NORMAL MODE

		Minimum	Good	Benchmark
GENERAL	**Delay**			
	Delay in Sending Direction	< 120 ms		
	Delay in Receiving Direction	< 100 ms		
	Loudness Ratings			
	Sending Loudness Rating **SLR**	8 dB ± 3dB	8 ± 3 dB	8 ± 3 dB
	Receiving Loudness Rating **RLR**	2 dB ± 3dB	2 ± 3 dB	2 ± 3 dB
	Sensitivity / Frequency Characteristics (guideline)			
	Sending Frequency Response	table	table	table
	Receiving Frequency Response	table	table	table
	Listening speech Quality TMOS			
	TMOS in sending direction (TOSQA2001)	≥ 3.2	≥ 3.5	≥ 3.8
	TMOS in receiving direction (TOSQA2001)	≥ 2.5	≥ 3.0	≥ 3.3
	Listening speech Quality MOS-LQO PESQ			
	Idle Channel Noise			
	Sending Direction	≤ -64 dBm0(P)		
	Receiving Direction	≤ -57 dBPa(A)		
ECHO CANCELLATION	**Acoustic Echo Control**			
	Terminal Coupling Loss TCLw (single talk)	≥ 46 dB	46 dB	46 dB
	Echo Level versus Time (single talk)	≤ 6 dB	6 dB	6 dB
	Spectral Echo Attenuation	table		
	Switching			
	Activation in Sending Direction: Activation Level Ls min	≤ -20 dB	-20 dB	-20 dB
	Activation in Sending Direction Build up time Trs min	≤ 50 ms	50 ms	50 ms
	Attenuation range in sending direction			
	Attenuation range Ahs	≤ -20 dB		
	build up time Trs	≤ 50 ms	≤ 50 ms	≤ 50 ms
	Doble Talk Performance			
	Attenuation range in sending direction in double talk Ahs	2b table	2a table	1 table
	Attenuation range in receiving direction in double talk Ahr	2b table	2a table	1 table
	Detection of Echo Components during Double Talk	2b table	2a table	1 table
NOISE TRANSMISSION	**Ambient Noise Rejection**			
	D-value from DELSM (ITU-T G.111) Pink noise	≥ 0 dB	≥ 0 dB	≥ 0 dB
	D-value from DELSM (ITU-T G.111) cafeteria noise	≥ 0 dB	≥ 0 dB	≥ 0 dB
	Background noise Transmission			
	Background noise Transmission with Near End Speech - Cafeteria noise 63 dB + Hoth noise 60 dB	< 10 dB	7 dB	3 dB
	Background noise Transmission with Far End Speech - Cafeteria noise 63 dB + Hoth noise 60 dB	≤ 10 dB	5 dB	3 db
	Confort Noise Injection Level	< 2 dB		
	Confort Noise Injection Level	> -5 dB		
	Confort Noise Injection Spectrum	table		

Sending sensitivity (handset mode)		
Frequency (Hz)	Upper limit	Lower limit
100	-12	
200	0	
300	0	-12
1000	0	-6
2000	4	-6
3000	4	-6
3400	4	-9
4000	0	

Receiving sensitivity (handset mode)		
Frequency (Hz)	Upper limit	Lower limit
100	-10	
200	2	
300		-9
1000	note	-7
3400		-12
4000	2	

Spectral echo attenuation mask	
Frequency (Hz)	Upper limit
100	-20
200	-30
300	-38
800	-34
1500	-33
2600	-24
4000	-24

Confort Noise Spectral Adjustment		
Frequency (Hz)	Upper limit	Lower limit
200	12	-12
800	12	-12
800	10	-10
2000	10	-10
2000	6	-6
4000	6	-6

Attenuation range in sending direction in double talk Ahs					
Behaviour	1	2a	2b	2c	3
ahsdt [dB]	≤ 3	≤ 6	≤ 9	≤ 12	> 12

Attenuation range in receiving direction in double talk Ahs					
Behaviour	1	2a	2b	2c	3
ahsdt [dB]	≤ 3	≤ 5	≤ 8	≤ 10	> 12

