

SULNOxEco Diesel Conditioner Test-Drives

Test Bench Trial 11-13 April 2022

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Agenda

- *What was the objective?*
- *Which equipment was used?*
- *Which data was collected?*



What was the goal?

- Test bench trial to prove the suitability of the additive
- Stable running?
- Possible negative influences
- Test run with 4,000 litres diesel fuel
- Capabilities of the additive / fuel conditioner



Which equipment was used?

- MAN 6L 23/30 engine
 - 960 KW load
 - 900 rpm
 - Water vortex brake
 - Generator operation

- Compression test measuring system CDS



Which data was collected?

- Exhaust gas analysis system ABB
 - CO
 - CO₂
 - THC
 - Soot number
 - O₂
 - NO
 - NO₂
 - Dust



Which data was collected?

- Elemental Analysis
- Density
- Viscosity



Which data was collected?

Dear Mr Güttinger,

Please find attached the presentation shown at the final meeting and the measured and processed operating and fuel analysis values.

*This clearly shows that the SulNOx additive package **did not have any negative effects in terms of operating behaviour** even after the 2-day test operation (4000 liters) with the measuring points relevant for the certification on the propeller and generator curve in the MAN 6L 23/30 research engine and stability of engine operation and fuel system.*

*Significant changes in the operating and emission values could not be determined, which, however, was not to be expected in view of the intended mode of action of the additive package during this "sample test". **The comparison of the cylinder pressure curves at the 75% load point (see presentation) shows a trend that would correspond to the desired effect of the additive package.***

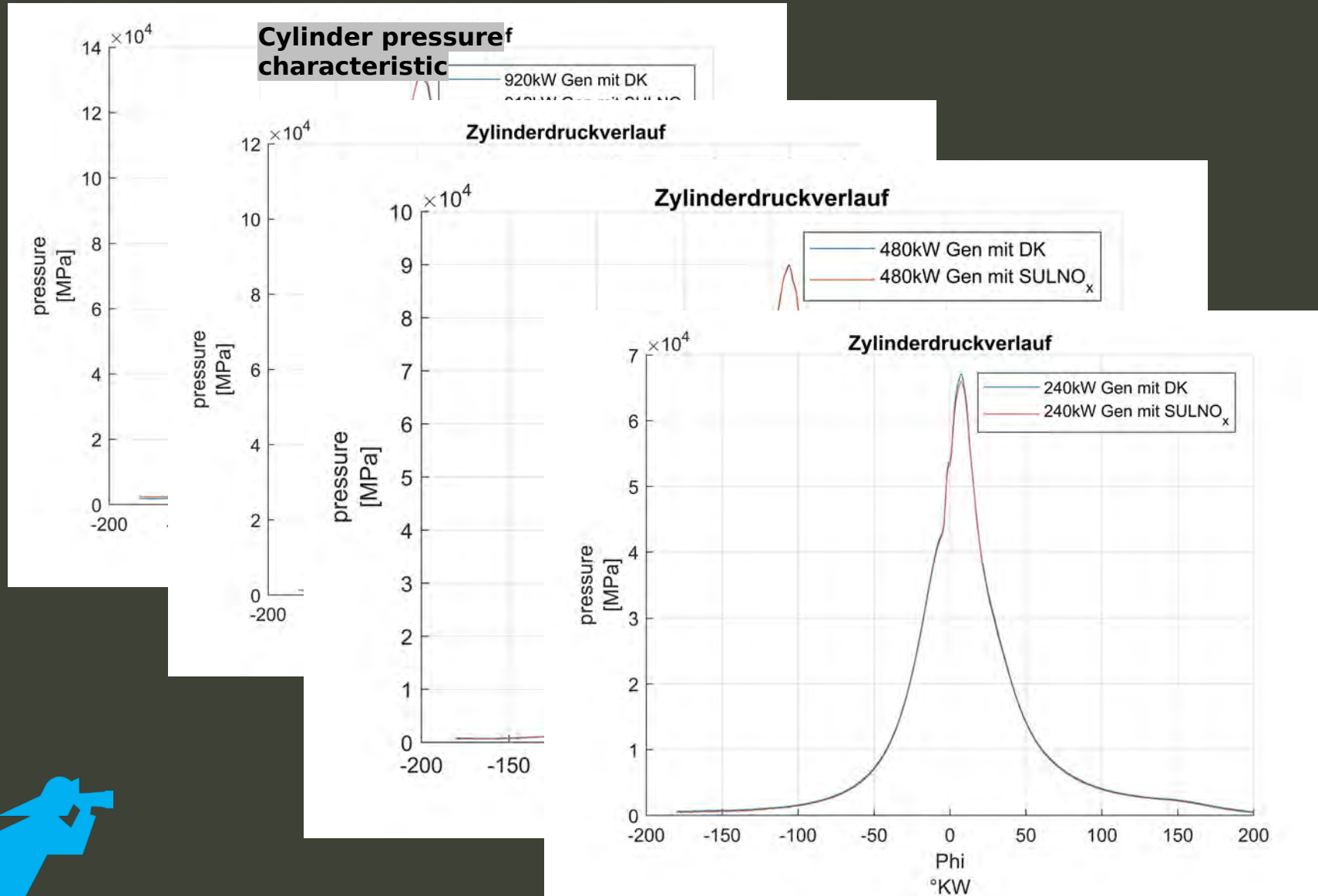
Here further investigations in the laboratory or long-term tests with the SulNox package are worthwhile.

