

Physical specifications		
No.	Feature	Specification
1	Unit <b>must</b> be operational down to	100 m
2	Unit <b>must</b> be	slightly buoyant
3	Unit <b>must</b> be operational in temp range	-20 to 40 °C
4	Unit <b>must</b> tolerate dropping on hard floor from at least	1.5 m
5	Hydrophone <b>must</b> be	shock protected
6	Units <b>must</b> be	standardized and have the same sensitivity within +3 dB <b>or</b> hydrophones <b>must</b> be easily exchangeable in field conditions and without requiring gain adjustment.
7	Unit <b>must</b> be able to record continuously for	>= 4 months
8	Unit <b>must</b> have replacable flash memory capable of storing	>= 4 months data
9	Exchanging memory card and batteries should not	force you to open up to the electronics or the electronics should be splash protected
10	Batteries <b>must</b> be	easily replacable
11	Deployment should be	based on suspension from sea floor (not sea surface) with attachment points in both bottom and top of unit
12	Color should be	black or bright orange (i.e. non-conspicuous to porpoises)
13	Unit <b>must</b> be provided with	a hydrophone insert voltage calibration facility for laboratory calibration
14	System clock <b>must</b> be stable at all operational conditions within	1 sec/month

Recording specifications		
No.	Feature	Specification
1	System should allow for	sea state noise identification/evaluation. Spec's for how this is accomplished should be provided
2	It should be possible to	record/quantify ambient noise in the 100-150 kHz band (to evaluate recording quality)
3	Internal filter functions capable of selectively recording porpoise clicks (reducing noise from ships, sonar, waves, rain, etc.) should be	user controlled
4	Measurement of ambient noise level should be	user adjustable: averaged over nn seconds, every yy hours
5	Time resolution <b>must</b> be	$\leq 5 \mu\text{s}$
6	Amplitude resolution <b>must</b> be	0.5 dB or better
7	Amplitude units should be clearly defined in	Volts or Pa or dB with reference
8	Hydrophone <b>must</b> be omni-directionally flat within	+3dB in the 100-150 kHz band and at the ref. freq. (if ref. frequency is applicable)
9	Hydrophone/unit sensitivity <b>must</b> be	individually comparable within +- 3dB @ 100-150 kHz and ref. freq. (if ref. frequency is applicable)
10	Overall detection threshold <b>must</b> be	115 dB re 1 $\mu\text{Pa}$ peak-peak or better
11	Trigger level <b>must</b> be	adjustable between 115 and 135 dB re 1 $\mu\text{Pa}$ p-p
12	Trigger level resolution <b>must</b> be	0.5 dB or better
13	Manufacturer <b>must</b>	provide info about signal to noise ratio @ received level 115 dB re 1 $\mu\text{Pa}$ p-p in the 100-150 kHz band
14	Raw data files <b>must</b> have	standard format, <b>or</b> a conversion tool to export all raw data to be readable by Matlab or Excel <b>must</b> be provided
15	Deployment software should provide	a receipt containing the parameter settings, to be stored in the setup computer
16	Unit <b>must</b> be provided	with a feedback indicating correct setup/start

Post-processing		
No.	Feature	Specification
1	Browsing of data files: Postprocessing software <b>must</b> provide	user friendly zooming, grabbing, scrolling, copying to clip board, and easy adjustment of axis scales
2	Browsing of data files: Postprocessing software <b>must</b> allow for	direct jump from one classified porpoise click train to the next
3	Postprocessing software <b>must</b> allow for	presentation on the screen in a selected time window of all clicks, porpoise-like clicks or porpoise click trains and combined presentation of all clicks + porpoise-like clicks, both coloured differently, and d:o porpoise-like clicks + porpoise click trains, both differently coloured
4	Display: Postprocessing software <b>must</b> allow for	display of click peak amplitude
5	Display: Postprocessing software <b>must</b> allow for	display of click amplitude in the 2 bandpass filters (porpoise click and reference frequency band; if such filters are applicable)
6	Display: Postprocessing software <b>must</b> allow for	display of amplitude ratio between porpoise click/ref bandpass filters (if such filters are applicable)
7	Display: Postprocessing software <b>must</b> allow for	display of click duration
8	Display: Postprocessing software <b>must</b> allow for	display of inter-click interval (ICI)
9	Postprocessing software should give	information on envelope (if applicable)
10	Postprocessing software should give	information on bandwidth (if applicable)
11	Postprocessing software should give	information on click centre frequency (if applicable)
12	Display: Postprocessing software should offer	split screen option showing data from different sections of a file
13	Display: Postprocessing software should offer	split screen option showing data with different click parameter settings
14	Display: Postprocessing software should offer	split screen option showing data from different channels (if applicable)
15	Display: Time windows <b>must</b> be scalable between	<= 10ms and 1 week
16	File edit: Postprocessing software should offer possibility to	edit raw file before producing reports or exporting data
17	Denotation: Postprocessing software should offer possibility to	mark clicks with notes
18	Settings of noise eliminating/porpoise click and porpoise click train extracting algorithms should be	user controlled
19	Underlying definitions and settings of noise eliminating/porpoise click extracting algorithms should be	transparent

