

RUBBER GUIDE®

GGF

Gotlands Gummifabrik AB

GGF

TMRubber Sp. z o. o.

Our areas of expertise

Rubber

Silicone

MedTech



FoodTech

**Assembly
& Testing**

**Bonding to
metal & plastic**

Certified according to ISO 9001, 14001 & 13485

Our manufacturing processes:

Compression: Rubber placed directly in the tool cavity.

Transfer: Rubber placed in the pot and pressed the plunger through shuttle bore, into the tool cavity.

Injection: Rubber injected into the closed tool through the channel further to the cavity.

Surface finish

VDI 3400	DIN / ISO 1302	Surface / Ra / CLA / AA	Surface / Ra	Surface / Rmax
0 - 31	Class / Klass N	(µm)	(µinch)	(µm)
	N1	0,03		0,1-0,3
	N2	0,05		0,3-0,7
0	N3	0,10	4,0	0,75-1,25
6	N4	0,20	8,0	1,5-2,5
12	N5	0,40	16,0	2-6
19	N6	0,90	36,0	6-10
25	N7	1,60	72	10-20
30	N8	3,20	125	20-40
36	N9	6,30	250	~60
42	N10	12,60	500	~125
	N11	25,00		~250
	N12	50,00		~500

Attention! - this is not on cross reference list, only comparison.

Flash

Class	Maximum height of flash in mm.	Desription
X0	0	No flash*
X1	0,1	Precision flash
X2	0,5	Accurate flash
X3	1	Normal flash
X4	2	Rough flash
X5	No limit	Non critical

* Class X0 can only apply to those surfaces which do not have any parting lines

Tolerances for mouldings

All dimensions in mm.

Nominal dimension.		Class M1		Class M2		Class M3		Class M4
Above	Up to and including	F ±	C±	F ±	C±	F ±	C±	F and C ±
0	4,0	0,08	0,10	0,10	0,15	0,25	0,40	0,50
4	6,3	0,10	0,12	0,15	0,20	0,25	0,40	0,50
6,3	10	0,10	0,15	0,20	0,20	0,30	0,50	0,70
10	16	0,15	0,20	0,20	0,25	0,40	0,60	0,80
16	25	0,20	0,20	0,25	0,35	0,50	0,80	1,00
25	40	0,20	0,25	0,35	0,40	0,60	1,00	1,30
40	63	0,25	0,35	0,40	0,50	0,80	1,30	1,60
63	100	0,35	0,40	0,50	0,70	1,00	1,60	2,00
100	160	0,40	0,50	0,70	0,80	1,30	2,00	2,50
160	-	0,3%	0,4%	0,5%	0,7%	0,8%	1,3%	1,5%

According to ISO 3302-1:2014

Fixed and opening dimensions.

F: Solid tool dimensions. This can achieve tighter tolerances on the finished part compared to "C".

C: Open tool dimensions, they have a wider tolerance and therefore cannot achieve the same tolerances as "F".

Se drawing of tool for explanation of F and C

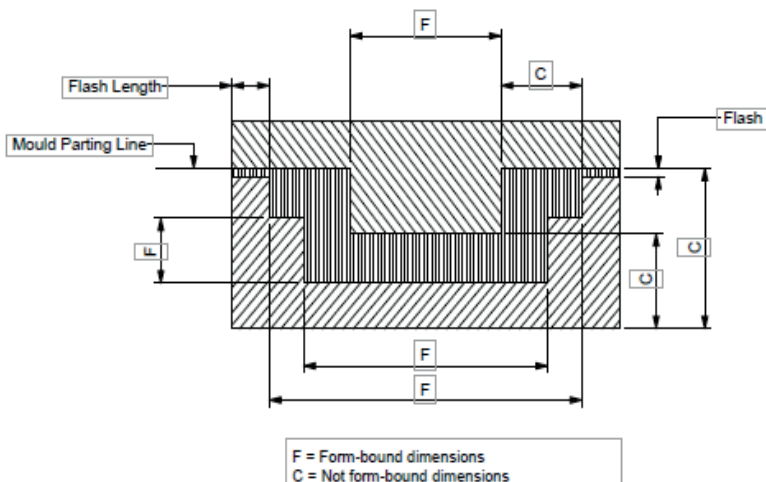
Tolerances classes.

M1: This tolerance class is only used for precision molded parts. This normally requires one cavity tools, custom rubber mixtures. Means high detail costs.

M2: Used for moulded parts with high demands. In many cases, the demands on materials and process is like, M1 tolerances.

M3: Used for molding parts with normal tolerance requirements.

M4: Use for details where the dimensions are not as critical.