We wish you every success and are happy to accompany further experiments scientifically.

Georg Finger, Rom Rabe, SULNO_x Messfahrt

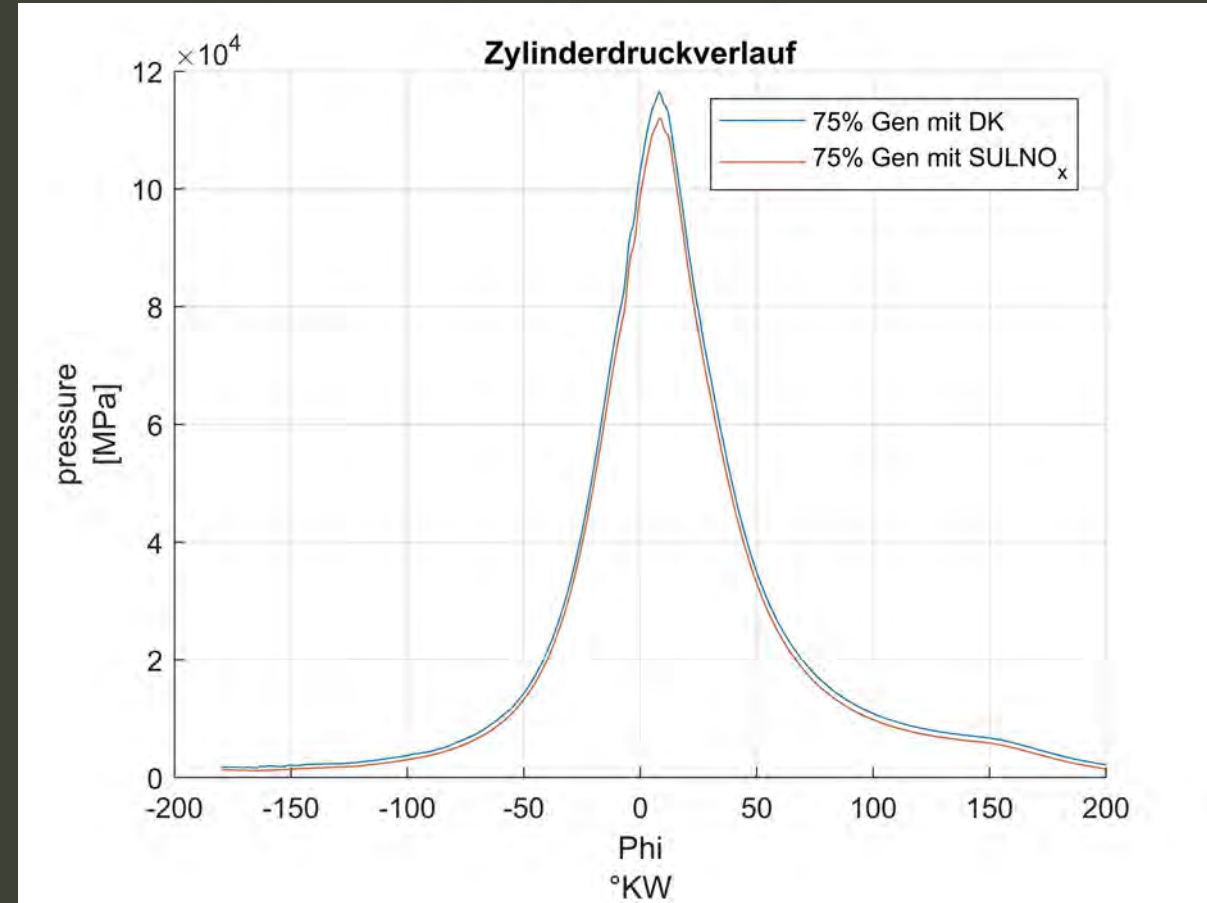
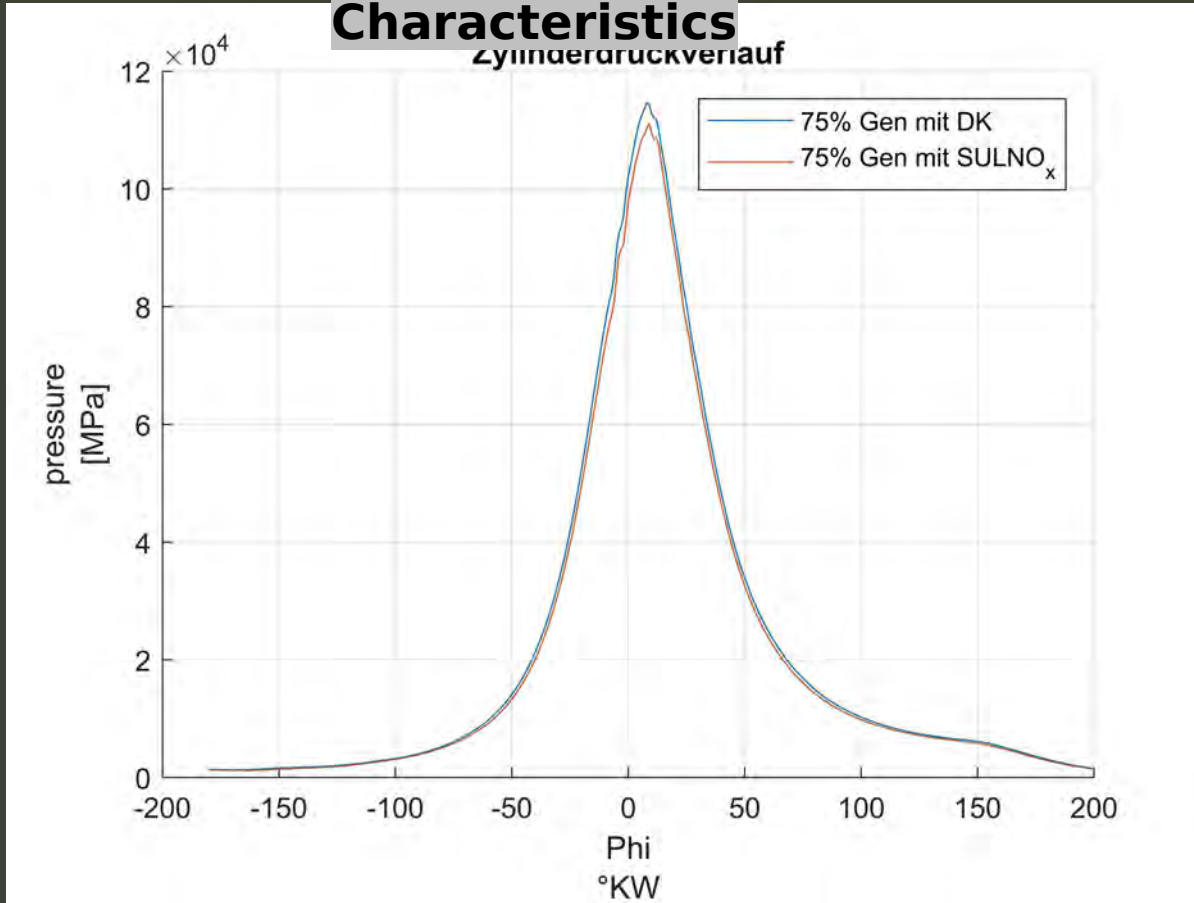
Kind regards

