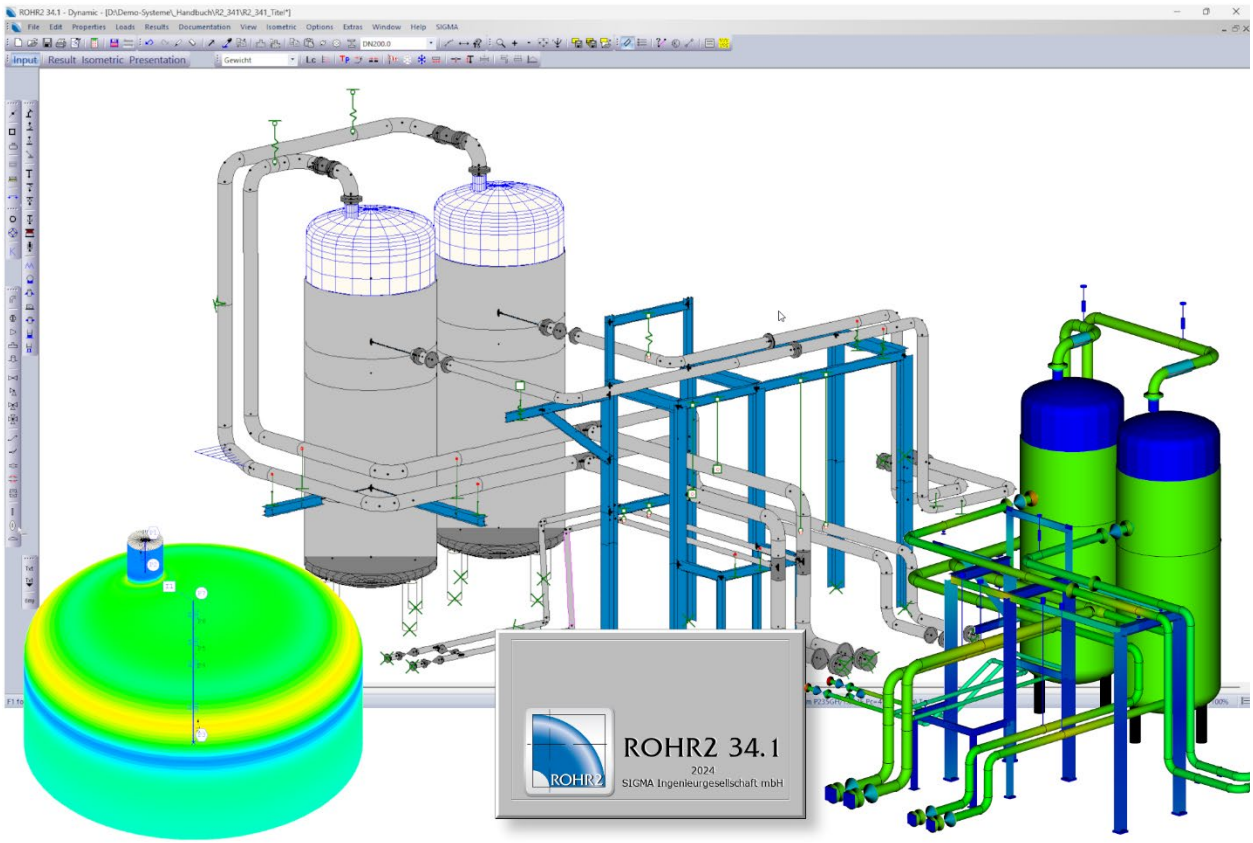


Flange analysis in ROHR2

ROHR2flange

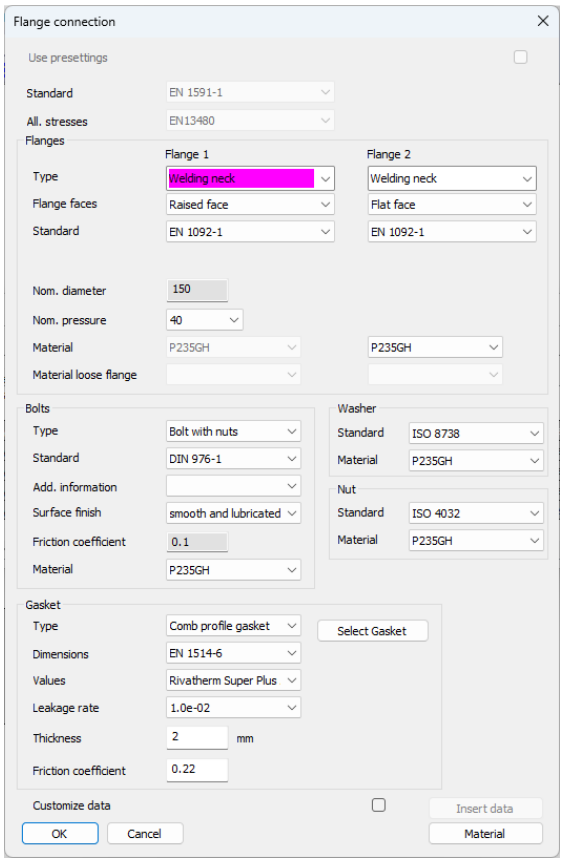
Program System ROHR2

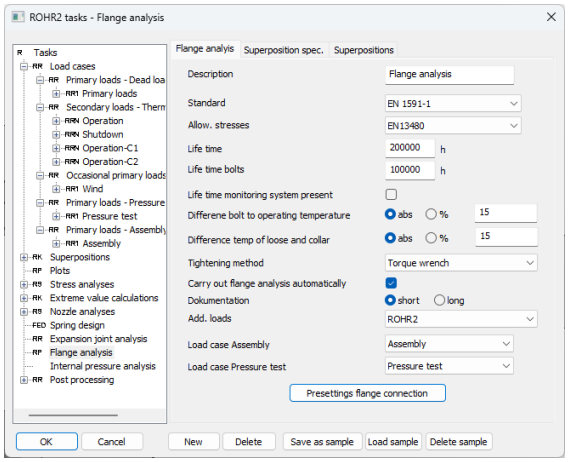
