

### 1.1.1.2 Acoustic signature and noise level

#### 1.1.1.2.1 Cavitation appearance

The following requirements have been taken into account concerning steady-state cavitation appearance:

- periscopic depth  $\geq$  ■ knots, attack periscope raised, with sea state not more than 1
- 40 m. (safety depth)  $\geq$  ■ knots
- 60 m  $\geq$  ■ knots
- ■ m  $\geq$  ■ knots

#### 1.1.1.2.2 Airborne noise levels in compartments

The airborne noise levels (consistent with Naval Standards STANAG 1186) are expressed in dB (A).

	Spaces	Silent run	Cruising run	Snorkel run
		4 knots	8 knots	6 knots
Space where intelligible speech is necessary	Torpedo room	■	■	■
Spaces where comfort of personnel in their quarters is normally considered to be an important factor	Accommodation (berth, wardroom)	■	■	■
Spaces where it is essential to maintain especially quiet conditions	Control room (CR) Radio room (RR)	■	■	■ (CR) ■ (RR <sup>1</sup> )
Spaces or areas where a higher noise level is expected and where deafness avoidance is important	Diesel engine room	■	■	■
High noise level areas where intelligible speech communication is necessary	Galley (in service)	■	■	■

The acoustic insulation of the radio room will be done carefully to avoid a too high noise level in snorting condition.

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<sup>1</sup> door closed

1.1.1.2.4 Radiated noises

The following diagrams indicate the radiated noise levels, measured in 1/3 of octave (reference 1 (μPa)<sup>2</sup> / Hz at one meter), for silent patrol (4 knots, [redacted] m), attack (8 knots, [redacted] m) and snorting ([redacted] and [redacted] knots) conditions.

These levels are given for frequencies varying from 25 Hz (minimum frequency possible to measure) to 10 kHz (maximum significant frequency).

For each situation, two levels are defined:

- a maximum level which is a guaranteed one: every measurement proceeded during the acceptance trials will be below,
- an objective level: it corresponds to the mean level. This objective level is more realistic but at the same time perfectible. It is 5dB below the guaranteed level.

The following figures are guaranteed ones:

	25Hz	100Hz	10 kHz
Submerged speed (4 kts)	[redacted] dB	[redacted] dB	[redacted] dB
Submerged speed (8 kts)	[redacted] dB	[redacted] dB	[redacted] dB
Snorting (8 kts)	[redacted] dB	[redacted] dB	[redacted] dB

IN BROAD BAND (1/3 OF OCTAVE) FROM 25 HZ TO 10 KHZ

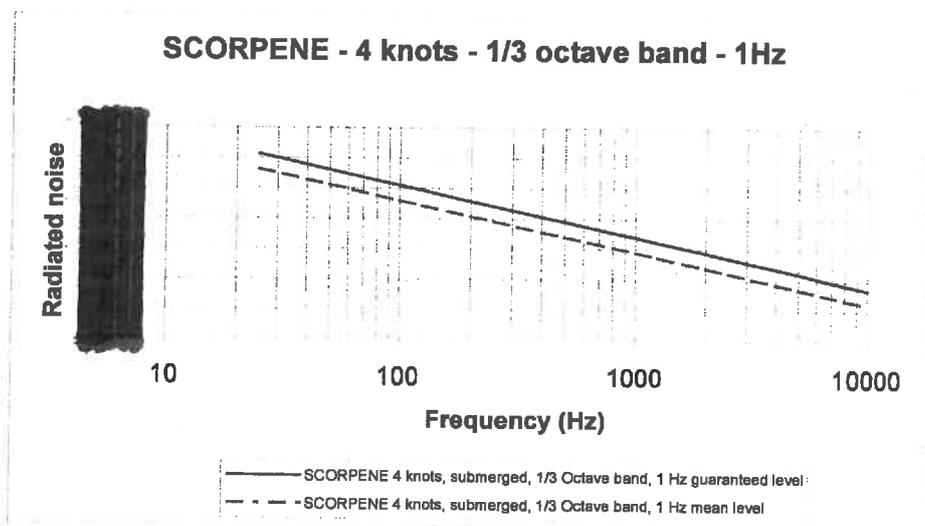


Fig. 1. 1: SCORPENE submarine radiated noise levels (submerged at 4 knots)

