G-T® RINGS

13,000 & 14,000 Series

COMPACT SEAL

The unique G-T® Ring provides a compact double-acting seal for use in new designs for light or heavy duty applications where a more bulky type of seal had previously been required.

This proven seal combines a tough, resilient, T-shaped sealing element with precisely dimensioned, pressure-activated non-extrusion rings (Figure 1) in applications where pressures may range to 10,000 psi (690 bar) or higher.

The seal eliminates several major sealing problems:

- Sealing element is protected from extrusion where clearances are large or pressures are high,
- Prevents spiral failure common to O-Rings, and
- As non-extrusion rings are radially activated, they may be fabricated of materials with high shear strengths that will successfully bridge large clearance gaps encountered during high pressure cylinder breathing or incidental to use of wear rings. For more than 40 years, the G-T Ring has been used by the Ordnance Department in recoil systems and by Industrial designers to solve their most severe sealing problems encountered in a wide variety of industrial, mobile and oil field requirements.

Utilize related ISO recommendations where appropriate as follows:

- ISO/R286, tolerances (where suitable),
- ISO 468, surface roughness, and
- ISO 3286, Single Point Cutting tools-corner radii.

The sequential range of rod and bore diameters for each cross section are recommended for G-T seal type usage in dynamic applications only. Extension of range of diameters in each cross section group is possible but should be discussed with Greene, Tweed. For example, use of 1.80 mm cross section seal in a 20 mm dynamic piston application would not be recommended in favor of a 2.62 mm Cx seal.

14,000 Radiused, Piston Type

13,000 Non-Radiused, Rod Type

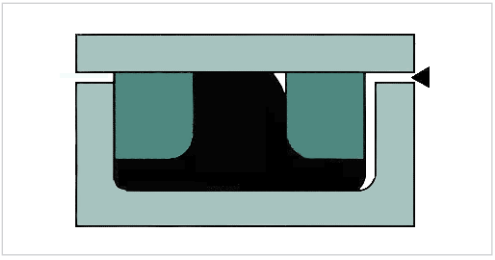


Figure 1

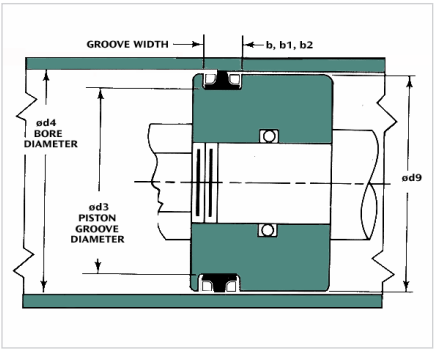
10/13-GT DS-US-OF-141

TABLE 1 ELASTOMERIC COMPOUND SELECTOR

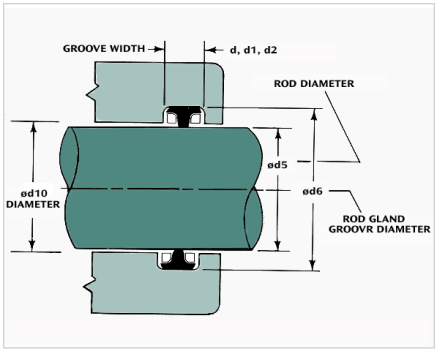
Service Conditions

Fluid	Temperature Range	Base Polymer	Durometer Hardness (Shore A)	Compound Designator	Compatible Non-Extrusion Ring Material*
Hydraulic Fluids					
General purpose hydraulic oils - petroleum base lubricating oils, air, water, water-glycols, soluble oils	-34°C to 149°C (-29°F to 300°F)	NBR (Nitrile)	75	173	TFE, NWR
	-46°C to 107°C (-51°F to 225°F)	AU (Urethane)	75	367	
Water, water-glycols, soluble oils	-34°C to 100°C (-29°F to 212°F)	NBR	75	173	TFE
Silicone Oils	-34°C to 149°C (-29°F to 300°F)	NBR	75	173	TFE, NWR
	-54°C to 149°C (-65°F to 300°F)	EPR (Ethylene propylene)	80	952	
Pydraul 30E, 50E, 90E, 115E	-29°C to 232°C (-20°F to 450°F)	FKM (Flurocarbon)	75	731	TFE, P5, P8
Fuels					
Gasoline, Kerosene	-29°C to 232°C (-20°F to 450°F)	FKM	75	731	TFE, P5, P8
Break Fluids					
Automotive (SAE-J-1703), Silicone	-54°C to 149°C (-65°F to 300°F)	EPR	80	952	TFE, P4
Gases					
Nitrogen and most inert gases	-34°C to 149°C (-29°F to 300°F)	NBR	75	173	TFE, NWR, P4
	-29°C to 232°C (-20°F to 450°F)	FKM	75	731	
Miscellaneous					
Chemicals, lubricating oils, solvents	-29°C to 232°C (-20°F to 450°F)	FKM	75	731	TFE, P8
Steam, amines, H_2S (sour gas) (Very low permeability material)	-7°C to 232°C (19°F to 450°F)	FEPM (Fluoraz = Tetrafluoro-ethylene-propylene Elastomer)	95	790	TFE, NWR, P8
			75	797	
			90	799	

