

Declaration of conformity (DoC) according ISO/TR 17534-3:2015

We

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declare under our sole responsibility that the product



IMMI 2024 from April 2024 [551]

to which this declaration relates is in conformity with the calculation method
ISO 9613-2:1996 following the provisions of ISO 17534-1:2015 and
ISO/TR 17534-3:2015.

The declared conformity applies to situations covered by the above calculation method except
the situations specified in the enclosed Test Case Results Comparison Form (TRCForm) and
with limitations according to the enclosed "Grade of Implementation Form (QAForm).

All test cases were calculated in the reference setting.

The deviation of the final results with the reference results is documented in the tables below.

Wölfel Engineering GmbH + Co. KG

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Table 71 — QA-form on ISO 9613-2:1996 including ISO/TR 17534-3 5.2 to 5.9

In the reference setting for application of the program, it is possible to calculate	Yes	To a limited degree	No
with			
A-weighted sound pressure levels (reference 500 Hz)	✓		
sound pressure levels in octave-bands of 63 Hz to 8 kHz;	✓		
with			
point sources,	✓		
line sources,	✓		
area sources,	✓		
with automatic subdivision of line and/or area sources under consideration of			
the distance to the receiver,	✓		
with image sources describing the reflection of sound at walls and other vertical surfaces			
that can be designed pursuant to Figure 8, and	✓		
that occur at surfaces with dimensions and orientations pursuant to Formula (19),	✓		
of first order,	✓		
acc. to 5.9 of ISO/TR 17534-3:2015 with higher order, complete until n = 50	✓		
with directivity factor for point sources			
depending on an angle,	✓		
depending on two angles,	✓		
with selectable reference direction for each source;	✓		
acc. to Formula (4) for moderate downwind conditions with			
attenuation due to geometrical divergence according to Formula (7),	✓		
attenuation due to air absorption acc. to Formula (8) and Table 2,	✓		
attenuation due to air absorption for other conditions acc. to ISO 9613-1	✓		
attenuation due to ground effects in octave-bands according to Formula (9) and Table 3	✓		
attenuation due to ground effects for A-weighted sound pressure levels acc. to Formula (10) under consideration of a directivity due to ground reflection according to Formula (11),	✓		
attenuation caused by screening			
acc. to 5.2 ISO/TR 17534-3:2015	✓		

acc. to Formula (12) with diffraction over the upper edge of the screen,	✓		
acc. to 5.5 ISO/TR 17534-3:2015	✓		
acc. to Formula (13) with diffraction around the vertical edges,	✓		

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In the reference setting for application of the program, it is possible to calculate	Yes	To a limited degree	No
with consideration of the special case for application of Formula (13) for large-area industrial premises for determination of the long-term average level in accordance with Note 15,	✓		

Table 70 — TRC-form for test cases

Test suite	Title	ISO/TR 17534-3:2015 Acoustics — Software for the calculation of sound outdoors: Recommendations for quality ensured implementation of ISO 9613-2 in software according to ISO 17534-1:—, Clause 6 "Test cases"* * Considering correction according ISO TC43 SC1 WG 56 from 10/2020
	Place and date of publication	Switzerland, Geneva, International Organization for Standardization, 2015-01-15
Calculation method	Title	ISO 9613-2:1996, Acoustics — Attenuation of sound during propagation outdoors — Part 2: General method of calculation
	Place and date of publication	Switzerland, Geneva, International Organization for Standardization, 1996-12-15