Which data was collected?



Which data was collected?

Cylinder Pressure Characteristics



Which data was collected?

Datum	Uhrzeit	Punkt	T _U [°C]	p _U [mbar]		n _M [1/min]	P _M [% / Mod]	P _M [kW]	p _{LL} [bar]	p _{Abgg} [bar]	T _{Abgg} [°C]	n _{ATL} [1/min]		m _{KS} [kg/h]
11.04.2026	10:26	25G	22,20	1019,77	↑	896,14	25% / G	236,67	0,20	0,20	327,16	15045,81		60,17
11.04.2026	17:47	25G	25,10	1018,67	↓	895,40	25% / G	239,59	0,20	0,20	336,90	15070,72		59,81
12.04.2026	08:15	25G	22,60	1020,25	↑	896,83	25% / G	236,18	0,20	0,20	326,42	14995,34		59,58
12.04.2026	16:33	25G	26,50	1017,76	↓	897,15	25% / G	240,91	0,20	0,20	340,20	15091,10		62,08
Differenz			19,37	-0,20		0,11		1,79	0,00	0,00	3,99	0,30		3,17
11.04.2026	11:10	50 G	22,70	1019,65	↑	894,33	50% / G	481,13	0,70	0,50	398,46	23740,42		108,29
11.04.2026	14:27	50 G	23,80	1019,65	↑	896,24	50% / G	479,06	0,60	0,50	403,19	23566,17		106,80
11.04.2026	17:18	50 G	25,00	1018,80	↓	895,34	50% / G	484,63	0,70	0,50	405,86	23725,45		108,94
12.04.2026	9:08	50 G	23,40	1020,50	↑	895,16	50% / G	484,15	0,70	0,50	402,52	23780,60		106,60
12.04.2026	16:03	50 G	26,50	1017,92	↓	897,19	50% / G	480,98	0,60	0,50	410,28	23673,83		108,98
Differenz			16,74	-0,17		0,32		-0,03	-14,29	0,00	2,97	-0,28		0,64
11.04.1022	11:40	75 G	22,90	1019,77	↑	893,33	75 / G	740,36	1,40	1,10	437,24	31194,99		160,67
11.04.2026	12:40	75 G	23,80	1019,90	↓	896,24	75 / G	732,82	1,30	1,00	440,82	31028,90		161,87
11.04.2026	15:26	75 G	24,50	1019,15	↑	895,41	75 / G	709,84	1,30	1,00	437,30	30488,51		153,46
11.04.1022	16:37	75 G	25,30	1019,02	↓	895,41	75 / G	712,92	1,30	1,00	439,00	30550,67		154,90
12.04.2026	09:56	75 G	24,10	1020,50	↑	894,24	75 / G	721,42	1,30	1,00	438,04	30798,20		153,70
12.04.2026	15:20	75 G	26,80	1018,05	↓	897,20	75 / G	715,43	1,30	1,00	444,08	30732,20		157,69
Differenz			17,03	-0,17		0,43		-3,37	-7,14	-9,09	1,56	-1,48		-1,85
11.04.2026	12:18	95 G	23,40	1020,00	↑	896,26	95 / P	911,41	1,90	1,50	469,62	35241,90		200,17
11.04.2026	16:16	95 G	25,30	1018,92	↑	895,42	95 / G	909,97	1,90	1,40	473,44	35307,90		196,08
12.04.2026	11:08	95 G	25,50	1020,25	↑	897,17	95 / G	911,84	1,90	1,50	472,80	35441,44		194,44
12.04.2026	12:12	95 G	26,00	1019,77	→	897,17	95 / G	913,07	1,90	1,50	475,18	35531,39		195,79
12.04.2026	13:17	95 G	26,50	1019,27	→	897,19	95 / G	923,99	1,90	1,50	478,65	35814,00		200,25
12.04.2026	14:30	95 G	26,43	1018,67	→	896,29	95 / G	911,90	1,90	1,40	476,26	35505,90		199,51
Differenz			12,95	-0,13		0,00		0,05	0,00	-6,67	1,41	0,75		-0,33



Which data was colle

CO [ppm]	CO ₂ [%]	RZ	O ₂ [%]	NO [ppm]	NO ₂	THC [mgCO/m ³]	Staub
111,79	4,50	0,37	14,50	633,73	56,74	58,88	10,40
109,12	4,60	0,35	14,40	656,89	55,82	63,43	9,70
110,32	4,50	0,37	14,50	632,25	58,61	57,64	10,50
110,96	4,60	0,37	14,30	662,12	57,05	65,44	10,90
-0,74	2,22	0,00	-1,38	4,48	0,55	11,14	4,81
65,38	5,10	0,29	13,70	780,29	54,05	62,17	8,40
62,59	5,10	0,28	13,60	793,33	54,65	58,98	8,10
63,59	5,20	0,29	13,60	790,74	54,71	60,51	8,10
66,71	5,10	0,28	13,70	790,95	55,40	61,32	8,10
70,92	5,20	0,31	13,50	801,12	55,75	61,53	8,60
8,47	1,96	6,90	-1,46	2,67	3,15	-1,03	2,38
48,89	5,20	0,19	13,60	819,04	54,69	57,29	5,10
49,12	5,20	0,19	13,50	827,61	55,34	57,60	5,20
51,05	5,20	0,20	13,50	812,76	55,05	57,57	5,80
50,97	5,20	0,20	13,50	819,54	55,54	57,30	5,60
48,52	5,20	0,19	13,50	833,30	56,35	58,53	5,40
51,73	5,30	0,20	13,40	840,05	56,80	58,37	5,70
5,81	1,92	5,26	-1,47	2,57	3,86	1,89	11,76
38,62	5,30	0,14	13,40	852,35	55,65	52,98	3,80
39,51	5,30	0,14	13,30	853,30	55,95	52,96	3,90
39,76	5,30	0,14	13,30	870,41	57,24	53,00	3,80
39,49	5,30	0,14	13,30	868,37	57,16	52,60	3,80
38,87	5,40	0,14	13,30	871,21	57,25	52,81	3,80
39,65	5,30	0,14	13,30	876,02	57,54	52,67	3,90
2,67	0,00	0,00	-0,75	2,78	3,40	-0,59	2,63



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Thank you for your attention

Professor Dr Ing. Jean Rom Rabe