Detection of Echo Components during Double Talk					
Behaviour	1	2a	2b	2c	3
ahsdt [dB]	≥ 27	≥ 23	≥ 17	≥ 11	< 11

HANDS-FREE MODE

		Minimum	Good	Benchmark
GENERAL	**Delay**			
	Delay in Sending Direction	< 120 ms		
	Delay in Receiving Direction	< 100 ms		
	Loudness Ratings			
	Sending Loudness Rating **SLR**	13 dB ± 4dB	13 ± 4 dB	13 ± 4 dB
	Receiving Loudness Rating **RLR**	6 dB +12dB -4dB	6 +12 -4 dB	6 +12 -4 dB
	Sensitivity / Frequency Characteristics (guideline)			
	Sending Frequency Response	table	table	table
	Receiving Frequency Response	table	table	table
	Listening speech Quality TMOS			
	TMOS in sending direction (TOSQA2001)	≥ 3.0	≥ 3.5	≥ 3.8
	TMOS in receiving direction (TOSQA2001)	≥ 2.5	≥ 3.0	≥ 3.3
	Idle Channel Noise			
	Sending Direction	≤ -64 dBm0(P)		
	Receiving Direction	≤ -57 dBPa(A)		
	Distortion in Receiving Direction	table		
ECHO CANCELLATION	**Acoustic Echo Control**			
	Terminal Coupling Loss TCLw (single talk)	≥ 46 dB	46 dB	46 dB
	Echo Level versus Time (single talk)	≤ 6 dB	6 dB	6 dB
	Spectral Echo Attenuation	table		
	Switching			
	Activation in Sending Direction: Activation Level Ls min	≤ -20 dB	-20 dB	-20 dB
	Activation in Sending Direction Build up time Trs min	≤ 50 ms	50 ms	50 ms
	Attenuation range in sending direction			
	Attenuation range Ahs	≤ -20 dB		
	build up time Trs	≤ 50 ms	≤ 50 ms	≤ 50 ms
	Doble Talk Performance			
	Attenuation range in sending direction in double talk Ahs	2b table	2a table	1 table
	Attenuation range in receiving direction in double talk Ahr	2b table	2a table	1 table
	Detection of Echo Components during Double Talk	2b table	2a table	1 table
NOISE TRANSMISSION	**Ambient Noise Rejection**			
	D-value from DELSM (ITU-T G.111) Pink noise	≥ -13 dB	≥ -6 dB	≥ 0 dB
	D-value from DELSM (ITU-T G.111) cafeteria noise	≥ -13 dB	≥ -6 dB	≥ 0 dB
	Background noise Transmission			
	Background noise Transmission with Near End Speech - Cafeteria noise 63 dB + Hoth noise 60 dB	< 10 dB	7 dB	3 dB
	Background noise Transmission with Far End Speech - Cafeteria noise 63 dB + Hoth noise 60 dB	≤ 10 dB	5 dB	3 db
	Confort Noise Injection Level	< 2 dB		
	Confort Noise Injection Level	> -5 dB		
	Confort Noise Injection Spectrum	table		

Sending sensitivity (Speaker mode)		
Frequency (Hz)	Upper limit	Lower limit
200	0	
250	0	
315	0	-14
400	0	-13
500	0	-12
630	0	-11
800	0	-10
1000	0	-8
1300	2	-8
1600	3	-8
2000	4	-8
2500	4	-8
3100	4	-8
4000	0	

Receiving sensitivity (Speaker mode)		
Frequency (Hz)	Upper limit	Lower limit
200	0	
250	0	
315	0	
400	0	
500	0	
630	0	
800	0	-12
1000	0	-12
1300	0	-12
1600	0	-12
2000	0	-12
2500	0	-12
3100	0	-12
4000	0	

Note: all sensitivity values are expressed in dB on an arbitrary scale

Distortion in receiving	
Level at POI (dBm0)	Required Disturted
-45	17.5
-40	22.5
-35	26.35
-30	30.5
-25	31.7
-20	33.0
-15	33.3
-10	33.5
-5	31.8