Test case No.	Centre frequency of octave bands	Limits of certified results (A-weighted) in dB		Software calculation result (A-weighted) in dB	Results inside tolerance	Comments
		Upper	Lower		yes/no	
TC01						
	63 Hz	13,75	13,65	13,70	yes	
	125 Hz	23,81	23,71	23,75	yes	
	250 Hz	31,15	31,05	31,10	yes	
	500 Hz	36,22	36,12	36,17	yes	
	1000 Hz	39,00	38,90	38,95	yes	
	2000 Hz	39,42	39,32	39,37	yes	
	4000 Hz	36,52	36,42	36,47	yes	
	8000 Hz	23,99	23,89	23,94	yes	
	Total (63 Hz up to 8000 Hz)	44,34	44,24	44,29	yes	
TC02						
	63 Hz	13,75	13,65	13,70	yes	
	125 Hz	20,12	20,02	20,06	yes	
	250 Hz	24,47	24,37	24,41	yes	
	500 Hz	30,05	29,95	30,00	yes	
	1000 Hz	36,16	36,06	36,11	yes	
	2000 Hz	37,58	37,48	37,53	yes	
	4000 Hz	34,68	34,58	34,63	yes	
8000 Hz	22,15	22,05	22,10	yes		

	Total (63 Hz up to 8000 Hz)	41,58	41,48	41,53	yes	
TC03						
	63 Hz	13,75	13,65	13,70	yes	

Test case No.	Centre frequency of octave bands	Limits of certified results (A-weighted) in dB		Software calculation result (A-weighted) in dB	Results inside tolerance	Comments
		Upper	Lower		yes/no	
	125 Hz	16,43	16,33	16,38	yes	
	250 Hz	17,78	17,68	17,72	yes	
	500 Hz	23,88	23,78	23,83	yes	
	1000 Hz	33,32	33,22	33,28	yes	
	2000 Hz	35,74	35,64	35,68	yes	
	4000 Hz	32,84	32,74	32,79	yes	
	8000 Hz	20,31	20,21	20,26	yes	
	Total (63 Hz up to 8000 Hz)	39,19	39,09	39,14	yes	
TC04						
	63 Hz	13,75	13,65	13,70	yes	
	125 Hz	20,19	20,09	20,13	yes	
	250 Hz	26,68	26,58	26,62	yes	
	500 Hz	32,89	32,79	32,84	yes	
	1000 Hz	37,00	36,90	36,96	yes	
	2000 Hz	37,82	37,72	37,77	yes	
	4000 Hz	34,92	34,82	34,87	yes	
	8000 Hz	22,40	22,30	22,34	yes	
	Total (63 Hz up to 8000 Hz)	42,28	42,18	42,23	yes	
TC05						
	63 Hz	8,75	8,65	8,70	yes	
	125 Hz	18,81	18,71	18,76	yes	
	250 Hz	26,16	26,06	26,10	yes	
	500 Hz	31,23	31,13	31,18	yes	
	1000 Hz	34,00	33,90	33,96	yes	
	2000 Hz	34,42	34,32	34,37	yes	
	4000 Hz	31,53	31,43	31,47	yes	
	8000 Hz	19,00	18,90	18,94	yes	
	Total (63 Hz up to 8000 Hz)	39,35	39,25	39,30	yes	
TC06						

	63 Hz	13,73	13,63	11,01	yes	
	125 Hz	19,60	19,50	19,54	yes	
	250 Hz	21,15	21,05	21,09	yes	
	500 Hz	26,09	25,99	26,04	yes	
	1000 Hz	34,87	34,77	34,82	yes	
	2000 Hz	37,08	36,98	37,03	yes	