RUBBER POLYMERS -

Rubber Polymers/ Properties	NR/IR	SBR	BR	EPDM/ EPDM	PNR	IIR	BIIR/ CIIR	NBR	NBR/ PVC	HNBR	XNBR	CR	
Max temperature	80	90	80	120	60	90	90	90	80	125	90	85	
Min temperature	-50	-40	-75	-35	-50	-45	-45	-30	-25	-25	-25	-35	
Tear resistance	4	3	3	3	2	3	3	3	3	3	4	3	
Compression set at -30-+70 °C	4	4	4	3	3	2	2	3	2	2-3	3	3	
Compression set at +70-+150 °C	1	1	1	2-3	1	2	2	3	2	4	3	2-3	
Abrasion	4-5	4-5	5	3	3	3	3	3	3	3	4	3-4	
Oil and fuel resistance	1	1	1	1	1	1	1	3-4	4	3-4	3-4	2-3	
Gasdiffusion inert gas	2	2-3	2	2	2	5	5	4	4	4	4	3-4	
Oxidations resistance	2	2	2	5	2	3-4	3-4	2-3	3	5	2-3	3-4	
Weathering and ozone resistance	1-2	1-2	1-2	5	1-2	4	4	1-2	3-4	5	1-2	3	
Heat aging	1-2	1-2	1-2	3-4	1-2	3-4	3-4	3	3	4	3	3	
Cold stiffening	4-5	4	5	4	3-4	3-4	3-4	2-3	2	2-3	2	2-3	
Water resistance	4	4	4	5	4	4	3	3-4	3	3-4	3-4	2-3	
Fire resistance	1	1	1	1	1	1	1	1	2-3	1	1	3	
Rebound elasticity in cold	5	3	5	3	3	1	1	3	2	3	3	4	
Rebound elasticity in heat	5	3	5	3	3	3	3	3	2-3	3	3	4	
Dynamic fatigue	4	4	4	3	3	3	3	2	2-3	4	2	4	
High friction	5	4	3	3	4	4	4	3-4	3	3-4	3-4	4	
Bonding to metal	4-5	4-5	4-5	3	4-5	2	2	4	3	3	4	4	
Bonding to textile	4-5	4-5	4-5	3	4-5	2	2	3-4	3	3	3-4	4-5	

Rating

- 5 Excellent
- 4 Very good
- 3 Good
- 2 Fair
- 1 Bad

The values in the table above apply to average compounds and the table is just for reference, the properties may be greatly influenced by the application and the formulation of the compound.

The table of properties is produced by Läroverket i Småland AB
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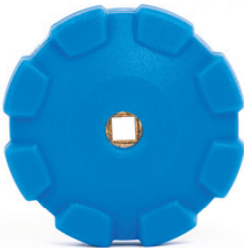
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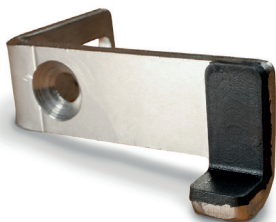
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TABLE OF PROPERTIES

	CSM	ECO	ACM	AEM	EVM	AU/ EU	FKM	FFKM	FEPM	PMQ/ VMQ	FMQ/ FVMQ	FZ/ PZ	OT/ EOT
	125	120	140	150	150	70	200	250	200	200	175	160	80
	-40	-40	-20	-30	-30	-10	-15	-15	-5	-80	-55	-55	-40
	3	2-3	2-3	2	3	4-5	1-2	2	4	1	1	2	1
	2	2-3	3	4	2	3	2-3	2-3	2	4	3	3	1-2
	2	3	3	4	2	1-2	5	3-4	3-4	4	4	4	1-2
	3	3	2-3	3	2	5	3	3	3	1-2	1	2	1
	2-3	4	4	3	2	4-5	5	4	4	2-3	4	3-4	4-5
	3	4-5	2	2-3	1	4	3	4		1-2	3	4	3
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	2	2	1	2	1	2-3	4	4		2	3	5	
	3	3-4	2	1		1	2	2	1	5	4	4	2
	3	5	4	2		3	4	4	2	5	4	4	1-2
	3	3	2-3	3	2	4	1-2	1-2	3	1-2	2	3	1
	3	3	3	3	3	1	2	2		3-4	3		
	4	3	3	3	4	5	2	2	2-3	2	2	3	3
	3	3	3	3	4	5	2	3		2	2		

NR/IR	Natural R/Isoprene R	CR	Chloroprene R	FMQ/FVMQ	Fluorsilicone R
SBR	Styrene-butadiene R	CSM	Chlorinated polythylene	FZ/PZ	Polyphosphazene R
BR	Butadiene R	ECO	Epichlorohydrine R	OT/EOT	Polysulphide R
EPM/EPDM	Ethylene-propylene R	ACM	Acrylic R		
PNR	Norbornene R	AEM	Ethylene-acrylic R		
IIR	Butyl R	EVM	Ethylene-vinyl acetate R		
BIIR/CIIR	Halobutyl R	AU/EU	Urethane R		
NBR	Nitrile R	FKM	Fluorocarbon R		
NBR/PVC	Nitrile/PVC blend	FFKM	Perfluorocarbon R		
HNBR	Hydrogenated NBR	FEPM	Tetrafluorethylenepropylene R		
XNBR	Carboxylated NBR	PMQ/PVMQ	Silicone R		





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