

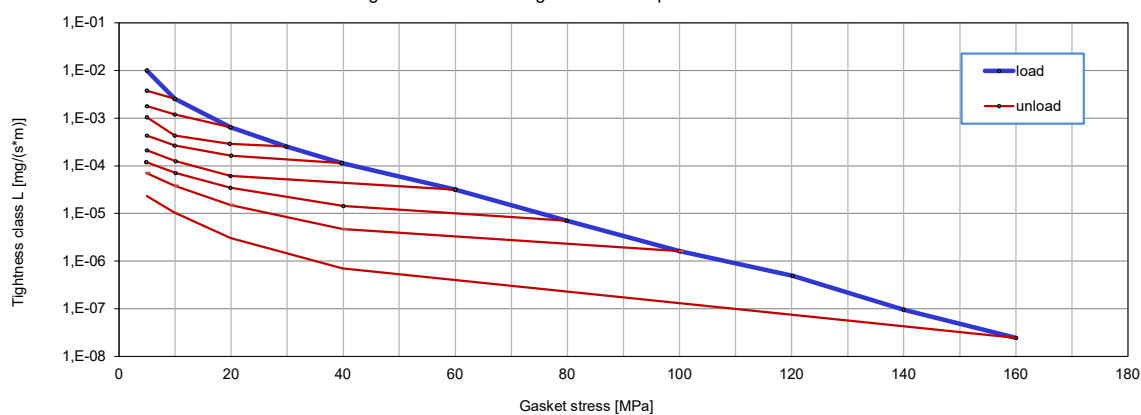
		LABORATORY OF SEALING MATERIALS 43-382 Bielsko-Biała, ul. Szyprów 17 tel. +48 33 8184133 e-mail: lbmu@spetech.com.pl www.laboratory.spetech.eu			 TUV Rheinland CERTIFIED DIN EN ISO 9001 210/AL1/5952
Company		SPETECH sp. z o.o.			
Gasket Type		SPETOGRAF® GUS® 30 PRO			 LB - 12402
Dimensions [mm]		92 x 49 x 2 (DN40 PN40)			
Calculation type EN 1591-1		a) flat gasket;		IBC	
Notes:	Rev.1 (04-03-2021)				

Factors acc. to EN 13555 to use in calculation standard EN 1591-1:2009/ :2013

Minimum level of surface pressure required for leakage rate class L on assembly $Q_{min/L}$ and after off-loading $Q_{Smin/L}$ at room temperature (RT)

Internal pressure [bar]		10									
L [mg/(s·m)]	$Q_{min/L}$ [MPa]	$Q_{Smin/L}$ [MPa] for effective gasket stress									
		$Q_A = 10$ [MPa]	$Q_A = 20$ [MPa]	$Q_A = 30$ [MPa]	$Q_A = 40$ [MPa]	$Q_A = 60$ [MPa]	$Q_A = 80$ [MPa]	$Q_A = 100$ [MPa]	$Q_A = 160$ [MPa]		
10^{-0}	5	5	5	5	5	5	5	5	5		
10^{-1}	5	5	5	5	5	5	5	5	5		
10^{-2}	5	5	5	5	5	5	5	5	5		
10^{-3}	17		12	5	5	5	5	5	5		
10^{-4}	42					13	7	5	5		
10^{-5}	75						10	10	10		
10^{-6}	108								35		
10^{-7}	139								109		