Test case No.	Centre frequency of octave bands	Limits of certified results (A-weighted) in dB		Software calculation result (A-weighted) in dB	Results inside tolerance	Comments
		Upper	Lower		yes/no	
	4000 Hz	34,18	34,08	34,12	yes	
	8000 Hz	21,63	21,53	21,57	yes	
	Total (63 Hz up to 8000 Hz)	40,64	40,54	40,59	yes	
TC07						
	63 Hz	9,21	9,11	9,16	yes	
	125 Hz	19,27	19,17	19,21	yes	
	250 Hz	26,61	26,51	26,56	yes	
	500 Hz	31,68	31,58	31,63	yes	
	1000 Hz	34,45	34,35	34,41	yes	
	2000 Hz	34,87	34,77	34,82	yes	
	4000 Hz	31,97	31,87	31,92	yes	
	8000 Hz	19,42	19,32	19,37	yes	
	Total (63 Hz up to 8000 Hz)	39,80	39,70	39,75	yes	
TC08						
	63 Hz	8,71	8,61	8,64	yes	
	125 Hz	14,80	14,70	14,74	yes	
	250 Hz	21,17	21,07	21,11	yes	
	500 Hz	25,86	25,76	25,81	yes	
	1000 Hz	27,31	27,21	27,26	yes	
	2000 Hz	27,26	27,16	27,21	yes	
	4000 Hz	22,09	21,99	22,03	yes	
	8000 Hz	6,97	6,87	6,91	yes	

	Total (63 Hz up to 8000 Hz)	32,53	32,43	32,48	yes	
TC09	63 Hz	10,75	10,65	10,70	yes	
	125 Hz	16,26	16,16	16,20	yes	
	250 Hz	21,17	21,07	21,11	yes	
	500 Hz	26,05	25,95	26,00	yes	
	1000 Hz	27,88	27,78	27,83	yes	
	2000 Hz	27,75	27,65	27,70	yes	
	4000 Hz	22,50	22,40	22,45	yes	
	8000 Hz	7,34	7,24	7,29	yes	
	Total (63 Hz up to 8000 Hz)	32,97	32,87	32,92	yes	
TC10						

Test case No.	Centre frequency of octave bands	Limits of certified results (A-weighted) in dB		Software calculation result (A-weighted) in dB	Results inside tolerance	Comments
		Upper	Lower		yes/no	
	63 Hz	10,19	10,09	10,13	yes	
	125 Hz	15,17	15,07	15,12	yes	
	250 Hz	19,63	19,53	19,57	yes	
	500 Hz	22,69	22,59	22,64	yes	
	1000 Hz	24,17	24,07	24,13	yes	
	2000 Hz	23,39	23,29	23,34	yes	
	4000 Hz	17,64	17,54	17,58	yes	
	8000 Hz	2,91	2,81	2,85	yes	
	Total (63 Hz up to 8000 Hz)	29,35	29,25	29,30	yes	
TC11	63 Hz	23,94	23,84	23,85	yes	
	125 Hz	28,57	28,47	28,52	yes	
	250 Hz	30,65	30,55	30,60	yes	
	500 Hz	32,60	32,50	32,55	yes	
	1000 Hz	34,82	34,72	34,77	yes	
	2000 Hz	35,04	34,94	34,99	yes	

	4000 Hz	33,83	33,73	33,78	yes	
	8000 Hz	30,23	30,13	30,18	yes	
	Total (63 Hz up to 8000 Hz)	41,35	41,25	41,30	yes	
TC12						
	63 Hz	24,89	24,79	24,81	yes	
	125 Hz	30,66	30,56	30,61	yes	
	250 Hz	33,64	33,54	33,59	yes	
	500 Hz	35,55	35,45	35,50	yes	
	1000 Hz	36,75	36,65	36,70	yes	
	2000 Hz	37,51	37,41	37,46	yes	
	4000 Hz	36,62	36,52	36,57	yes	
	8000 Hz	33,02	32,92	32,97	yes	
	Total (63 Hz up to 8000 Hz)	43,86	43,76	43,81	yes	
TC13						
	63 Hz	25,02	24,92	24,95	yes	
	125 Hz	30,61	30,51	30,56	yes	
	250 Hz	34,31	34,21	34,26	yes	
	500 Hz	36,13	36,03	36,08	yes	
	1000 Hz	37,05	36,95	37,00	yes	

