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ENGINEERING LABORATORY DESIGN, INC.

Designers and Manufacturers of Quality
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SPECIFICATIONS

12 INCH LOW-SPEED, RECIRCULATING WIND TUNNEL

General: The proposed system is a closed, recirculating design. The flow loop is arranged in a vertical configuration.

System components include: flow ducts, test section, fan, motor with variable frequency speed controller, a chilled water heat exchanger, and supporting frames. A stand-alone, packaged water chiller can also be furnished.

Overall dimensions of the unit will be: length, 15'-0" (4.57m); height, 7'-2 1/2" (2.20m); width, 3'-1" (94.0cm). The test section centerline height is 5'-8" (1.73m). The dimensions of the chilled water unit will be: length, 23.875" (60.6cm); width, 12.625" (32.1cm); height 20.125" (51.1cm).

The total weight will be approximately 1,600 lbs (727kg).

Flow Sections: The ducts bounding the air stream will be fabricated of fiberglass reinforced plastic molded over precision tooling. Interior surfaces will be glass smooth, white, gel-coat. Exterior surfaces are spray finished with medium blue, polyester, gel-coat enamel. Miter flanges, fastened with stainless steel bolts and sealed with elastomeric sealant, will join the longitudinal corners of the duct sections. Face flanges, joining adjacent ducts sections will be sealed with resilient, closed cell, urethane foam gasket. The flanges will be bolt fastened. Careful attention will be paid to the fit and alignment of mating sections to insure that no leaks or discontinuities exist which would disturb the flow.

The contraction will have a 6.25:1 area ratio, with a symmetrical cross section and analytically developed contours. The primary diffusion section will expand with a total included angle of 5.7°.

High efficiency, turning vane cascades, fabricated of galvanized steel, will be installed in each of the four circuit elbows.

A 1" X 2" (2.54cm X 5.08cm) mesh safety grid will be provided at the downstream end of the primary diffuser.

Test Section: 0.75" (19.1mm) thickness, clear, GM grade, acrylic plexiglass will be used to fabricate the top, sides and bottom of the test section. The interior dimensions of the test section will be: length, 24.0" (60.96cm); width, 12.0" (30.48cm); height, 12.00" (30.48cm). Aluminum angle flanges will join the test section to the contraction and the diffuser ducts. The cover of the working section will be removable and fitted with quick release fasteners. The bottom can also be make detachable if desired. Wall ports, closed with flush fitting, flanged plexiglass plugs, can be provided in either or both side walls. The location and size of the ports should be specified prior to fabrication of the test section. Test section arrangements specific to a customers requirements can be provided. Please consult with an **ELD** representative to determine the costs associated with the desired modifications.

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Speed, in a clear test section, will be continuously variable from 50 fpm (0.25 m/s) to 1200 fpm (6.10 m/s). Cross sectional velocity variation will be less than ± 1% variation from the mean, free stream, velocity when measured at a fixed streamwise location (excluding boundary layer displacement thickness). Turbulence level will be on the order of 0.5% when measured at the maximum operating velocity.

Flow Straighteners: The settling length, upstream of the contraction, will be fitted with a precision, hexagonal cell, aluminum honeycomb section. Graduated mesh, high porosity (60%), stainless steel screens, mounted and tensioned in proprietary design, extruded aluminum frames will be furnished.

Heat Exchanger: A commercial quality, aluminum fin/copper tube, single row, heat exchanger will be installed between the third and fourth elbows. The heat exchanger is intended for use with chilled water on the liquid side at a rate of up to 4 GPM (15.1 Lpm). An electronically actuated, modulating valve, regulated by a set point controller monitoring a thermocouple probe in the tunnel airstream, will be provided in the return piping. Freestream temperature can be maintained at ±1° F throughout the range 65°F (18.3°C) to 150°F (65.5°C).

Air Cooled Chiller: A packaged chiller, with a 0.5 gallon (1.8 L) reservoir and an integral circulating pump will be furnished. The chiller has a rated cooling capacity of 4,266 Btu/hr (1,250W) at 68°F (20°C). Quick release fittings will be provided to connect the supply and return hoses to the heat exchanger.

Supporting Frames: The duct sections and the fan will be supported by frames fabricated of structural steel tubing joined by welding. The frames will be etched, prime coated and spray finished with acrylic enamel. The frames will be fitted with adjustable leveling pads. Rubber-in-shear mounts are used extensively to isolate the duct sections from room and fan vibration.

Fan Assembly: A in-line, centrifugal fan will be used. The fan will be powered by a 1/2 HP, TENV, AC induction motor. A sheet metal enclosure covers the motor, drives, and fan belt. The enclosure is lined with a closed cell, polyurethane foam to decrease the sound emissions from the motor/inverter combination at the lower operating speeds.

A transistor invertor type variable frequency controller will regulate fan shaft RPM. A speed control station, located adjacent to the test section, will regulate test section velocity.