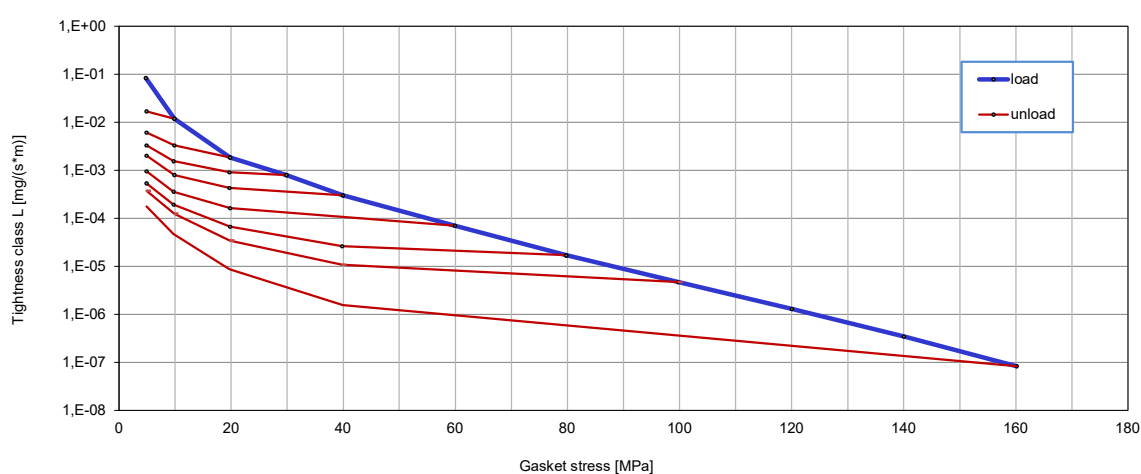
Leakage rate in function of gasket stress - pressure 10 bar / RT



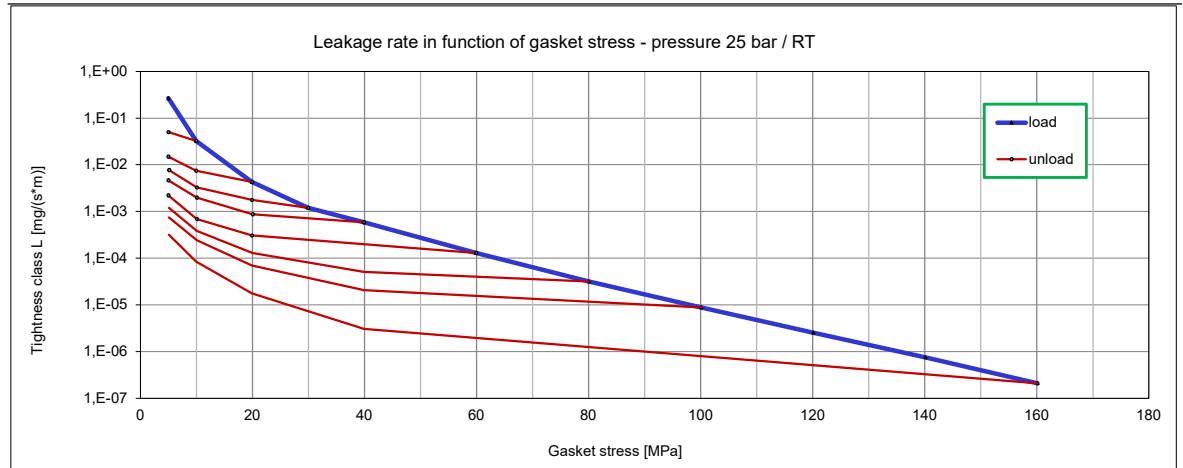
Minimum level of surface pressure required for leakage rate class L on assembly $Q_{min/L}$ and after off-loading $Q_{Smin/L}$ at room temperature (RT)

Internal pressure [bar]		16									
L [mg/(s·m)]	$Q_{min/L}$ [MPa]	$Q_{Smin/L}$ [MPa] for effective gasket stress									
		$Q_A = 10$ [MPa]	$Q_A = 20$ [MPa]	$Q_A = 30$ [MPa]	$Q_A = 40$ [MPa]	$Q_A = 60$ [MPa]	$Q_A = 80$ [MPa]	$Q_A = 100$ [MPa]	$Q_A = 160$ [MPa]		
10^{-0}	5	5	5	5	5	5	5	5	5		
10^{-1}	5	5	5	5	5	5	5	5	5		
10^{-2}	11		5	5	5	5	5	5	5		
10^{-3}	27			18	9	5	5	5	5		
10^{-4}	55					41	16	12	7		
10^{-5}	88							44	19		
10^{-6}	124								56		
10^{-7}	157								151		