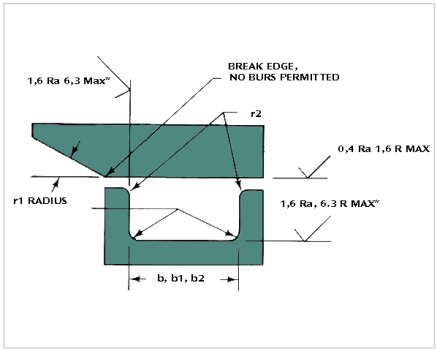
**TFE: Virgin or filled to GT specification*



Groove Width



Groove Width



Groove Detail

TABLE 2 PISTON TYPE DIMENSIONAL INFORMATION

G-T Ring Part No.	Ød4		Ød3		Ød9		Groove Width G (+0.25/-0.00)			Radii	
	Bore ID (mm)	Tolerance H8 (microns)	Gland OD (mm)	Tolerance h8 (microns)	Piston OD (mm)	Tolerance (microns)	b Narrow (mm)	b1 Intermediate (mm)	b2 Wide (mm)	r1 (mm)	r2 (mm)
10800	6.3	+22 / -0	3.40	+0 / -18	6.3	-25 / -61 (e9)	2.39**	3.78	5.26	0.3	0.1
10900	7		4.10		7					0.5	0.3
11000	8		5.10		8						
11100	9		6.10	+0 / -22	9						
11200	10*		7.10		10						
11300	11	+27 / -0	8.10		11	-32 / -75 (e9)					
11400	12*		9.10		12						
21400	12*		7.60		12		3.58	4.65	6.22	0.3	0.1
21500	13		8.60		13					0.5	0.3
21600	14*		9.60		14						
21700	15		10.60		15						
21800	16*		11.61	+0 / -27	16						
21900	18*		13.61		18						
22000	20*	+33 / -0	15.61		20	-40 / -92 (e9)					
22100	21		16.61		21						
22200	22*		17.61		22						
22300	23		18.61		23						
32200	22*		15.99	+0 / -33	22	-20 / -72 (f9)	4.78	5.97	7.72	0.4	0.1
32300	23		16.99		23					0.8	0.3
32400	25*		18.99		25						
32500	27		20.99		27						
32600	28		21.99		28						
32700	30		23.99		30						
32800	32*	+39 / -0	26.00		32	-25 / -87 (f9)					
32900	33		27.00		33						
33000	35		29.00		35						

** Indicates Rod/Bore sizes to ISO R3320 and ISO 5597*
***Noted tolerance is not recommended, GT recommends a tolerance of +0.13/-0*

TABLE 2 PISTON TYPE DIMENSIONAL INFORMATION CONTINUED

G-T Ring Part No.	Ød4		Ød3		Ød9		Groove Width G (+0.25/-0.00)			Radii	
	Bore ID (mm)	Tolerance H8 (microns)	Gland OD (mm)	Tolerance h8 (microns)	Piston OD (mm)	Tolerance (microns)	b Narrow (mm)	b1 Intermediate (mm)	b2 Wide (mm)	r1 (mm)	r2 (mm)
33100	36*		30.00		36						
33200	38		32.00	+0	38						
33300	40*		34.00	-39	40						
33400	42		36.00		42						
33500	45*		39.00		45						
53500	45*		35.78				7.14	8.48	10.77	0.4	0.1
53600	48		38.78		48					0.8	0.3
53700	50*		40.78		50						
53800	55	+46 -0	45.78		55	-30 -104 (f9)					
53900	56*		46.78		56						
54000	60		50.79	+0 -46	60						
54100	63*		53.79		63						
54200	65		55.79		65					0.4	0.1
54300	70		60.79		70					0.8	0.3
54400	75		65.79		75						
54500	80*		70.79		80						
54600	85	+54 -0	75.79		85	-36 -123 (e9)					
54700	90*		80.79	+0 -54	90						
54800	95		85.79		95						
54900	100*		90.79		100						
55000	105		95.79		105						
55100	110*		100.79		110						
55200	115		105.79		115						
55300	120		110.79		120						
55400	125*	+63 -0	115.80		125	-43 -106 (f8)					
55500	130		120.80		130						
55600	135		125.80		135						
75600	135		122.65	+0 -63	135		9.53	12.07	14.71	0.8	0.1
75700	140*		127.65		140					1.2	0.3
75900	150		137.65		150						
76100	160*		147.65		160						
76300	170		157.65		170						
76500	180*		167.65		180						
76700	190	+72 -0	177.65		190	-50 -122 (f8)					
76900	200*		187.66	+0 -72	200						
77100	210		197.66		210						
77300	220*		207.66		220						
77400	225		212.66		225						

