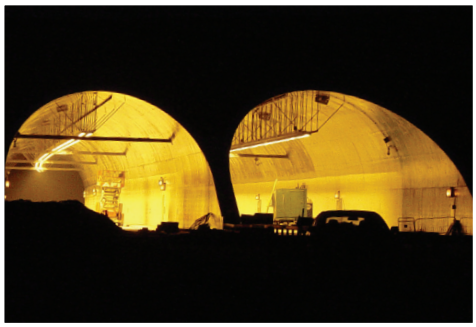
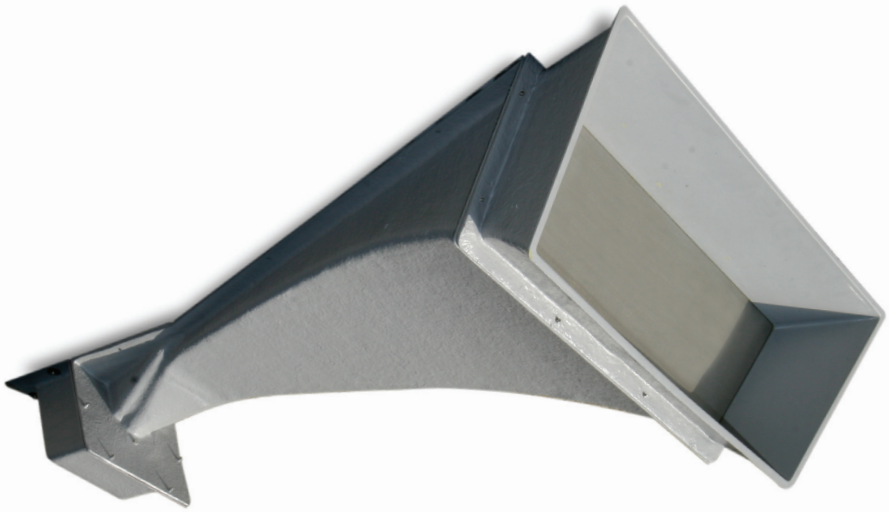
The AXYS® ABF-260

High powered, low distortion horn for PA/VA systems
in areas with high noise levels







Shaping the future of sound reinforcement

AXYS®

Road Tunnels - The Problem

In order to achieve high levels of speech intelligibility within road traffic tunnels three main factors need to be taken into account. All of these factors form part of the acoustic transmission system that affects how the sound from the loudspeaker is heard by the listener.

1. The Acoustics of the tunnel.

The reverberation and reflections within a tunnel are not conducive to achieving high levels of speech intelligibility. Because of the reverberation it is often difficult to achieve a good Direct to Reverberant Ratio (that is the ratio of direct sound to reverberant sound) which is essential for achieving high levels of speech intelligibility. There are two ways that you can improve the intelligibility of a system: The first would be to install absorption within the tunnel (which is costly and impractical). The alternative is to use highly directional loudspeakers.

2. Noise caused by cars and ventilation systems.

There are two ways to combat the problems of noise. One is to use quieter ventilation systems (often not a practical solution) the other is to use a high power horn, that will ensure that you achieve a good Signal to Noise Ratio and therefore the highest level of speech intelligibility possible within the limitations of the acoustic environment.

3. Distortion caused by the loudspeaker system.

Many conventional folded horn designs have high distortion levels so it is essential to use a low distortion horn.

As you can see this means that there are several problems with using conventional horn technology within road tunnels:

- Many hundreds of sources
- Uncontrolled radiation patterns due to clustering
- Unfavourable front-to-back ratio
- Distortion at high SPL's
- Poor sound quality/frequency response
- Short throw, leading to a high number of installation points
- High installation/maintenance costs due to large number of units

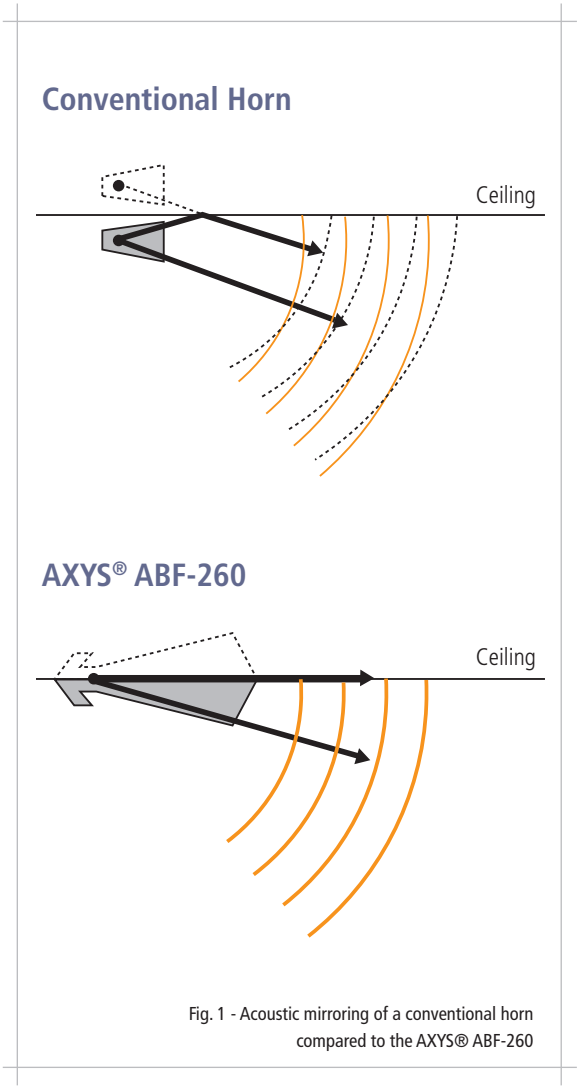


Fig. 1 - Acoustic mirroring of a conventional horn compared to the AXYS® ABF-260

Road Tunnels - The Solution

The ABF-260 has been specially developed for use in road traffic tunnels to form part of the voice alarm and announcement systems and has already been used in highly successful installations in Europe.