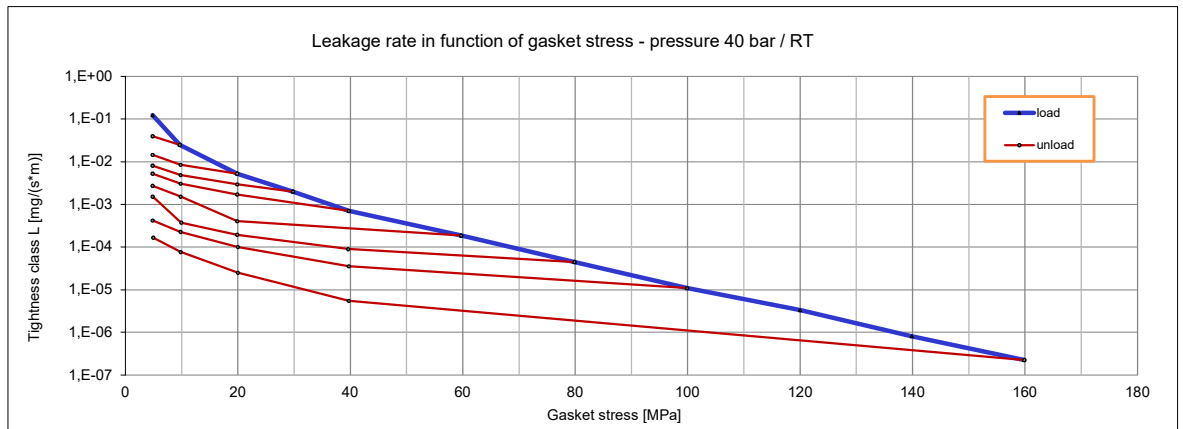
Leakage rate in function of gasket stress - pressure 16 bar / RT



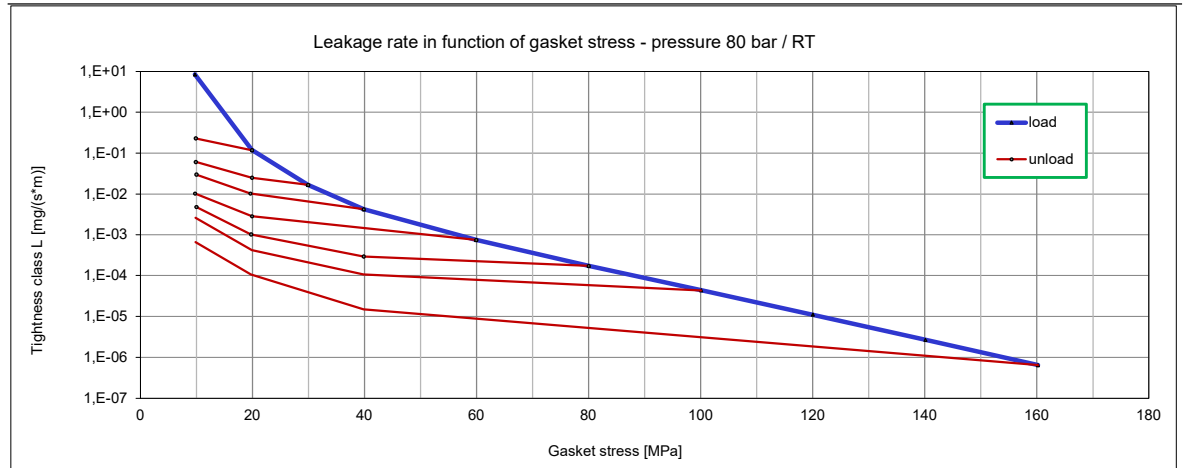
Minimum level of surface pressure required for leakage rate class L on assembly $Q_{min/L}$ and after off-loading $Q_{Smin/L}$ at room temperature (RT)											
Internal pressure [bar]		25									
L [mg/(s·m)]	$Q_{min/L}$ [MPa]	$Q_{Smin/L}$ [MPa] for effective gasket stress									
		$Q_A = 10$ [MPa]	$Q_A = 20$ [MPa]	$Q_A = 30$ [MPa]	$Q_A = 40$ [MPa]	$Q_A = 60$ [MPa]	$Q_A = 80$ [MPa]	$Q_A = 100$ [MPa]	$Q_A = 160$ [MPa]		
10^{-0}	5	5	5	5	5	5	5	5	5		
10^{-1}	7	5	5	5	5	5	5	5	5		
10^{-2}	18		8	5	5	5	5	5	5		
10^{-3}	32				18	8	6	5	5		
10^{-4}	63						25	17	9		
10^{-5}	98							90	26		
10^{-6}	136								90		
10^{-7}											
10^{-8}											