Test case No.	Centre frequency of octave bands	Limits of certified results (A-weighted) in dB		Software calculation result (A-weighted) in dB	Results inside tolerance	Comments
		Upper	Lower		yes/no	
	2000 Hz	35,27	35,17	35,22	yes	
	4000 Hz	32,27	32,17	32,22	yes	
	8000 Hz	26,88	26,78	26,83	yes	
	Total (63 Hz up to 8000 Hz)	42,76	42,66	42,71	yes	
TC14						
	63 Hz	8,78	8,68	8,71	yes	
	125 Hz	14,37	14,27	14,31	yes	
	250 Hz	16,63	16,53	16,57	yes	
	500 Hz	18,40	18,30	18,35	yes	

	1000 Hz	20,19	20,09	20,14	yes	
	2000 Hz	18,66	18,56	18,60	yes	
	4000 Hz	13,05	12,95	13,00	yes	
	8000 Hz	-1,13	-1,23	-1,19	yes	
	Total (63 Hz up to 8000 Hz)	25,43	25,33	25,38	yes	
TC15						
	63 Hz	27,34	27,24	27,28	yes	
	125 Hz	35,66	35,56	35,61	yes	
	250 Hz	41,04	40,94	40,99	yes	
	500 Hz	44,06	43,96	44,01	yes	
	1000 Hz	44,65	44,55	44,61	yes	
	2000 Hz	42,58	42,48	42,53	yes	
	4000 Hz	38,81	38,71	38,76	yes	
	8000 Hz	33,00	32,90	32,94	yes	
	Total (63 Hz up to 8000 Hz)	49,97	49,87	49,92	yes	
TC16						
	63 Hz	14,88	14,78	14,79	yes	
	125 Hz	18,23	18,13	18,18	yes	
	250 Hz	20,78	20,68	20,73	yes	
	500 Hz	23,49	23,39	23,44	yes	
	1000 Hz	26,50	26,40	26,45	yes	
	2000 Hz	26,93	26,83	26,88	yes	
	4000 Hz	25,27	25,17	25,22	yes	
	8000 Hz	20,02	19,92	19,97	yes	
	Total (63 Hz up to 8000 Hz)	32,59	32,49	32,54	yes	
Test case No.	Centre frequency of octave bands	Limits of certified results (A-weighted) in dB		Software calculation result (A-weighted) in dB	Results inside tolerance	Comments
		Upper	Lower		yes/no	
TC17						
	63 Hz	15,39	15,29	15,30	yes	
	125 Hz	19,23	19,13	19,18	yes	
	250 Hz	22,00	21,90	21,95	yes	

	500 Hz	24,03	23,93	23,98	yes	
	1000 Hz	26,44	26,34	26,40	yes	
	2000 Hz	26,88	26,78	26,83	yes	
	4000 Hz	25,22	25,12	25,17	yes	
	8000 Hz	19,97	19,87	19,92	yes	
	Total (63 Hz up to 8000 Hz)	32,77	32,67	32,72	yes	
TC18						
	63 Hz	15,06	14,96	15,03	yes	
	125 Hz	21,84	21,74	21,81	yes	
	250 Hz	25,12	25,02	25,06	yes	
	500 Hz	26,34	26,24	26,25	yes	
	1000 Hz	27,79	27,69	27,71	yes	
	2000 Hz	28,70	28,60	28,63	yes	
	4000 Hz	27,86	27,76	27,80	yes	
	8000 Hz	23,51	23,41	23,45	yes	
	Total (63 Hz up to 8000 Hz)	34,94	34,84	34,87	yes	
TC19						
	63 Hz	13,73	13,63	11,01	yes	
	125 Hz	19,60	19,50	19,54	yes	
	250 Hz	23,37	23,27	23,32	yes	
	500 Hz	28,06	27,96	28,02	yes	
	1000 Hz	36,56	36,46	36,52	yes	
	2000 Hz	38,48	38,38	38,43	yes	
	4000 Hz	35,25	35,15	35,21	yes	
	8000 Hz	23,23	23,13	23,19	yes	
	Total (63 Hz up to 8000 Hz)	42,07	41,97	42,03	yes	