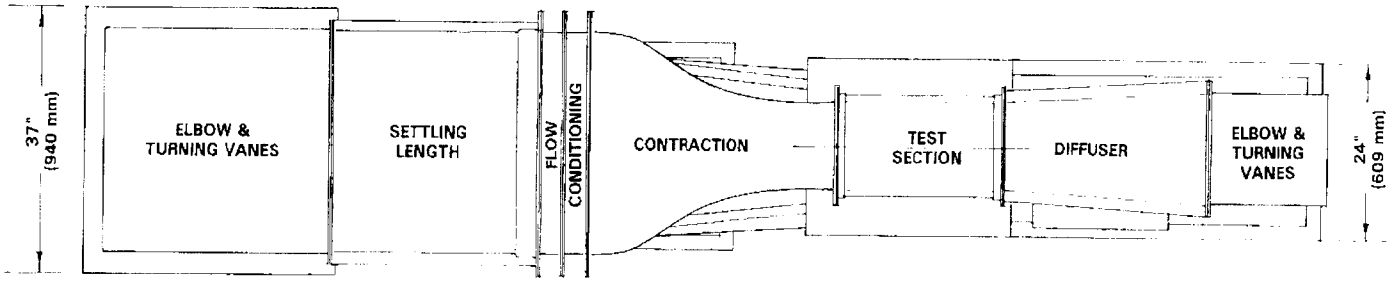
A NEMA rated fusible disconnect will be furnished. The unit will be arranged for 208 VAC/1ϕ/60Hz electric service. A 20'-0" (6m) long, neoprene covered, service cable, fitted with a NEMA rated twist lock type cap (NEMA L6-20P) and mating receptacle (NEMA L6-20R), will be furnished.

Miscellaneous: The equipment will be designed, fabricated, assembled, and tested in our Lake City, MN facility. Interested members of the buyer's organization are invited to visit the plant to inspect the wind tunnel and observe its performance and operation.

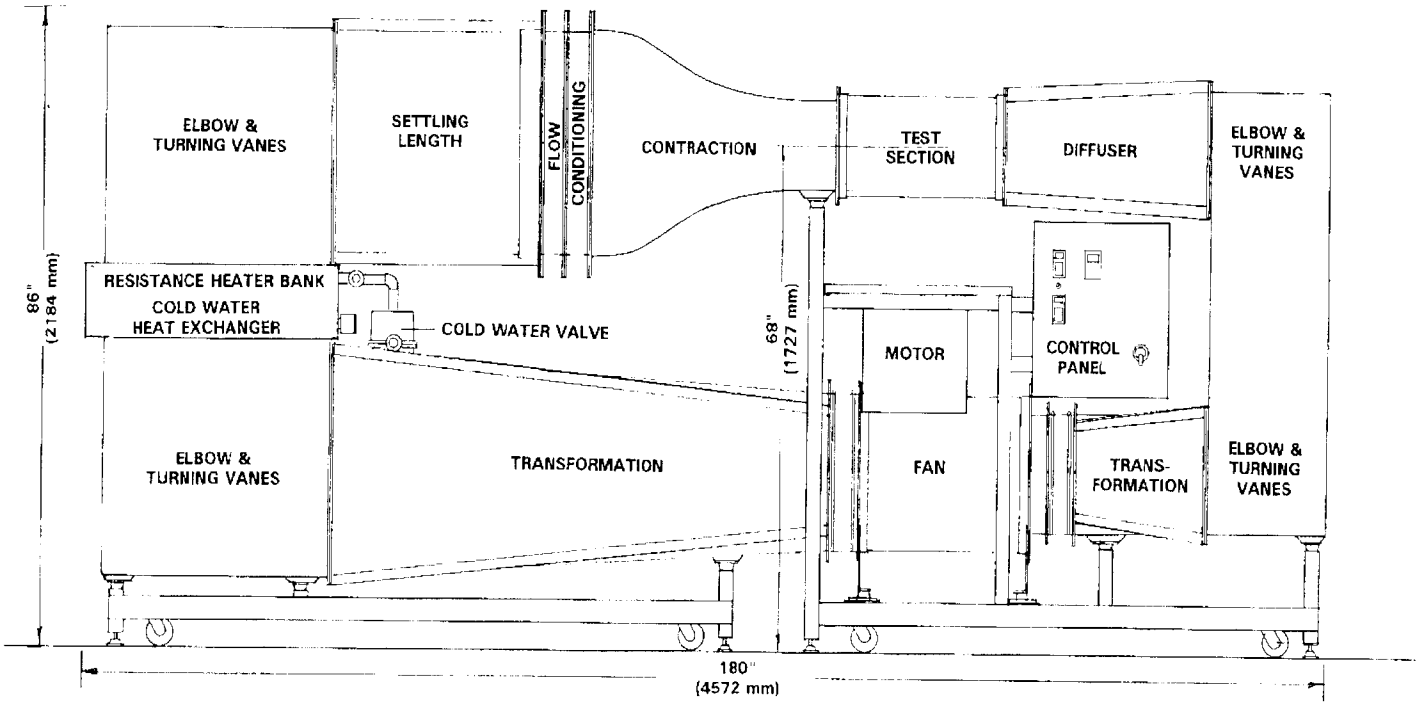
The wind tunnel will be disassembled and shipped via motor freight carrier. Complete installation, operation, and maintenance instructions will be furnished with the equipment. Alternatively, an **ELD** representative can be contracted to supervise and participate in the unloading, placement, assembly, and start-up of the wind tunnel system.