SIGMA Ingenieurgesellschaft mbH

ROHR2flange - features and functions

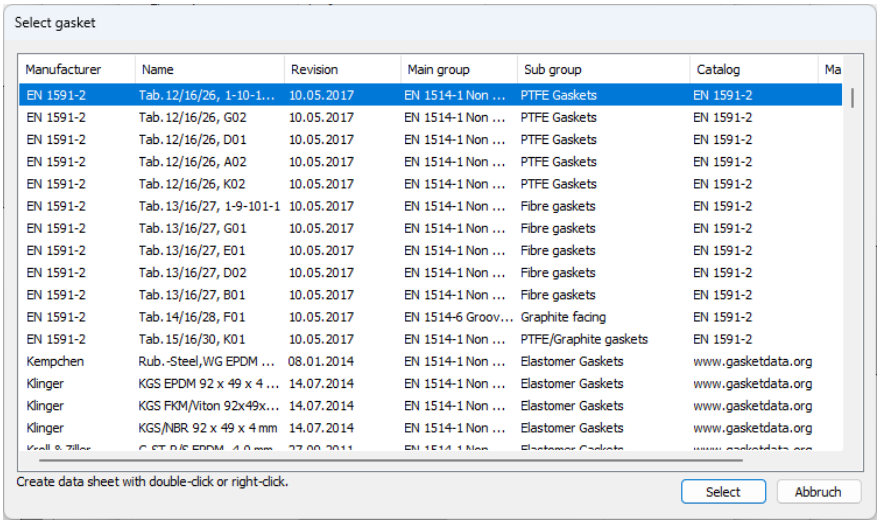
Analysis of standard flanges using the optional available module ROHR2flange.