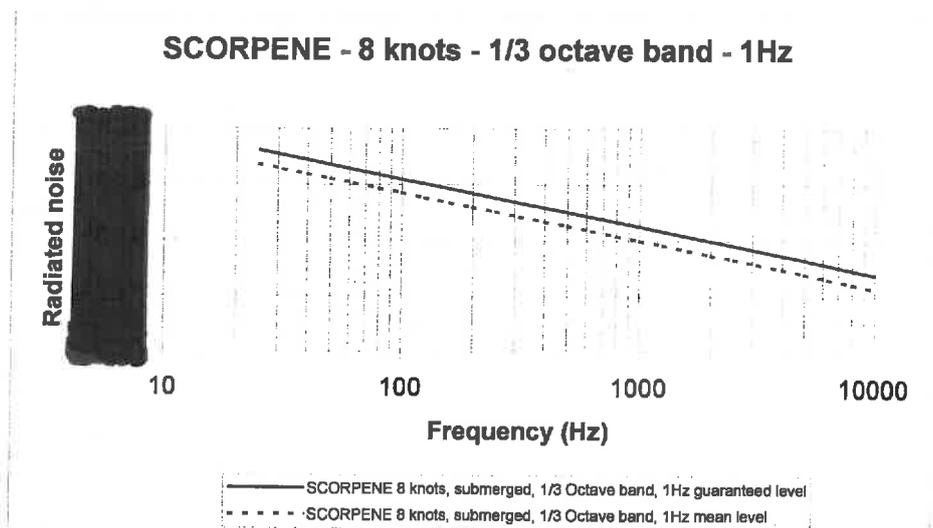


Fig. 1. 2: SCORPENE submarine radiated noise levels (submerged at 8 knots)

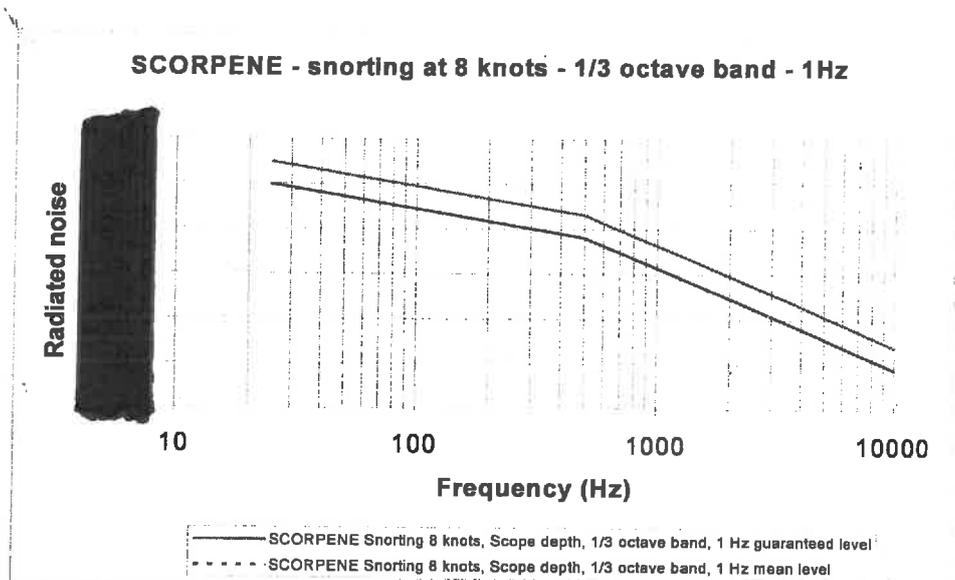


Fig. 1. 3: SCORPENE submarine radiated noise levels (snorting at 8 knots)

**Remark:** The radiated noise levels in snorting situation at [redacted] knots are the same as for [redacted] knots. When snorting, the main noise source is the Diesel system; the auxiliaries [redacted] and hydrodynamic contribution [redacted].