** Indicates Rod/Bore sizes to ISO R3320 and ISO 5597*

TABLE 2 PISTON TYPE DIMENSIONAL INFORMATION CONTINUED

G-T Ring Part No.	Ød4		Ød3		Ød9		Groove Width G (+0.25/-0.00)			Radii	
	Bore ID (mm)	Tolerance H8 (microns)	Gland OD (mm)	Tolerance h8 (microns)	Piston OD (mm)	Tolerance (microns)	b Narrow (mm)	b1 Intermediate (mm)	b2 Wide (mm)	r1 (mm)	r2 (mm)
77500	230		217.66		230		9.53	12.07	14.71	1.2	0.3
77600	235		222.66		235						
77900	250*		237.66		250						
78200	265	+81	252.67	+0	265	-56 (f8)					
78400	280*	-0	267.67	-81	280	-137					
78600	300		387.67		300						
78700	320*	+89	307.67		320	-62 (f8)					
78800	340	-0	327.68	+0	340	-151					
78900	360*		347.68	-89	360						
79000	380		367.68		380						
79100	400*		387.68		400						

** Indicates Rod/Bore sizes to ISO R3320 and ISO 5597*

TABLE 3 ROD TYPE DIMENSIONAL INFORMATION

G-T Ring Part No.	d5		d6		d10		Groove Width G (+0.25/-0.00)			Radii	
	Rod ID (mm)	Tolerance f8 (microns)	Gland ID (mm)	Tolerance H8 (microns)	Piston ID (mm)	Tolerance H8 (microns)	b Narrow (mm)	b1 Intermediate (mm)	b2 Wide (mm)	r1 (mm)	r2 (mm)
10500	4	-10	6.97	+22	4	+18	2.39**	3.78	5.26	0.2	0.1
10600	5	-28	7.97	-0	5	-0				0.4	0.3
10700	6		8.97		6						
10800	6.3	-13	9.27		6.3	+22					
10900	7	-35	9.97		7	-0					
11000	8		10.97	+27	8						
11100	9		11.97	-0	9						
21200	10*		14.50		10		3.58	4.65	6.22	0.2	0.1
21300	11	-16	15.50		11	+27				0.4	0.3
21400	12*	-43	16.50		12	-0					
21500	13		17.50		13						
21600	14*		18.50	+33	14						
21700	15		19.50	-0	15						
21800	16*		20.50		16						
21900	18*		22.50		18						
32000	20*	-20	26.07		20	+33	4.78	5.97	7.72	0.4	0.1
32100	21	-53	27.07		21	-0				0.8	0.3
32200	22*		28.07		22						

** Indicates Rod/Bore sizes to ISO R3320 and ISO 5597*
***Noted tolerance is not recommended, GT recommends a tolerance of +0.13/-0*

TABLE 3 ROD TYPE DIMENSIONAL INFORMATION CONTINUED

G-T Ring Part No.	d5		d6		d10		Groove Width G (+0.25/-0.00)			Radii	
	Rod ID (mm)	Tolerance f8 (microns)	Gland ID (mm)	Tolerance H8 (microns)	Piston ID (mm)	Tolerance H8 (microns)	b Narrow (mm)	b1 Intermediate (mm)	b2 Wide (mm)	r1 (mm)	r2 (mm)
32300	23		29.07		23		4.78	5.97	7.72	0.8	0.3
32400	25*		31.06	+39	25						
32500	27		33.06	-0	27						
32600	28		34.06		28						
32700	30		36.06		30						
32800	32*	-25	38.05		32	+39					
32900	33	-64	39.05		33	-0					
33000	35		41.05		35						
33100	36		42.05		36						
33200	38		44.05		38						
53300	40*		49.17		40		7.14	8.48	10.77	0.4	0.1
53400	42		51.17	+46	42					0.8	0.3
53500	45		54.17	-0	45						
53600	48		57.17		48						
53700	50*		59.17		50						
53800	55	-30	64.16		55	+46					
53900	56	-76	65.16		56	-0					
54000	60		69.16		60						
54100	63*		72.16		63						
54200	65		74.16		65						
54300	70		79.16		70						
54400	75		84.16	+54	75						
54500	80*		89.16	-0	80						
54600	85	-36	94.15		85	+54					
54700	90	-90	99.15		90	-0					
54800	95		104.15		95						
54900	100*		109.15		100						
55000	105		114.15		105						
55100	110		119.15		110						
75200	115		127.12	+63	115		9.53	12.07	14.71		0.1
75300	120		132.12	-0	120					1.2	0.3
75400	125*	-43	137.12		125	+63					
75500	130	-106	142.12		130	-0					
75600	135		147.12		135						
75700	140		152.12		140						
75800	145		157.12		145						
75900	150		162.12		150						
76000	155		167.12		155						
76100	160*		172.12		160						
76200	165		177.12		165						
76300	170		182.11	+72	170						
76400	175		187.11	-0	175						