- acc. to - EN 1591-1: and - - ASME VIII, Div.1:
- Automatic analysis of all flanges in the system taking into account all load cases. The number of load cases can be reduced by the user.
- Automatic generation of load case combinations required for the analyses.
- Simple pre-settings of the flange parameters by means of standard values for flanges, screws and gaskets.
- The flanges may be modified individually and in detail.



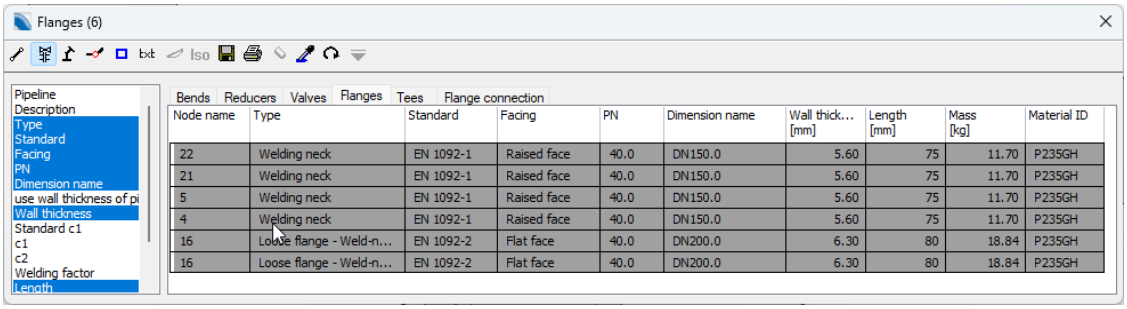


Flange analysis in ROHR2



Listing of available gaskets

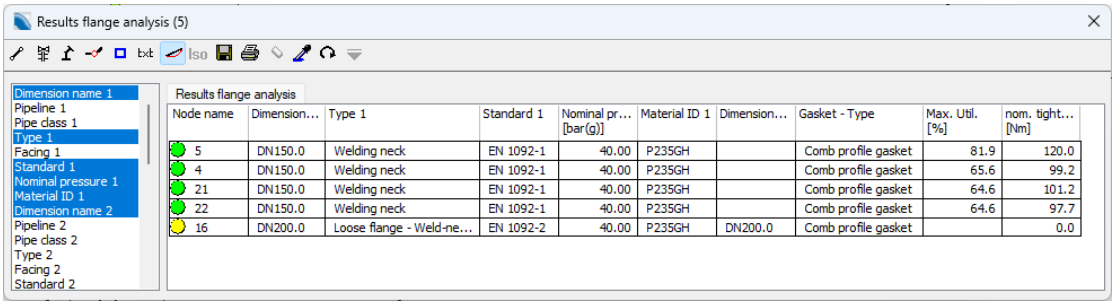
Overview of the flanges in a list



Node name	Type	Standard	Facing	PN	Dimension name	Wall thick... [mm]	Length [mm]	Mass [kg]	Material ID
22	Welding neck	EN 1092-1	Raised face	40.0	DN150.0	5.60	75	11.70	P235GH
21	Welding neck	EN 1092-1	Raised face	40.0	DN150.0	5.60	75	11.70	P235GH
5	Welding neck	EN 1092-1	Raised face	40.0	DN150.0	5.60	75	11.70	P235GH
4	Welding neck	EN 1092-1	Raised face	40.0	DN150.0	5.60	75	11.70	P235GH
16	Loose flange - Weld-n...	EN 1092-2	Flat face	40.0	DN200.0	6.30	80	18.84	P235GH
16	Loose flange - Weld-n...	EN 1092-2	Flat face	40.0	DN200.0	6.30	80	18.84	P235GH

Documentation, Calculation report

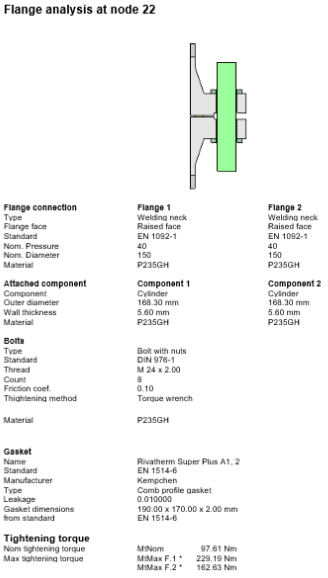
- Report of the calculation results in a list