A one year limited warranty covers the equipment.

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PLAN



ELEVATION

ENGINEERING LABORATORY DESIGN, INC.
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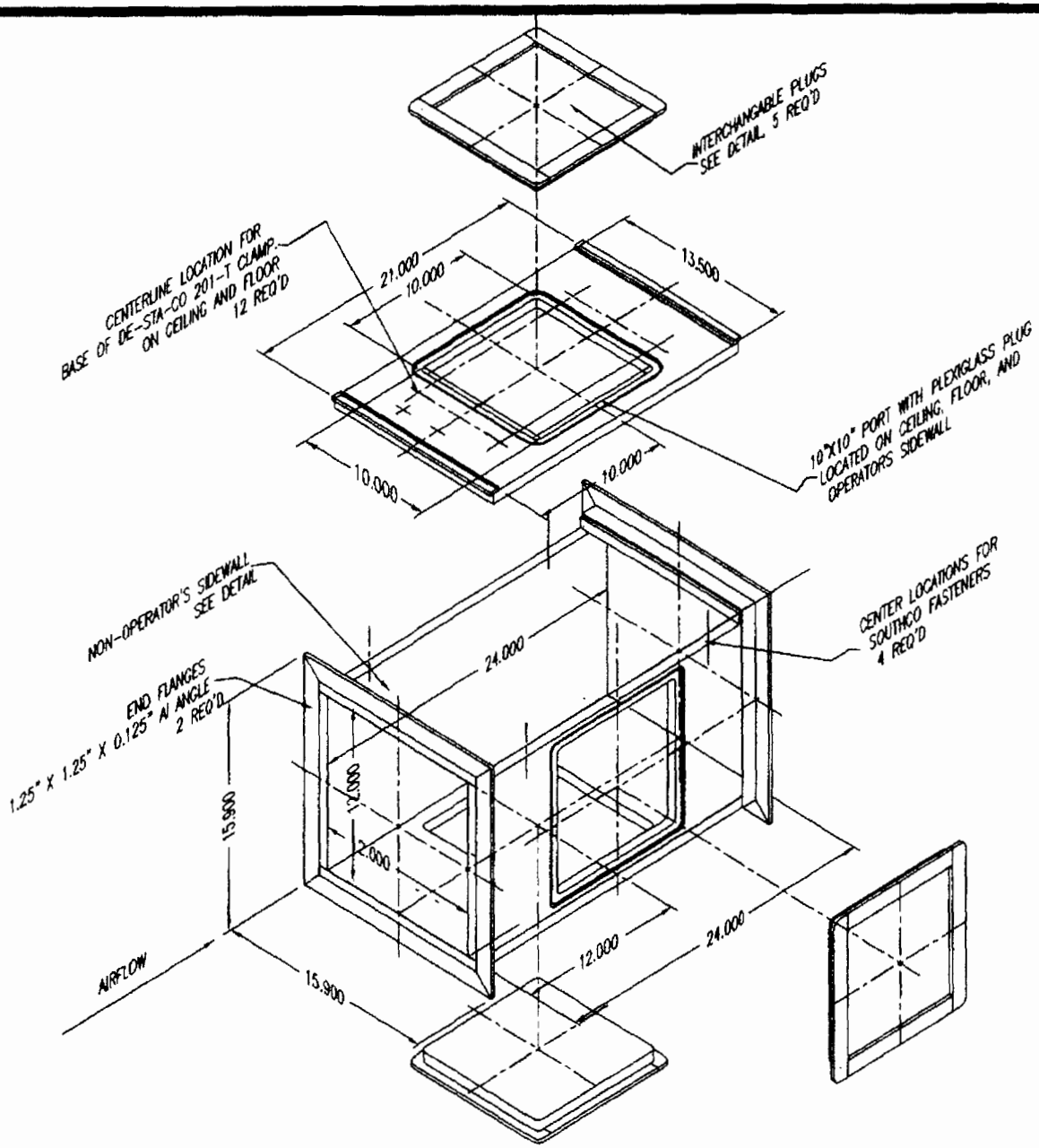
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Project: 12" RECIRCULATING WIND TUNNEL
LOW SPEED, VARIABLE FREE-STREAM TEMPERATURE
Organization

Reference
Sheet
Scale
Date

Nov 21 00 09:57a Engineering Lab Design (651)345-5095 p.4

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PROJECT: 12" LOW SPEED, OPEN CIRCUIT WIND TUNNEL
TEST SECTION ISOMETRIC ASSEMBLY

ORGANIZATION: LUCENT TECHNOLOGIES

REFERENCE:	DATE:	SCALE:
QUOTATION NO. Q003000	11/21/00	1" = 1'-0"

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