



Aerodynamics

AF302

Continuous Supersonic Wind Tunnel

For investigations into two-dimensional flow around models at supersonic and subsonic airspeeds

Works with
VDAS[®]



Vacuum Pump (supplied)
not shown on image

Screenshot of the optional
VDAS[®] software

- A suction-type continuous-operation supersonic wind tunnel for investigations into two-dimensional air flow around models for airspeeds up to Mach 1.8
- Includes high-quality optical glass windows in the working section, suitable for use with an optional Schlieren system
- Includes a selection of models for two-dimensional flow experiments and an encoder for feedback of model angle
- Supplied with a multi-pressure display unit and calibrated pressure sensors to show pressures relative to atmosphere.
- Includes a vacuum pump with remote control for ease of use
- Works with TecEquipment's Versatile Data Acquisition System (VDAS[®]) for automatic data acquisition

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- An ISO 9001 certified company
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AF302

Continuous Supersonic Wind Tunnel

Description

A suction-type continuous-operation supersonic wind tunnel for investigations into subsonic and supersonic air flow. It also allows students to study air flow in two dimensions around aerodynamic models.

An instrument frame (supplied) holds a remote control unit that controls a high-capacity vacuum pump (supplied). The pump creates a low pressure downstream of the working section to draw air into the wind tunnel. A bypass duct with a hand-operated valve allows the operator to reduce the airflow through the Working Section without disturbing the quality of the main airflow. This is useful for startup and shutdown and for subsonic tests.

The working section of the wind tunnel is a convergent-divergent nozzle with a removable top part ('liner'). The shape of the liner controls the maximum air velocity at the divergent part of the working section. Included are three different liners.

A selection of models are included with the equipment (one has pressure tapings) for experiments in two-dimensional flow. These fit in the 'portal' of the working section, flush to both windows. A geared mechanism allows students to adjust the incidence angle of the models. An encoder works with the optional VDAS to measure the model angle.

Pressure tapings along the working section connect to a 'mimic' panel and multi-pressure display unit in the instrument frame. The display unit shows the pressures at the tapings. The display includes calibrated pressure sensors to measure pressures relative to atmosphere. It also shows the pressures on one of the models.

An analogue pressure gauge measures and displays the suction of the pump (tunnel reference pressure). This pressure line also connects to the multi-pressure display for data acquisition.

The equipment works with TecEquipment's optional Versatile Data Acquisition System (VDAS®) and can quickly and conveniently connect to a frame-mounting interface unit (VDAS-F, not included). Using VDAS® enables accurate real-time data capture, monitoring, display, calculation and charting of all relevant parameters on a suitable computer (computer not included).

The wind tunnel includes transparent windows in the working section. These are high-quality optical glass suitable for use with the optional Schlieren Apparatus (AF302a, available separately) enabling display and recording of images of high-speed flow.

Standard Features

- Supplied with comprehensive user guide
- Five-year warranty
- Manufactured in accordance with the latest European Union directives

Experiments

- Pressure distribution along a convergent/divergent (Laval) nozzle with subsonic and supersonic air flow
- Comparison of theoretical and actual pressure distribution
- Comparison of actual and theoretical area ratio of a nozzle at supersonic air velocities (Mach numbers)
- Pressures around a two-dimensional model in subsonic and supersonic flow conditions, at different angles of incidence
- Lift coefficient for aerodynamic models in supersonic flow
- Shock waves and expansion patterns around a two-dimensional model in supersonic flow conditions (when used with the optional Schlieren Apparatus).

Recommended Ancillary

- Schlieren Apparatus AF302a

Essential Ancillary

- Versatile Data Acquisition System - Frame-mounted version (VDAS-F)

Operating Conditions

Operating environment:
Well ventilated 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:
80% at temperatures < 31°C decreasing linearly to 50% at 40°C

Note: For best results, use the Wind Tunnel in areas of low relative humidity (<10% at 30°C). High humidity levels can cause condensation shocks and ice may build up in the working section, giving poor results.

Essential Services

Electrical supply for instrument frame:
100 VAC to 240 VAC, 50 to 60 Hz

Electrical supply for vacuum pump:
400 VAC Three phase neutral and earth
250 A starting current, 90 A running current

Sound Levels

This equipment emits sound levels greater than 90 dB(A). You must wear ear defenders when you use it or work near to it.

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AF302

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Specification

Vacuum pump dimensions and eight (including hood):

Nett (assembled): 1800 mm x 1800 mm x 1500 mm plus a 2400 mm high silencer. Total 1750 kg

Packed: 7.44 m³ and 1970 kg

Wind tunnel dimensions and weight:

Nett (assembled): 4000 mm long x 900 mm wide x 1600 mm high and 209 kg

Packed: Approximately 6.5 m³ and 250 kg

Working section:

101.6 mm x 25.4 mm

Air speeds:

Interchangeable liners are provided to give working section airspeeds of:

- Mach 1.8
- Mach 1.4
- Subsonic

Models (included):

- 5-degree single wedge
- 7-degree double wedge
- 10-degree double wedge
- 10-degree double wedge with two pressure tappings.

Models adjustment:

Nominally ± 10 degrees

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