Task Group 3 – Flange Leak Tightness

Minutes of the first telematic meeting of TG3

Monday March 14th, 2022

14,00 – 16,30 CET

1) **Roll call of participants:** see attendance list below

	EPERC TG3-14.03.2022 - Attendance list			
PARTICIPANT	**E-mail address**	**Member**	**Country**	**Present**
Yves Simonet	yves.simonet.ys@outlook.fr	YES	France	YES
Fernando Lidonnici	fernando.lidonnici@fastwebnet.it	YES	Italy	YES
Guy Baylac	guy.baylac114@gmail.com	YES	France	YES
Andrea Tonti	a.tonti@inail.it	YES	Italy	NO
Claude Faidy	claude.faidy@gmail.com	YES	France	NO
Mayur Brijlani	mayur.brijlani@gmx.de	YES	Germany	NO
Luca Gaetani	lucagaet@yahoo.it	YES	Italy	YES
Andrea Burberi	burberi@enerconsulting.it	YES	Italy	YES
Manfred Schaaf	ms@amtec.de	NO	Germany	YES
David Nash	d.nash@strath.ac.uk	YES	UK	YES
Pai Gopalkrishna	gopalkrishna.ipr@gmail.com	NO	India	YES
Neel Dineshkumar Shah	neel.shah@lyondellbasell.com	NO	Germany	YES
Cyril Saintigny	cyril.saintigny@cryostar.com	YES	France	YES

2) **Approval of the agenda:** the agenda (see Annex 2) is approved

3) to 10) Mr. Lidonnici explains that the reason for a further meeting of TG3, after the preceding "in presence" meeting of Milano in January 2020, arises from the need to bring Annex G of EN 13445.3 in compliance with EN 1591.1, in order to give the possibility of designing a flange for a given allowable leak rate. Furthermore, the experts of WG53/CEN TC54 would like to have the possibility of designing flanged connections typical of shell & tube heat exchangers, such as tubesheets of removable tube bundles, inserted between a couple of flanges having different pressures and temperatures, or flanges bolted to tubesheets welded to a shell on the opposite side.

Mr. Lidonnici also explains that the approach used by EN 1591.1, that is to consider for each bolted assembly the specific characteristics of the gasket supplied by the relevant gasket manufacturer, may cause problems in case the purchasing department of the vessel fabricator will buy the same gasket type from a manufacturer different from the

one chosen by the designer. He also provides a series of examples (see Annex 1) in which a series of equal flanges with equal design conditions have been calculated using the characteristics of spirally wound stainless steel gaskets with graphite filler (with inner and outer rings) of different manufacturers stored in the European Gasket Data Base (https://www.gasketdata.org/en/database/),noting that the results, in terms of minimum design assembly bolt load and component load ratios, are almost the same: therefore he proposes to give the possibility of using tabulated values for each gasket type, as it is provided in EN 1591.1 for the case of liquids.

Mr. Schaaf objects that this situation could be possibly due to the fact that all the gaskets using in the examples are very similar to each other, while e similar situation is not likely to occur in the case of gaskets made of mineral or vegetable fibres, which many times are made with different materials by different manufacturers. Therefore he insists on the approach used by EN 1591.1, that is, either to use the characteristics contained in the gasket data base, or, alternatively, derived from a test made in accordance with EN 13555. He also notes that, according to the German requirements contained in the German TA-Luft regulation and in the VDI standard 2290 (which gives specific maximum allowable leak rates for bolted assemblies), the approach used in Clause 11 of EN 13445.3 (the so called Taylor Forge method) is not any more acceptable in Germany.

Mr. Lidonnici proposes to go on with the preparation of some more examples, so that the great majority of bolted assemblies using specific gasket types, such as the gaskets normally used for shell and tube heat exchangers (for example, spirally wound or metal jacketed gaskets) might be calculated using a standard table also in the case of a specified allowable leak rate. In any case it will be necessary to give some additional data concerning, for example, fully metallic flat gaskets of different materials, for which there are no data in the gasket data base. Some reasonable proposal should also be made for flanges bolted to tubesheets.

