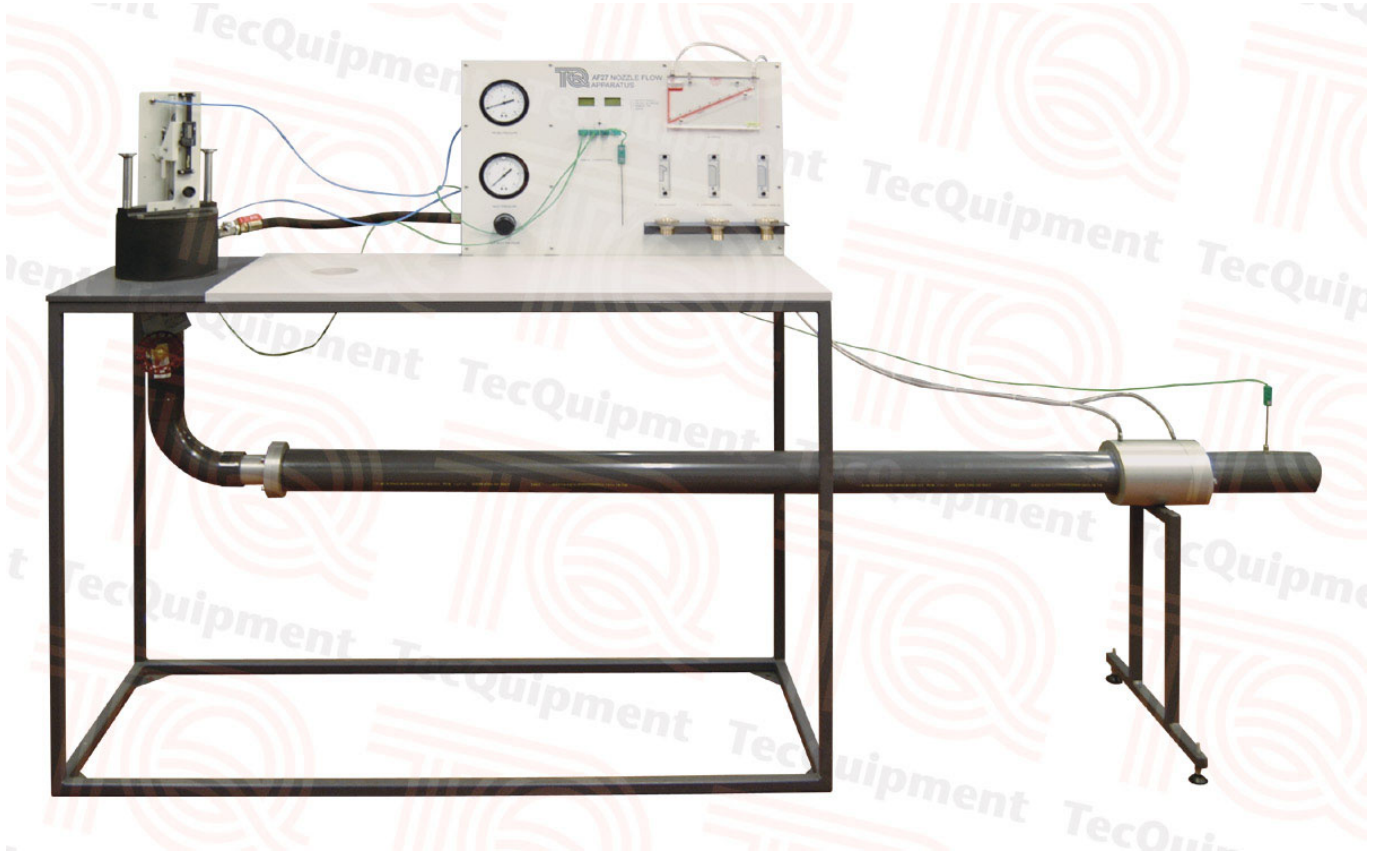


## AF27

## Nozzle Flow Apparatus

***Demonstrates the thermodynamics and fluid mechanics of the adiabatic expansion of air through subsonic and supersonic nozzles***



- Practical laboratory apparatus which demonstrates the thermodynamics and fluid mechanics of the adiabatic expansion of air through subsonic and supersonic nozzles
- Convenient size, floor-standing
- Includes three interchangeable, profiled and polished brass nozzles
- Battery-powered digital instrumentation
- Built-in instrument panel and student work top
- High levels of safety

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- An ISO 9001 certified company

# AF27

# Nozzle Flow Apparatus

## Description

Demonstrates the thermodynamics and fluid mechanics of the adiabatic expansion of air through subsonic and supersonic nozzles.

The apparatus is floor standing. It comprises a pressure chest with a removable lid and a pressure regulator at its input and a throttling valve at its output. The equipment includes three interchangeable, profiled and polished brass nozzles. One nozzle fits onto the chest at any one time. Each nozzle includes a mimic panel clearly showing the nozzle profile. The nozzles and the mimic panels have a safe and secure storage position when not in use.

Compressed air from an external source (not included) enters the pressure chest and passes through the nozzle. The settings of the inlet pressure regulator and the throttling valve determine the operating pressure of the chest as well as the inlet pressure/outlet pressure ratio of the nozzle.

A stainless-steel probe on a manually adjustable, vertical traverse measures the pressure distribution along the axis of the nozzle. The traverse assembly includes a digital depth indicator to measure the probe position in the nozzle. The selected nozzle's mimic panel mounts adjacent to the probe traverse to give a visual indication of the position of the probe in the nozzle during experiments.

The air discharge from the nozzle passes along a long horizontal parallel pipe before being discharged to atmosphere. An orifice plate in the pipe includes two pressure tapings which connect to an inclined manometer to allow the air flow to be determined.

A sturdy steel frame with an instrument panel and student worktop holds the main assembly. The instrument panel includes an inclined manometer, and gauges to display chest and probe pressures. Air temperature is displayed digitally.

## Standard Features

- Supplied with comprehensive user guide
- Two-year warranty
- Made in accordance with the latest European Union directives

## Essential Ancillaries

- Compressor (AF27a)

## Experiments

- The relationship between pressure ratio and flow for convergent and convergent/divergent Laval nozzles
- The pressure profile in convergent/divergent nozzles at various pressure ratios
- Investigation of expansion with friction in a parallel passage at high subsonic velocities
- Boundary layer growth under subsonic and supersonic conditions
- The phenomenon of choked flow corresponding to sonic velocity at a nozzle throat

## Operating Conditions

*Operating environment:*  
Laboratory environment

*Storage temperature range:*  
-25°C to +55°C (when packed for transport)

*Operating temperature range:*  
+5°C to +40°C

*Operating relative humidity range:*  
30% to 95% (non-condensing)

## Sound Levels

Maximum sound levels measured approximately 100 dB(A)

**TecEquipment strongly recommends that ear defenders are worn by anyone using or working close to this apparatus when it is running.**

## Specification

*Dimensions:*  
Nett: Length 2900 mm x depth 600 mm x height 1600 mm

Packed: 4.0 m<sup>3</sup>

*Weight:*  
Nett: 105 kg  
Packed: 200 kg

*Maximum air consumption:*  
2.5 kg/min at 7 bar

*Maximum supply pressure:*  
10 bar

- Nozzles:*
- Convergent nominal bore 6.4 mm
  - Convergent/divergent nominal bore 6.4 mm
  - Convergent/parallel nominal bore 4.8 mm