a \leq 500$	± 2.30	± 1.60	± 1.10
$500 < a \leq 630$	± 2.90	± 2.00	± 1.30
$630 < a \leq 800$	± 3.60	± 2.50	± 1.60
$800 < a \leq 1\,000$	± 4.50	± 3.00	± 2.00

3.5. Category 4

Table 8 - Deviations for dimensions not including the parting line

Dimensions (mm)	Tolerance class		
	normal	reduced	precision
$a \leq 1$	± 0.13	± 0.06	± 0.04
$1 < a \leq 3$	± 0.15	± 0.07	± 0.05
$3 < a \leq 6$	± 0.17	± 0.08	± 0.06
$6 < a \leq 10$	± 0.20	± 0.09	± 0.07
$10 < a \leq 15$	± 0.22	± 0.10	± 0.08
$15 < a \leq 22$	± 0.25	± 0.11	± 0.09
$22 < a \leq 30$	± 0.27	± 0.13	± 0.10
$30 < a \leq 40$	± 0.30	± 0.15	± 0.11
$40 < a \leq 53$	± 0.35	± 0.17	± 0.13
$53 < a \leq 70$	± 0.38	± 0.20	± 0.15
$70 < a \leq 90$	± 0.43	± 0.24	± 0.17
$90 < a \leq 115$	± 0.50	± 0.29	± 0.20
$115 < a \leq 150$	± 0.60	± 0.35	± 0.24
$150 < a \leq 200$	± 0.75	± 0.44	± 0.30
$200 < a \leq 250$	± 0.90	± 0.55	± 0.36
$250 < a \leq 315$	± 1.10	± 0.70	± 0.44
$315 < a \leq 400$	± 1.30	± 0.85	± 0.55
$400 < a \leq 500$	± 1.50	± 1.00	± 0.65
$500 < a \leq 630$	± 1.90	± 1.20	± 0.80
$630 < a \leq 800$	± 2.40	± 1.50	± 1.00
$800 < a \leq 1\,000$	± 2.90	± 1.90	± 1.25

Table 9 - Deviations for dimensions including the parting or sliding line

Dimensions (mm)	Tolerance class		
	normal	reduced	precision
$a \leq 1$	± 0.16	± 0.09	± 0.07
$1 < a \leq 3$	± 0.18	± 0.10	± 0.08
$3 < a \leq 6$	± 0.20	± 0.11	± 0.09
$6 < a \leq 10$	± 0.23	± 0.12	± 0.10
$10 < a \leq 15$	± 0.25	± 0.13	± 0.11
$15 < a \leq 22$	± 0.28	± 0.14	± 0.12
$22 < a \leq 30$	± 0.30	± 0.16	± 0.13
$30 < a \leq 40$	± 0.33	± 0.18	± 0.14
$40 < a \leq 53$	± 0.36	± 0.20	± 0.16
$53 < a \leq 70$	± 0.41	± 0.23	± 0.18
$70 < a \leq 90$	± 0.46	± 0.27	± 0.20
$90 < a \leq 115$	± 0.55	± 0.32	± 0.23
$115 < a \leq 150$	± 0.65	± 0.38	± 0.27
$150 < a \leq 200$	± 0.80	± 0.47	± 0.33
$200 < a \leq 250$	± 0.95	± 0.60	± 0.39
$250 < a \leq 315$	± 1.20	± 0.75	± 0.47
$315 < a \leq 400$	± 1.40	± 0.90	± 0.60
$400 < a \leq 500$	± 1.60	± 1.10	± 0.70
$500 < a \leq 630$	± 2.00	± 1.30	± 0.85
$630 < a \leq 800$	± 2.50	± 1.60	± 1.10
$800 < a \leq 1\,000$	± 3.00	± 2.00	± 1.30