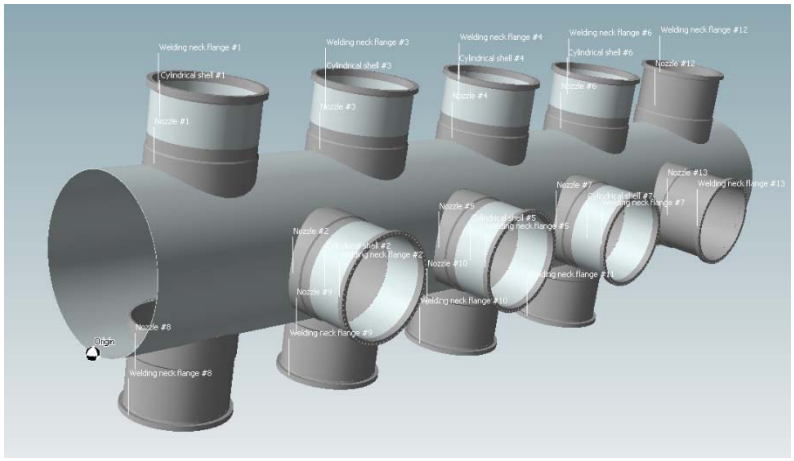
It is clarified that the situation existing in Germany still does not exist in France, in the United Kingdom or in Italy. However, considering that the German legislation was made on the basis of various EU directives concerning air pollution, sooner or later the EN standards should be amended in this direction.

11) Date of the next meeting. The date will be decided when more data will be available, also considering the discussions in the next meetings of TC54 and WG53.

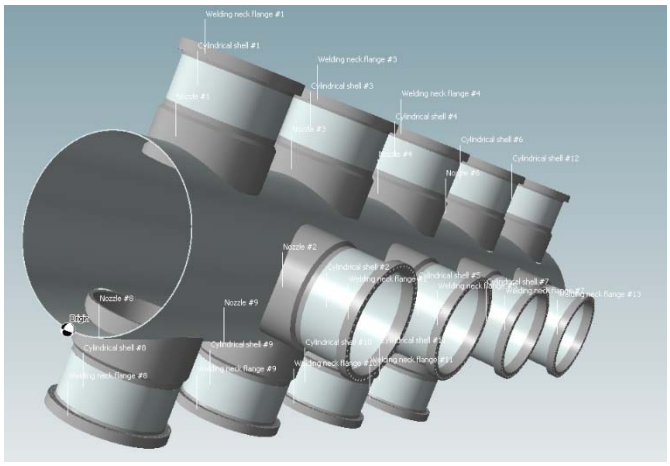
F.Lidonnici (info@eperc-aisbl.eu)

Note: technical documents presented in the TG meetings are stored in the EPERC web site www.eperc-aisbl.eu

Annex 1 – Example of equal flanges with spirally wound gaskets of different manufacturers