	<b>Post-processing, cont'd</b>	
20	Discrimination should be possible	between broadband dolphin and porpoise clicks
21	Postprocessing software should offer	playback functionality with ICI scaled according to x-axis setting, and reflecting amplitude and click duration
22	Postprocessing software should offer	playback functionality reflecting click centre frequency (if applicable)
23	Report and export functions: Postprocessing software should offer	report graph and export function with adjustable x-axis and spreadsheet format, presenting <b>number of porpoise-like clicks</b> and porpoise clicks in trains per min, per hour, per 24 hours, selectively coloured in composite graph. Export format <b>must</b> be readily readable by MatLab, Excel etc.
24	Report and export functions: Postprocessing software should offer	report graph and export function with adjustable x-axis and spreadsheet format presenting <b>number of detection-positive minutes</b> per 10min, 1 hour, 1/4 tide cycle, 24 hours. Export format <b>must</b> be readily readable by MatLab, Excel etc.
25	Report and export functions: Postprocessing software should offer	report graph and export function, after selection of ' <b>porpoise clicks in trains</b> ', presenting mean, min/max and SD of the ICI. Export format <b>must</b> be readily readable by MatLab, Excel etc.
26	Report and export functions: Postprocessing software should offer	report graph and export function, after the selection of ' <b>porpoise-like clicks</b> ' and ' <b>porpoise clicks in trains</b> ', presenting mean, min/max and SD of the <b>click duration</b> . Export format <b>must</b> be readily readable by MatLab, Excel etc.
27	Report and export functions: Postprocessing software should offer	export of all individual click and train details, train by train. All parameters extracted by the program, plus all information about individual clicks of the train. Export format <b>must</b> be readily readable by MatLab, Excel etc.

Support guarantee		
No.	Feature	Specification
1	Manufacturer <b>must</b> guarantee	that the project can keep the required number of units in operation from January 2011 until December 2012
2	A buffer of 30 units <b>must</b> be	available from January 2011 until December 2012 at manufacturer for replacement of lost devices according to conditions under points 5 and 6
3	Operational and technical guarantee should cover	at least three years from delivery
4	Faulty units <b>must</b> be repaired	within one month, incl transport; if due to technical failure, a gratis replacement is offered during repairment time
5	If project buffer is exhausted due to losses, manufacturer should offer	leasing or purchase of units on reasonable terms for direct delivery during the field period
6	If project buffer is exhausted due to faulty devices, manufacturer <b>must</b> provide	gratis replacements off the shelf, incl shipping
7	Replacement hydrophones/transducers <b>must</b> be	available off the shelf. Technically failing hydrophones are replaced gratis incl shipping.
8	Software/operational support <b>must</b> be available	via phone/Skype/email/internet during daytime working hours (Mon-Fri) from delivery until June 6, 2012, incl vacation periods
9	Support language <b>must</b> be	English
10	Documentation <b>must</b> include	detailed specifications of raw and processed file format, filters, self-noise
11	Documentation should include	detailed information on the standardisation of each units sensitivity within +-3dB @130 kHz and ref. freq. (if ref. frequency is applicable)
12	Documentation should include	details on porpoise click and click train detection algorithms
13	Version compatability <b>must</b> be	guaranteed, e.g. by not changing unit or software versions for the entire SAMBAH duration or any changes must be discussed and approved by SAMBAH