3.6. Category 5

Table 10 - Deviations for dimensions not including the parting line

Dimensions (mm)	Tolerance class		
	normal	reduced	precision
$a \leq 1$	± 0.13	± 0.10	± 0.08
$1 < a \leq 3$	± 0.15	± 0.11	± 0.09
$3 < a \leq 6$	± 0.17	± 0.12	± 0.10
$6 < a \leq 10$	± 0.20	± 0.14	± 0.11
$10 < a \leq 15$	± 0.24	± 0.17	± 0.13
$15 < a \leq 22$	± 0.28	± 0.20	± 0.15
$22 < a \leq 30$	± 0.33	± 0.24	± 0.17
$30 < a \leq 40$	± 0.39	± 0.28	± 0.20
$40 < a \leq 53$	± 0.47	± 0.33	± 0.24
$53 < a \leq 70$	± 0.58	± 0.40	± 0.28
$70 < a \leq 90$	± 0.71	± 0.50	± 0.34
$90 < a \leq 120$	± 0.87	± 0.60	± 0.41
$120 < a \leq 160$	± 1.10	± 0.75	± 0.50
$160 < a \leq 200$	± 1.40	± 0.95	± 0.60
$200 < a \leq 250$	± 1.70	± 1.15	± 0.80
$250 < a \leq 315$	± 2.10	± 1.45	± 1.00
$315 < a \leq 400$	± 2.70	± 1.80	± 1.20
$400 < a \leq 500$	± 3.30	± 2.20	± 1.50
$500 < a \leq 630$	± 4.20	± 2.80	± 1.90
$630 < a \leq 800$	± 5.20	± 3.50	± 2.40
$800 < a \leq 1\,000$	± 6.50	± 4.40	± 2.90

Table 11 - Deviations for dimensions including the parting or sliding line

Dimensions (mm)	Tolerance class		
	normal	reduced	precision
$a \leq 1$	± 0.23	± 0.20	± 0.18
$1 < a \leq 3$	± 0.25	± 0.21	± 0.19
$3 < a \leq 6$	± 0.27	± 0.22	± 0.20
$6 < a \leq 10$	± 0.30	± 0.24	± 0.21
$10 < a \leq 15$	± 0.34	± 0.27	± 0.23
$15 < a \leq 22$	± 0.38	± 0.30	± 0.25
$22 < a \leq 30$	± 0.43	± 0.34	± 0.27
$30 < a \leq 40$	± 0.49	± 0.38	± 0.30
$40 < a \leq 53$	± 0.57	± 0.43	± 0.34
$53 < a \leq 70$	± 0.68	± 0.50	± 0.38
$70 < a \leq 90$	± 0.81	± 0.60	± 0.44
$90 < a \leq 120$	± 0.97	± 0.70	± 0.55
$120 < a \leq 160$	± 1.20	± 0.85	± 0.60
$160 < a \leq 200$	± 1.50	± 1.05	± 0.70
$200 < a \leq 250$	± 1.80	± 1.25	± 0.90
$250 < a \leq 315$	± 2.20	± 1.55	± 1.10
$315 < a \leq 400$	± 2.80	± 1.90	± 1.30
$400 < a \leq 500$	± 3.40	± 2.30	± 1.60
$500 < a \leq 630$	± 4.30	± 2.90	± 2.00
$630 < a \leq 800$	± 5.30	± 3.60	± 2.50
$800 < a \leq 1\,000$	± 6.60	± 4.50	± 3.00

3.7. Tolerances applicable to high precision parts

Table 12 - Deviations for dimensions not including the parting line

Dimensions (mm)	Tolerances
$a \leq 1$	± 0.025
$1 < a \leq 3$	± 0.03
$3 < a \leq 6$	± 0.035
$6 < a \leq 10$	± 0.04
$10 < a \leq 15$	± 0.05
$15 < a \leq 22$	± 0.06
$22 < a \leq 30$	± 0.07
$30 < a \leq 40$	± 0.08
$40 < a \leq 55$	± 0.09
$55 < a \leq 70$	± 0.10

Table 13 - Deviations for dimensions including the parting or sliding line

Dimensions (mm)	Tolerances
$a \leq 1$	± 0.05
$1 < a \leq 3$	± 0.06
$3 < a \leq 6$	± 0.07
$6 < a \leq 10$	± 0.08
$10 < a \leq 15$	± 0.10
$15 < a \leq 22$	± 0.11
$22 < a \leq 30$	± 0.12
$30 < a \leq 40$	± 0.13
$40 < a \leq 55$	-
$55 < a \leq 70$	-

3.8. Fillets, chamfers and connecting radii up to 2 mm

Normal class: $\pm 25\%$ of rated value, deviation rounded off to the upper 1/10.

Table 14

Rated dimension (mm)	Deviation (mm)
0.3 (1)	± 0.10
0.5	± 0.20
1	± 0.30
1.5	± 0.40
2	± 0.50
(1) To be avoided	

3.9. Dimensioned angle

The deviation $\Delta\alpha$ on the angle is measured taking the large side as the reference base.