VESSEL WITH PS = 10 bar



VESSEL WITH PS = 25 bar

FLANGE IDENTIFICATION	PRESS. (bar)	TEMP. (*C)	WEIGHT (kg)	Bolting	GASKET TYPE	MANUFACTURER	NAME	LEAK RATE	FBI min Nx1000	Bolts ΦB	Flange ΦF
#1 WN ID 1500 (Clause 11)	10	200	257	72 M20	Spirally wound SS	----------	----------	Unknown	2368	MAX	MAX
#2 WN ID 1500 (Annex G)	10	200	208	68 M20	Spirally wound SS/Graf.	----------	----------	Unknown	4045	0,975	0,964
#3 WN ID 1500	10	200	208	68 M20	Spirally wound SS/Graf.	Flexitallic	GI-Style Gr.filler and SS w.	NO LEAK	3777	0,797	1,044
#4 WN ID 1500	10	200	208	68 M20	Spirally wound SS/Graf.	MM Gmbh	MMSIA graph.spir.wound	10^0	3844	0,697	0,905
#5 WN ID 1500	10	200	208	68 M20	Spirally wound SS/Graf.	Flexitallic	GI-Style Gr.filler and SS w.	10^0	3959	0,712	0,925
#6 WN ID 1500	10	200	208	68 M20	Spirally wound SS/Graf.	CSUT Spetec	Spetospir SWZ Graphite	10^0	3939	0,704	0,916
#7 WN ID 1500	10	200	208	68 M20	Spirally wound SS/Graf.	Kempchen	Sp.W.Gasket SpV2I-Graph.	10^0	3864	0,730	0,943
#12 WN ID 1500	10	200	208	68 M20	Spirally wound SS/Graf.	EN 1591.2	3-4-104-1	10^0	3799	0,724	0,938
#8 WN ID 1500	10	200	208	68 M20	Spirally wound SS/Graf.	MM Gmbh	MMSIA graph.spir.wound	10^-3	3989	0,727	0,939
#9 WN ID 1500	10	200	208	68 M20	Spirally wound SS/Graf.	Flexitallic	GI-Style Gr.filler and SS w.	10^-3	4004	0,722	0,937
#10 WN ID 1500	10	200	208	68 M20	Spirally wound SS/Graf.	CSUT Spetec	Spetospir SWZ Graphite	10^-3	4064	0,732	0,949
#11 WN ID 1500	10	200	208	68 M20	Spirally wound SS/Graf.	Kempchen	Sp.W.Gasket SpV2I-Graph.	10^-3	3923	0,740	0,954
#13 WN ID 1500	10	200	208	68 M20	Spirally wound SS/Graf.	EN 1591.2	3-4-104-1	10^-3	3884	0,742	0,960
#1 WN ID 1500 (Clause 11)	25	200	627	60 M33	Spirally wound SS	----------	----------	Unknown	5622	MAX	MAX
#2 WN ID 1500 (Annex G)	25	200	578	56 M33	Spirally wound SS/Graf.	----------	----------	Unknown	9213	0,947	0,959
#3 WN ID 1500	25	200	578	56 M33	Spirally wound SS/Graf.	Flexitallic	GI-Style Gr.filler and SS w.	NO LEAK	9081	0,876	1,088
#4 WN ID 1500	25	200	578	56 M33	Spirally wound SS/Graf.	MM Gmbh	MMSIA graph.spir.wound	10^0	OUTSIDE GRAPH		
#5 WN ID 1500	25	200	578	56 M33	Spirally wound SS/Graf.	Flexitallic	GI-Style Gr.filler and SS w.	10^0	9221	0,777	0,935
#6 WN ID 1500	25	200	578	56 M33	Spirally wound SS/Graf.	CSUT Spetec	Spetospir SWZ Graphite	10^0	9241	0,775	0,933
#7 WN ID 1500	25	200	578	56 M33	Spirally wound SS/Graf.	Kempchen	Sp.W.Gasket SpV2I-Graph.	10^0	OUTSIDE GRAPH		
#12 WN ID 1500	25	200	578	56 M33	Spirally wound SS/Graf.	EN 1591.2	3-4-104-1	10^0	9221	0,795	0,948
#8 WN ID 1500	25	200	578	56 M33	Spirally wound SS/Graf.	MM Gmbh	MMSIA graph.spir.wound	10^-3	OUTSIDE GRAPH		
#9 WN ID 1500	25	200	578	56 M33	Spirally wound SS/Graf.	Flexitallic	GI-Style Gr.filler and SS w.	10^-3	9266	0,781	0,942
#10 WN ID 1500	25	200	578	56 M33	Spirally wound SS/Graf.	CSUT Spetec	Spetospir SWZ Graphite	10^-3	9366	0,787	0,950
#11 WN ID 1500	25	200	578	56 M33	Spirally wound SS/Graf.	Kempchen	Sp.W.Gasket SpV2I-Graph.	10^-3	OUTSIDE GRAPH		
#13 WN ID 1500	25	200	578	56 M33	Spirally wound SS/Graf.	EN 1591.2	3-4-104-1	10^-3	9316	0,802	0,958

Annex 2 – Meeting agenda

Agenda of the first telematic meeting of TG3

Monday March 14th, 2022

14,00 – 17,00 CET

1) Roll call of participants

2) Approval of the agenda

3) Review of the document "Status of Bolted Flange Connections" (freely downloadable in the EPERC Technical documents)

4) The different EN standards concerning Pressure Vessel Flanges (Clause 11 EN 13445.3, Annex G EN 13445.3, EN 1591).

5) European requirements for fugitive emissions.

6) Gasket data of different manufacturers for the same gasket type.

7) Practical examples

8) Program of work in CEN TC54 and CEN TC74: possible merging of Annex G EN 13445.3 and EN 1591.1

9) Calculation of heat exchanger flanges bolted to tubesheets.

10) Possible research projects on gasket leak tightness.

11) Date of the next meeting.

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