Node name	Dimension...	Type 1	Standard 1	Nominal pr... [bar(g)]	Material ID 1	Dimension...	Gasket - Type	Max. Util. [%]	nom. tight... [Nm]
5	DN150.0	Welding neck	EN 1092-1	40.00	P235GH		Comb profile gasket	81.9	120.0
4	DN150.0	Welding neck	EN 1092-1	40.00	P235GH		Comb profile gasket	65.6	99.2
21	DN150.0	Welding neck	EN 1092-1	40.00	P235GH		Comb profile gasket	64.6	101.2
22	DN150.0	Welding neck	EN 1092-1	40.00	P235GH		Comb profile gasket	64.6	97.7
16	DN200.0	Loose flange - Weld-ne...	EN 1092-2	40.00	P235GH	DN200.0	Comb profile gasket		0.0

- Automatic generation of a calculation report in German or English

Report, documentation



Flange analysis at node 22

Flange connection	Flange 1	Flange 2
Type	Welding neck	Welding neck
Flange face	Raised face	Raised face
Standard	EN 1092-1	EN 1092-1
Nom. Pressure	40	40
Nom. Diameter	150	150
Material	P235GH	P235GH
Attached component	**Component 1**	**Component 2**
Component	Cylinder	Cylinder
Outer diameter	168.30 mm	168.30 mm
Wall thickness	5.60 mm	5.60 mm
Material	P235GH	P235GH
Bolts		
Type	Bolt with nuts	
Standard	DIN 976-1	
Thread	M 24 x 2.00	
Count	8	
Friction coef.	0.10	
Thightening method	Torque wrench	
Material	P235GH	
Gasket		
Name	Rivatherm Super Plus A1, 2	
Standard	EN 1514-6	
Manufacturer	Kempchen	
Type	Comb profile gasket	
Leakage	0.010000	
Gasket dimensions	190.00 x 170.00 x 2.00 mm	
from standard	EN 1514-6	
Tightening torque		
Nom tightening torque	MtNom 97.61 Nm	
Max tightening torque	MtMax F.1 * 229.19 Nm	
	MtMax F.2 * 162.63 Nm	

Documentation:
- All flanges in one document
- or one flange/document
- Input data, e.g.:

Flange type / sealing face
- Norm / pressure level
- Nominal width and material
- Screw type, -size, -number
- Tightening method
- Gasket manufacturer, -type and leakage class

Results:
- Stress analysis
- Tightening moment

Calculation standards

- EN 1591-1
- ASME BPV VIII welding necks with sealing strip)

Databases

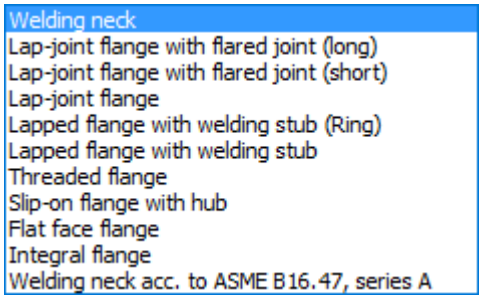
Databases with data e. g. of pipes, bends and various components are included:
The databases can´t be completed by the user.

Flanges

The ROHR2flange databases include:

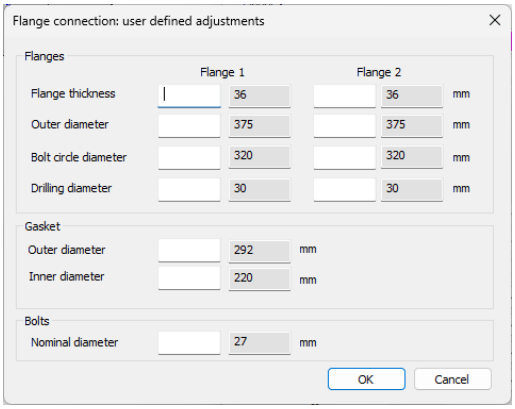
- EN 1092-1:2008-09, Dimensions of flanges general
- DIN 2627 – DIN 2638, Dimensions of welding necks
- ASME B16.47, Dimensions of welding necks
- ASME B16.5, Dimensions of welding necks and blind flanges