** Indicates Rod/Bore sizes to ISO R3320 and ISO 5597*

TABLE 3 ROD TYPE DIMENSIONAL INFORMATION CONTINUED

G-T Ring Part No.	d5		d6		d10		Groove Width G (+0.25/-0.00)			Radii	
	Rod ID (mm)	Tolerance f8 (microns)	Gland ID (mm)	Tolerance H8 (microns)	Piston ID (mm)	Tolerance H8 (microns)	b Narrow (mm)	b1 Intermediate (mm)	b2 Wide (mm)	r1 (mm)	r2 (mm)
76500	180		192.11		180		9.53	12.07	14.7	1.2	0.3
76600	185	-50	197.10		185	+72					
76700	190	-122	202.10		190	-0					
76800	195		207.10		195						
76900	200*		212.10		200						
77000	205		217.10		205						
77100	210		222.10		210						
77200	215		227.10		215						
77300	220		232.10		220						
77400	225		237.10		225						
77500	230		242.10		230						
77600	235		247.10		235						
77700	240		252.09	+81	240						
77800	245		257.09	-0	245						
77900	250*		262.09		250						
78000	255	-56	267.09		255	+81					
78100	260	-137	272.09		260	-0					
78200	265		277.09		265						
78300	270		282.09		270						
78400	280*		292.09		280						
78500	290		302.09		290						
78600	300		312.09		300						
78700	320*	-62	332.07	+89	320	+89					
78800	340	-151	352.07	-0	340	-0					
78900	360*		372.07		360						
79000	380		392.07		380						
79100	400*		412.06	+97	400						
79200	425	-68	437.05	-0	425	+97					
79300	450	-165	462.05		450	-0					
79400	475		487.05		475						

** Indicates Rod/Bore sizes to ISO R3320 and ISO 5597*

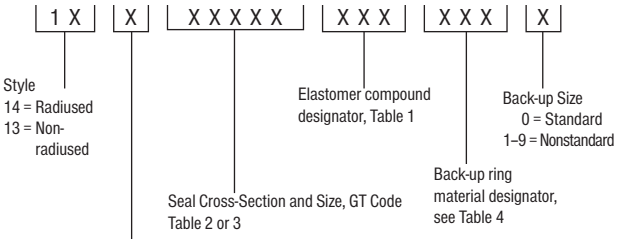
TABLE 4 ANTI-EXTRUSION RING MATERIAL SELECTOR

Pressure (bar)	Clearance	Recommended Anti-Extrusion Material	Designator
200	Without Wear Rings See Table 3 and 4	Virgin TFE	005
		NWR: Wear Resistant Nylon	006
		P4: Graphite filled TFE to GT specification	016
		P5: Glass and MoS_2 filled TFE to GT specification	021
	With Wear Rings 0.64 mm diametral clearance for 5.33 mm or 6.99 mm Cx seals	NWR: Wear Resistant Nylon	006
		P5: Glass and MoS_2 filled TFE to GT specification	021
200-350	Without Wear Rings See Tables 3 and 4	Staged Virgin TFE	050
		NWR: Wear Resistant Nylon	
	With Wear Rings Contact GT Engineering	Staged P4: Graphite filled TFE to GT specification	070
		P8: Arlon® 1330	

PART NUMBERING SYSTEM

The part numbering system requires the use of tables 1-4.

For nonstandard designs contact GT engineering.



Designator (First digit of basic part number column)	Nom. Cross Section (mm)
1	1,80
2	2,62
3	3,53
5	5,33
7	6,99

Rod	Piston	Axial Length
1	2	Narrow Base (0b/u)
3	4	Intermediate Base (1b/u)
5	6	Wide Base (2b/u)
7	8	Narrow Base GTL

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