Minimum level of surface pressure required for leakage rate class L on assembly $Q_{min/L}$ and after off-loading $Q_{Smin/L}$ at room temperature (RT)											
Internal pressure [bar]		40									
L [mg/(s·m)]	$Q_{min/L}$ [MPa]	$Q_{Smin/L}$ [MPa] for effective gasket stress									
		$Q_A = 10$ [MPa]	$Q_A = 20$ [MPa]	$Q_A = 30$ [MPa]	$Q_A = 40$ [MPa]	$Q_A = 60$ [MPa]	$Q_A = 80$ [MPa]	$Q_A = 100$ [MPa]	$Q_A = 160$ [MPa]		
10^{-0}	5	5	5	5	5	5	5	5	5		
10^{-1}	5	5	5	5	5	5	5	5	5		
10^{-2}	16		8	5	5	5	5	5	5		
10^{-3}	36				31	13	6	5	5		
10^{-4}	68						36	20	8		
10^{-5}	101								31		
10^{-6}	137								103		
10^{-7}											
10^{-8}											



Minimum level of surface pressure required for leakage rate class L on assembly $Q_{min/L}$ and after off-loading $Q_{Smin/L}$ at room temperature (RT)											
Internal pressure [bar]		80									
L [mg/(s·m)]	$Q_{min/L}$ [MPa]	$Q_{Smin/L}$ [MPa] for effective gasket stress									
		$Q_A = 20$ [MPa]	$Q_A = 30$ [MPa]	$Q_A = 40$ [MPa]	$Q_A = 60$ [MPa]	$Q_A = 80$ [MPa]	$Q_A = 100$ [MPa]	$Q_A = 160$ [MPa]			
10^{-0}	10	10	10	10	10	10	10	10			
10^{-1}	21		10	10	10	10	10	10			
10^{-2}	34			20	10	10	10	10			
10^{-3}	56				51	20	15	10			
10^{-4}	88						46	21			
10^{-5}	121							56			
10^{-6}	154							143			
10^{-7}											
10^{-8}											

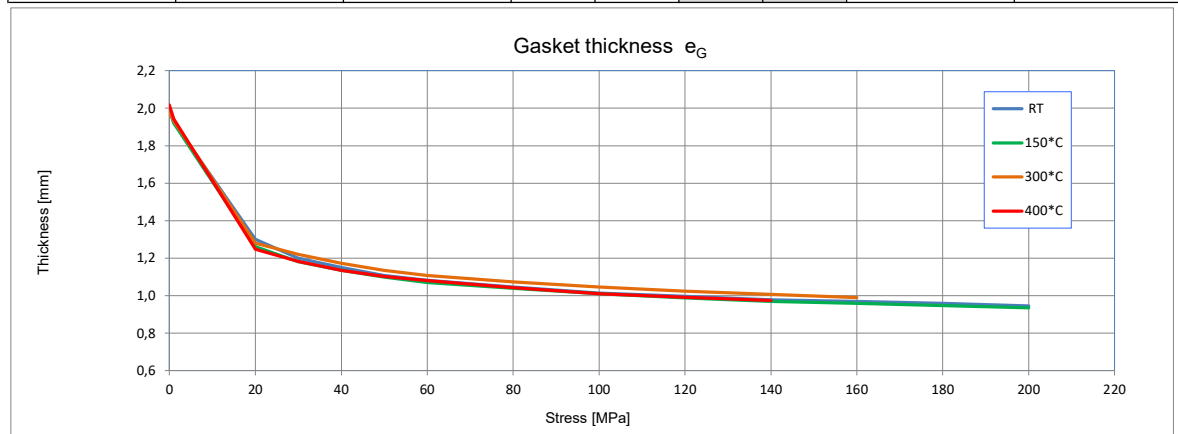


RT								
Temperature								
Gasket stress	E_G	e_G	C=500 kN/mm		C=1500 kN/mm		Q_{Smax}	μ_G
			P_{QR}	Δe_{Gc}	P_{QR}	Δe_{Gc}		
[MPa]	[MPa]	[mm]	[-]	[mm]	[-]	[mm]	[MPa]	[-]
0		1,991					200	0,06
1		1,924						
20	433	1,300						
30	814	1,200	0,97	0,008				
40	1066	1,149						
50	1077	1,107	0,99	0,004				
60	1645	1,081						
80	2628	1,046						
100	2375	1,013						
120	4666	0,996						
140	4919	0,977						
160	7545	0,969						
180	11339	0,958						
200	9901	0,945	1,00	0,000				