Types of Flanges



User defined adjustments for standard flanges

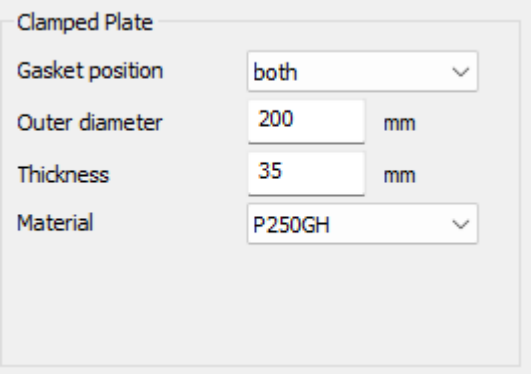
The following user-defined adjustments can be made for standard flanges:



Flange connection

Clamped plate

A clamped platte can be defined to be used in a flange connection.



Screws

Bolt types

Select required cross sectional data in accordance with the standard.

- EN ISO 4014 and EN ISO 4016
- ASME B1.1
- DIN 931-1 and 931-2
- DIN 2510-3 and 2510-4
- DIN 976-1

Washer/anti-fatigue sleeve

Select required dimensions in accordance with the standard:

- User defined
- ISO 7089
- ISO 7090
- ISO 7091
- ASME B 18.22.1

Bolt nuts

Select required dimensions in accordance with the standard:

- ISO 4032
- ISO 4033
- ISO 4034
- DIN 2510
- ASME B 18.22.2

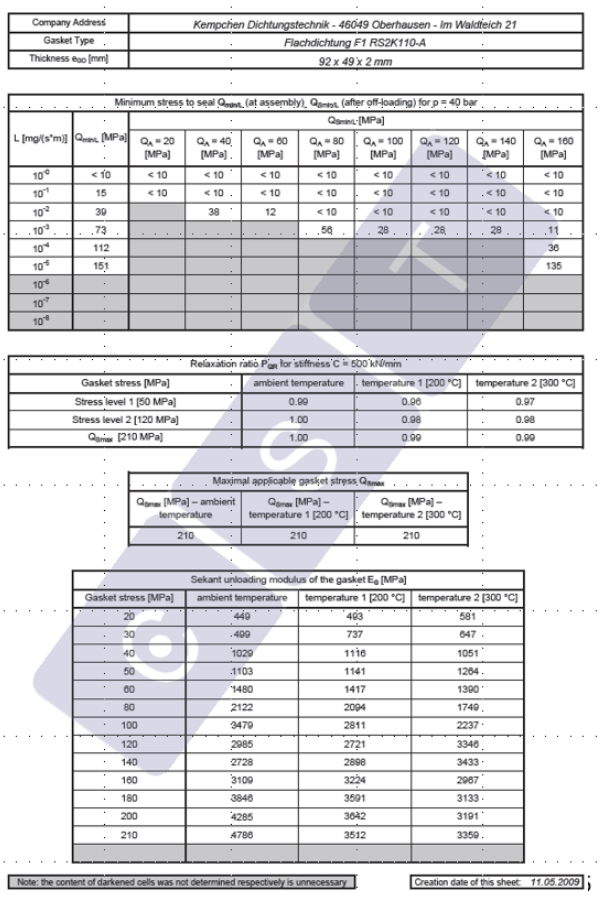
Gaskets

The gasket database at the moment includes more than 350 different types of gaskets of leading manufacturers (www.gasketdata.org).