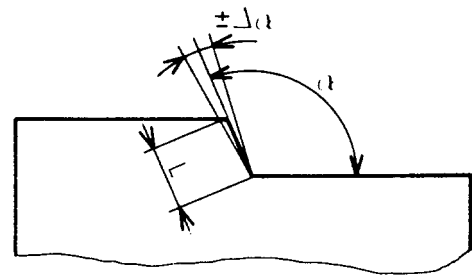


Figure 1

Table 15 - Permissible deviation $\Delta\alpha$

L	Normal class	Reduced class	Precision class
≤ 10	$\pm 3^\circ$	$\pm 1^\circ 30'$	$\pm 1^\circ$
$10 < L \leq 50$	$\pm 2^\circ$	$\pm 50'$	$\pm 30'$
$50 < L \leq 120$	$\pm 1^\circ$	$\pm 25'$	$\pm 20'$
> 120	$\pm 30'$	$\pm 15'$	$\pm 10'$

4. Shape and position tolerances

4.1. Clearance

Normal class: 0 to 1°

Unless otherwise stated on the drawing:

- for projecting or external parts, clearance is to be taken away from the dimension given. The tolerance only applies to the largest part.
- for hollow or internal parts, clearance is to be added to the dimension given. The tolerance only applies to the smallest part.

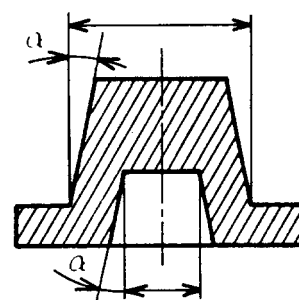


Figure 2

4.2. Tolerances for circularity (roundness), parallelism, coaxiality (out-of-line), and surface evenness

Deviations depend on the nature of the material and on the percentage and nature of the filler (mineral or glass fiber).

The tolerances for these shape and position parameters are expressed by a maximum deviation the value of which corresponds to the semi-interval of tolerance. This is

equivalent to taking the value indicated in the tables but without the signs.

Example: the permissible roundness of a 35 mm diameter part in unfilled PA 66: in normal class, according to table 6, the deviation is 0.32 mm.

4.3. Perpendicularity

Perpendicularity tolerance of an item with respect to a reference without allowing for clearance, in normal class: less than ± 15'.

4.4. Level of ejector traces

The permissible cavity or raised part must be determined jointly by all relevant parties within the range of 0.05 to 0.30 mm in normal class.

4.5. Offset due to mould parts

Unless otherwise stated on the drawing, the dimension considered on the part is overall dimension Y (figures 3 to 5).

Offset between two moving parts.

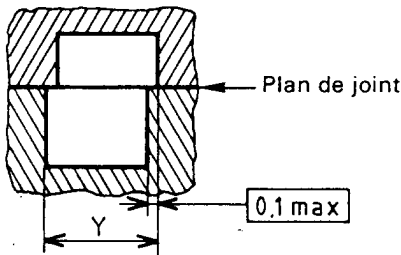


Figure 3

Offset between fixed parts

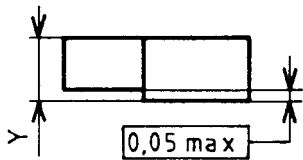


Figure 4

Connection

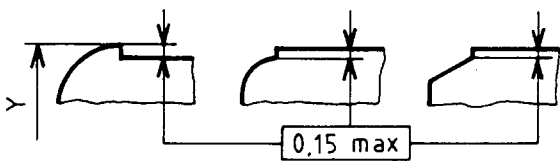


Figure 5

4.6. Sink marks for thermoplastics (1)

According to the B/A thickness ratio, in normal class:

- ratio ~ 1 : X = 0.10 mm maxi,
- ratio ~ 2 : X = 0.20 mm maxi,
- ratio ~ 3 : X = 0.30 mm maxi.

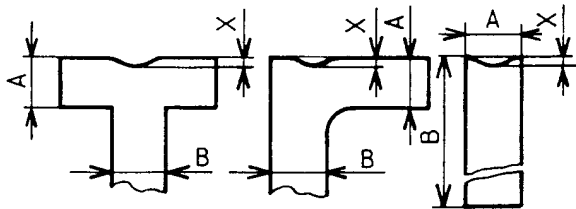


Figure 6

(1) The data concerning thermosets are not standardised.

5. Finishing tolerances

5.1. Flash

Flash at the parting line and on the ejector trace shall not exceed a projection of 0.15 mm in the normal class.

Wear bead at the parting line (thermosetting); in normal class: 0.3 mm maxi.

5.2. Injection threshold

In normal class, projection or cavity value according to the removal method chosen, if no special details are provided on the drawing:

	Removal method		
	ground	cut	broken
Thermosetting	± 0.20	+ 0.6 + 0	+ 1.5 - 0.3
Thermoplastic	-	± 0.20	+ 1 - 0.5

6. Reference

- NF T 58-000 - 1987: Tolerances applicable to moulded plastic parts (thermosetting and thermoplastic).