150°C								
Temperature								
Gasket stress	E_G	e_G	C=500 kN/mm		C=1500 kN/mm		Q_{Smax}	μ_G
			P_{QR}	Δe_{Gc}	P_{QR}	Δe_{Gc}		
[MPa]	[MPa]	[mm]	[-]	[mm]	[-]	[mm]	[MPa]	[-]
0		1,995					200	0,12
1		1,920						
20	596	1,260						
30	1030	1,181	0,94	0,016				
40	1086	1,134						
50	1289	1,099	0,97	0,015				
60	1366	1,070						
80	3210	1,038						
100	2859	1,010						
120	3119	0,988						
140	4768	0,970						
160	6044	0,959						
180	8752	0,947						
200	7804	0,934	0,99	0,017				

Temperature	300°C						
Gasket stress	E_G	e_G	C=500 kN/mm		C=1500 kN/mm		Q_{smax}
			P_{QR}	Δe_{Gc}	P_{QR}	Δe_{Gc}	
[MPa]	[MPa]	[mm]	[-]	[mm]	[-]	[mm]	[MPa]
0		1,976					160
1		1,933					
20	547	1,279					
30	1032	1,220	0,89	0,029			
40	1170	1,172					
50	1339	1,134	0,95	0,021			
60	1550	1,107					
80	3184	1,074					
100	2984	1,046					
120	3266	1,024					
140	4307	1,006					
160	5439	0,990	0,99	0,013			
							0,18

Temperature	400°C						
Gasket stress	E_G	e_G	C=500 kN/mm		C=1500 kN/mm		Q_{smax}
			P_{QR}	Δe_{Gc}	P_{QR}	Δe_{Gc}	
[MPa]	[MPa]	[mm]	[-]	[mm]	[-]	[mm]	[MPa]
0		2,017					140
1		1,942					
20	624	1,248					
30	770	1,183	0,84	0,040			
40	1092	1,135					
50	1314	1,102	0,91	0,040			
60	2018	1,080					
80	2216	1,042					
100	2383	1,011					
120	3101	0,991					
140	4254	0,974	0,98	0,023			
							0,13



Description:	E_G	Modulus of elasticity	Q_{smax}	Maximum surface pressure
	e_G	Gasket or sealing element thickness	μ_G	Static friction factor
	P_{QR}	Creep relaxation factor	C	Stiffness
	Δe_{Gc}	Gasket thickness change due to creep		

Factors acc. to EN 13555 to use in calculation standard EN 1591-1:2001

T	Q_{min}	$Q_{max, ref}$	E_0	K_1	Q_0/P	g_c	c_1
[°C]	[MPa]	[MPa]	[MPa]				
20	15	150	1	31	1,3	1,0	
100		145	1	31	1,3	1,0	
200		140	1	31	1,3	1,0	
300		130	1	31	1,3	1,0	
400							
bGref [mm]		19,5	eGref [mm]		2,0		

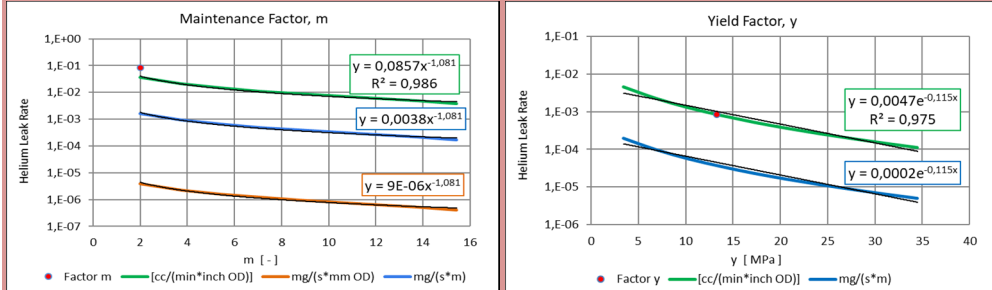
Factors acc. to:

EN 13445-3 : Unfired pressure vessels - Part 3: Design

EN 13480-3:2002 Metallic industrial piping - Part 3: Design and calculation

ASME Code s. VIII Boiler & Pressure Vessel Code

Tightness class		ASTM F3149	PVRC Tightness class		EN 13555	
			T3	T4	L0,01	L0,001
Factor m	[-]	2,0	< 2,0	18,9	< 2,0	3,5
Factor y	[MPa]	13,3			6,9	26,0
	[psi]	1930				

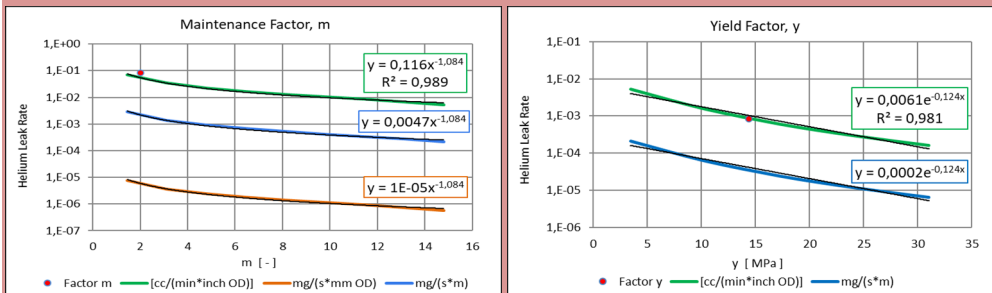


NOTE: Maintenance values [m] less than 2.0 are typically not used in ASME designs except for elastomeric gaskets (Classification D2000).

Gasket dimensions acc. to EN 1514-1 DN40 PN40

The given coefficient values are read from the test curves, not from the trend line.

Tightness class		ASTM F3149	PVRC Tightness class		EN 13555	
			T3	T4	L0,01	L0,001
Factor m	[-]	2,0	<1,5	18,8	<1,5	4,4
Factor y	[MPa]	14,4			7,5	25,8
	[psi]	2090				



NOTE: Maintenance values [m] less than 2.0 are typically not used in ASME designs except for elastomeric gaskets (Classification D2000).

Gasket dimensions acc. to EN 12560-1 NPS 4 Class 300

The given coefficient values are read from the test curves, not from the trend line.

[Qmax - see maximal applicable gasket stress Qsmax acc. EN 1591-1:2009/2013](#)**Factors acc. to:**

AD 2000-Merkblatt B7 August 2007

$k_0 k_D$ [N/mm]	k_1 [mm]	$k_0 k_9$ [N/mm]
$16,0 \cdot b_D$	$2,2 \cdot b_D$	$\cdot b_D$

[Qmax - see maximal applicable gasket stress Qsmax acc. EN 1591-1:2009/2013](#)**Factors acc. to:**

WUDT-UC-WO-O/19

σ_m [MPa]	σ_r [MPa]	b [1]				
		20°C	100°C	200°C	300°C	400°C
18,3	$5,1 \cdot p_D$	1,0	1,1	1,1	1,1	1,2

[Qmax - see maximal applicable gasket stress Qsmax acc. EN 1591-1:2009/2013](#)**Factors acc. to:**

ASTM F36-2003 Standard Test Method for Compressibility and Recovery of Gasket Materials

Procedure J

Compressibility [%]	Recovery [%]
41,0	17,0

Factors acc. to:

ASTM F38-00 Standard Test Methods for Creep Relaxation of a Gasket Material (Method B)

Temperature [°C]	Creep Relaxation [%]
20	6
100	21
200	26

Factors acc. to:

EN 61340-2-3 Electrostatics - Part 2-3: Methods of test for determining the resistance and resistivity of solid planar materials used to avoid electrostatic charge accumulation

Surface resistance R_s at U=10V	[Ω]	<	1,00E+03
Volume resistance R_v at U=10V	[Ω]	<	1,00E+03
Surface resistivity ρ_s at U=10V	[Ω]	<	1,01E+04
Volume resistivity ρ_v at U=10V	[Ωm]	<	7,43E+02