Gasket dimensions are included in acc. with EN, DIN and ASME for flanges, each one including gasket profiles and sealings in accordance with different standards

Gaskets dimension standards

- EN 1514-1, flat gaskets
- EN 1514-1, tongue and groove
- EN 1514-1, male/female gasket
- EN 1514-2, Spiral-wound gasket
- DIN 2690, flat gaskets
- DIN 2691, tongue and groove
- DIN 2692, male/female gasket
- EN 1514-6, Grooved gasket
- EN 1514-4, Corrugated gasket
- Kempchen WN 104, Spiral-wound gaskets
- ASME B 16.21, flat gasket
- ASME B 16.5 Grooved gasket, male/female
- ASME B 16.5 Grooved gasket, tongue and groove
- Kempchen WN 146 Grooved gasket, male/female gasket
- ASME B 16.20, API Std 6A, EN 12560-5, RTJ gasket
- ASME B 16.20, Spiral-wound gaskets
- User defined gaskets



Company Address	Kempchen Dichtungstechnik - 46049 Oberhausen - Im Waldteich 21
Gasket Type	Flachdichtung F1 RS2K110-A
Thickness e_{GD} [mm]	92 x 49 x 2 mm

Minimum stress to seal $Q_{min,L}$ (at assembly), $Q_{Smin,L}$ (after off-loading) for p = 40 bar

L [mg/(s*m)]	$Q_{min,L}$ [MPa]	Q_{SminL}-[MPa] Q_A = 20 [MPa]	Q_A = 40 [MPa]	Q_A = 60 [MPa]	Q_A = 80 [MPa]	Q_A = 100 [MPa]	Q_A = 120 [MPa]	Q_A = 140 [MPa]	Q_A = 160 [MPa]
10^{0}	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
10^{-1}	15	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
10^{-2}	39		38	12	< 10	< 10	< 10	< 10	< 10
10^{-3}	73				56	28	28	28	11
10^{-4}	112								36
10^{-5}	151								135
10^{-6}									
10^{-7}									
10^{-8}									

Relaxation ratio P_{QR} for stiffness C = 500 kN/mm

Gasket stress [MPa]	ambient temperature	temperature 1 [200 °C]	temperature 2 [300 °C]
Stress level 1 [50 MPa]	0.99	0.96	0.97
Stress level 2 [120 MPa]	1.00	0.98	0.98
Q_{Smax} [210 MPa]	1.00	0.99	0.99

Maximal applicable gasket stress Q_{Smax}

Q_{Smax} [MPa] – ambient temperature	Q_{Smax} [MPa] – temperature 1 [200 °C]	Q_{Smax} [MPa] – temperature 2 [300 °C]
210	210	210

Sekant unloading modulus of the gasket E_B [MPa]

Gasket stress [MPa]	ambient temperature	temperature 1 [200 °C]	temperature 2 [300 °C]
20	449	493	581
30	499	737	647
40	1029	1116	1051
50	1103	1141	1264
60	1480	1417	1390
80	2122	2094	1749
100	3479	2811	2237
120	2985	2721	3346
140	2728	2898	3433
160	3109	3224	2967
180	3846	3591	3133
200	4285	3642	3191
210	4786	3512	3359

Note: the content of darkened cells was not determined respectively is unnecessary