These include:

- Benelux tunnel, Rotterdam, The Netherlands
- Markusberg tunnel, Luxemburg
- Kil tunnel, near Rotterdam, The Netherlands
- Sijtwende, The Hague, The Netherlands
- IJ Tram tunnel, Amsterdam, The Netherlands
- Baldock Tunnel, Baldock, United Kingdom
- Blackwall Tunnel, London, United Kingdom
- Rotherhithe Tunnel, London, United Kingdom

The Asymmetric Boundary Flare (ABF) geometry is based on the principle of using acoustical mirroring to obtain a flat coherent wave front. The ABF is designed to be mounted on the ceilings of road tunnels, the ceiling then acts as a waveguide; reducing lateral reflections and obtaining a coherent wave front (see fig1). This principle means that an ABF horn can provide a high power and high directivity whilst at the same time offering a wide frequency response and exceptional sensitivity.

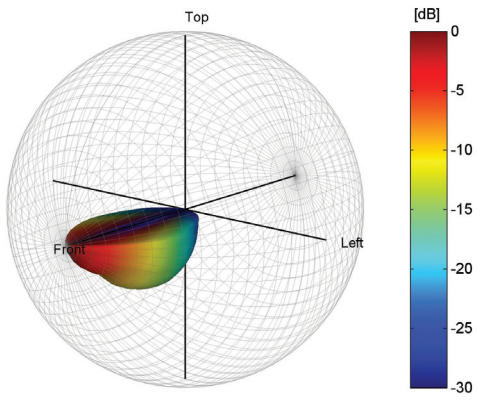
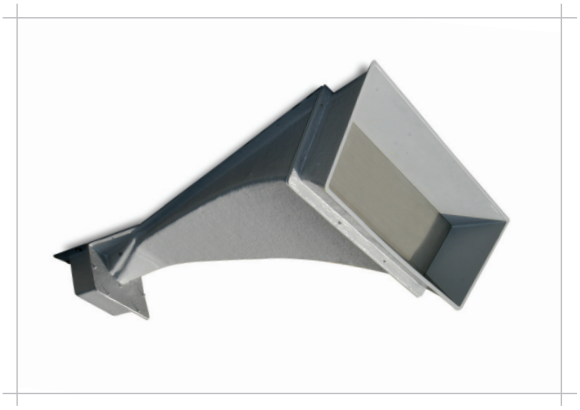


Fig. 2 - 3D Directivity balloon for the AXYS® ABF-260 mounted against a horizontal boundary plane



The ABF's low profile and its ability to produce high sound pressure levels with negligible distortion make it the perfect solution for low-ceiling noisy environments like traffic tunnels. A single ABF is capable of covering large distances within a tunnel environment. This has several advantages both in terms of system performance and saving in installation and maintenance costs.

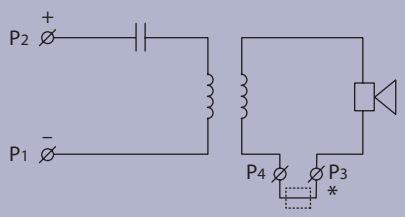
The advantages of the ABF approach include:

- Superior Speech Intelligibility
- Minimum number of sources
- High Directivity
- High Power
- Low Distortion
- Large front-to-back ratio
- Long throw
- Superior sound quality to conventional folded horns, the ABF has a useful frequency response up to 8 kHz
- Reduced installation and maintenance costs compared to conventional folded horns

The ABF-260 comprises of an impact resistant reinforced polyester flare (Fire Retardant to DIN4102 class B2), a 2" exit high performance compression driver and a 100 V impedance transformer. The exit or mouth of the flare is fitted with a stainless steel grill to prevent water from entering the flare during tunnel cleaning. This grill has been specially designed so that it does not affect the acoustical performance of the ABF-260.

Short Form Specifications

Electrical

Input	- Nominal input voltage	100 V_{rms}
Input impedance	- Nominal - Minimum	200 Ω 150 Ω
	- Maximum input power - Connector	50 W_{rms} 4-pole Hirschmann CA3GD, p1 = - (100 V connection) p2 = + (100 V connection) p3 = Current sensing (send)* p4 = Current sensing (return)*
	For normal operation P3 should be externally connected to P4	
Recommended Amplifier		AXYS® 100 V Industry Amp series

Acoustical

Nominal Frequency Response (+3/-10 dB)	350 - 8k Hz
Horizontal Opening Angle (-6 dB)	500 Hz octave band 36° 1k Hz octave band 26° 2k Hz octave band 26°
Sensitivity	500 Hz octave band, 117 dB_{SPL} @ 1W/1m 1k Hz octave band, 119 dB_{SPL} @ 1W/1m 2k Hz octave band, 116 dB_{SPL} @ 1W/1m
Directivity Index	500 Hz octave band 17.5 dB 1k Hz octave band 19.6 dB 2k Hz octave band 18.5 dB

Mechanical

Material	Glass fibre reinforced polyester
Fire Retardant Class	DIN 4102 class B2
Colour	RAL 7004
Dimensions	1575 x 986 x 328 mm (62″ x 39″ x 13″)
Weight	29 kg (64 lbs)
Mounting	6 x M8
Water Protection for Compression Driver	Stainless steel mesh grill in mouth

* p3/p4 allow an external current sensing resistor to be connected in series with the driver (for 3rd party load monitoring)

AXYS®

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