Creation date of this sheet: 11.05.2009

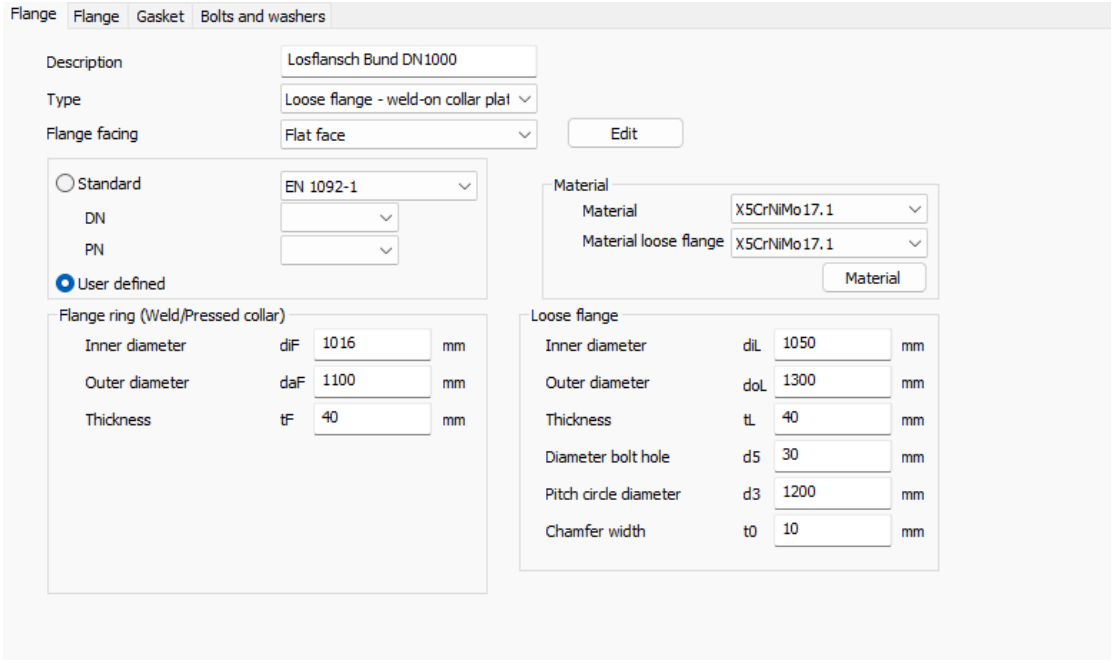
Manufacturers of gaskets

- A.W. Schultz
- AVKO
- Beyer GmbH
- Burgmann
- Donit Tesnit
- Durlon
- Eagle Burgmann
- Eriks
- Flexitalic
- FluorTex
- FMI
- Frenzelit
- Gambit-Lubawka
- Garlock
- Hecker
- IDT
- James Walker
- Jungtec
- Kempchen
- Klinger
- Kroll&Ziller
- KWO
- Leader Gasket
- M. Zilken GmbH
- Matusza
- Möller
- Montero Fibras Y
- Reinz
- Revoseal
- SGL
- Spetech
- Teadit
- Tedima
- Triangle Fluid Controls
- W.L. Gore

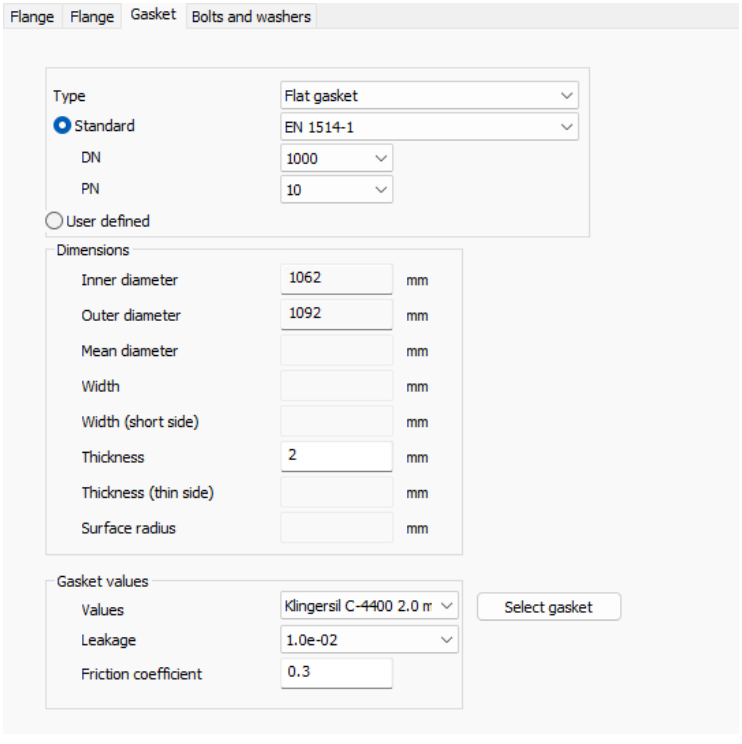
User defined input of the flange geometry

Depending on the selected flange type the flange geometry allows various inputs:

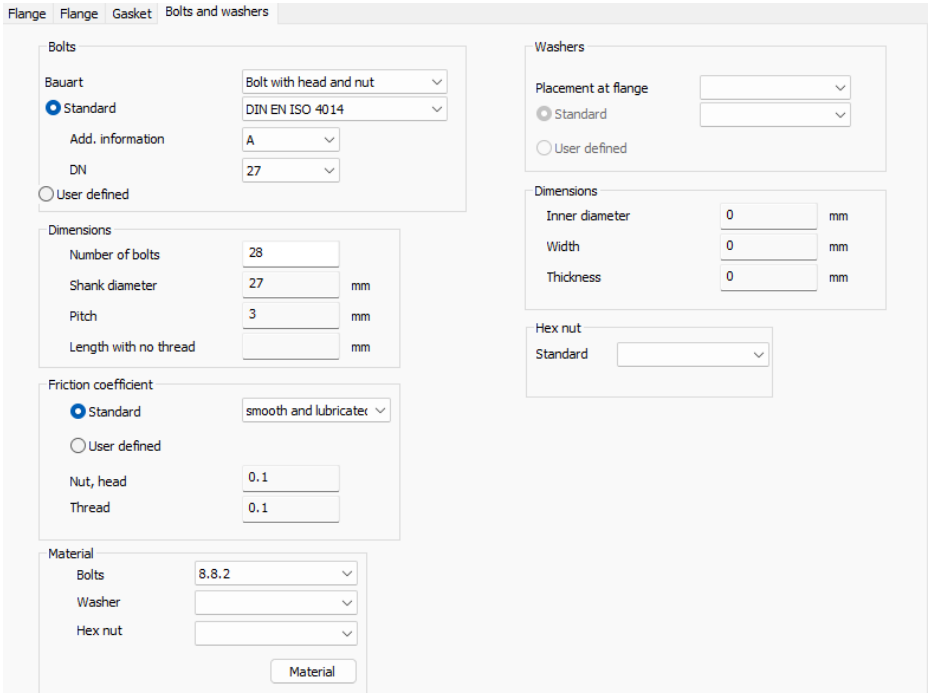
Flanges



Gaskets



Bolts and washers



Program license and system requirements

Program version, network license

ROHR2flange is an optional available module in the program system ROHR2.
It can be part of the ROHR2 single user license and ROHR2 network license. In the ROHR2 network license the number of the users of an optional module can be similar or lower than the number of ROHR2 network seats.
For system requirements and program features see ROHR2 specification.
ROHR2flange is not a stand-alone application. The installation of **ROHR2** is required

Scope of delivery and license key

The programs´ scope of delivery contains
- the program data
- the program documentation in html format
- unlocking the module on the ROHR2 license key.

The software does not run without the license key. In case of updates/upgrades the license key will be replaced or updated.

Documentation /User manual

The functions of ROHR2flange are part of the ROHR2 online help.

Maintenance and user support

Advice about installation and application is done by the ROHR2 user support (hotline). The hotline is part of the included service after purchase, during time limited licensing (rent) and as a part of a maintenance agreement.
Interfaces and additional programs are integrated into ROHR2. Maintenance of additional programs and interfaces is mandatory in this case.

Software Development, Sales and Support

SIGMA as one of the leading engineering specialists in the Pipe Stress Business offers ROHR2, PROBAD and SINETZ: field tested software products, strongly adapted to the user´s needs.
SIGMA engineering division is known as a partner of choice offering consulting services for plant engineering, chemical industry, engineering companies, energy suppliers and technical security boards.

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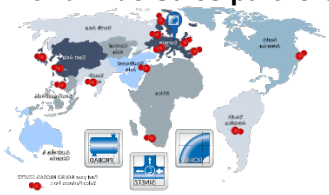

www.rohr2.com