

1 OVERVIEW OF THE LOW-SPEED WIND TUNNEL

The side profile of the low-speed wind tunnel is shown in Figure 1. The tunnel is a closed-loop recirculating type, which can produce smooth, uniform airflow conditions in the range of 8-30 m/s in the lower test section, and speeds in the range of about 0-5 m/s in the upper section. The lower test section features an octagonal cross-section with tapered fillets to account for boundary layer growth. The major dimensions of the lower test section are approximately 53 x 76 x 183 cm. The airflow is generated by using two counter-rotating hydraulic fans. The main flow conditioning apparatus upstream of the lower test section includes a 5:1 contraction cone and two identical screens. Turning vanes are located at each corner section of the tunnel and flow straighteners are found before and after the fan section.

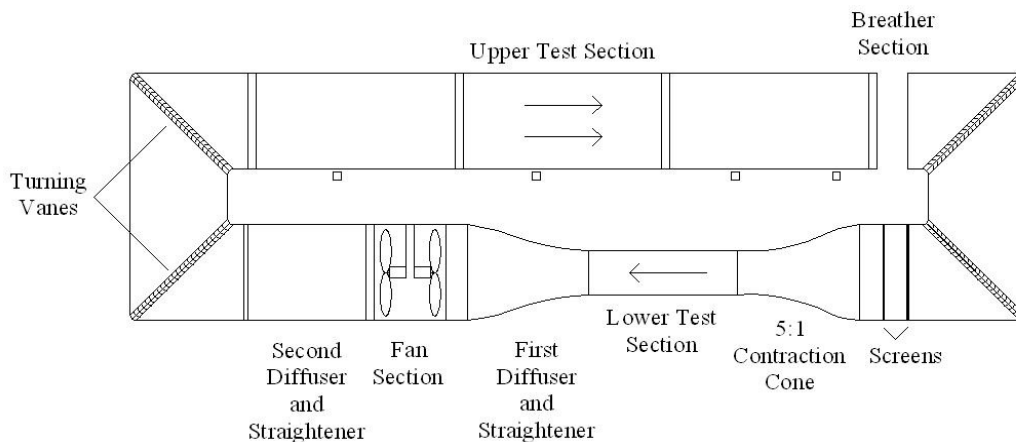


Figure 1. Overview of the low-speed wind tunnel.

2 BASIC STARTUP PROCEDURE

Several steps are required to start the wind tunnel. These steps should be followed in the order listed below:

1. Turn on the cooling water located at the motor enclosure.
2. Check to ensure that the Spool Valve*, located above the First Diffuser, and the Hydraulic Valve located at the motor enclosure are closed fully.
3. Adjust Bypass Valve #1 to the fully open position.
4. Energise the motor by turning the Motor Starter switch to its ON position.
5. Use the Hydraulic Pump Adjustment Screw located inside the motor enclosure to set the desired pressure on the pressure gauge at the Hydraulic Valve.
6. Open the Hydraulic Valve smoothly and swiftly.
7. Adjust Bypass Valve #1 to the fully closed position.
8. Slowly open the Spool Valve until the desired wind speed and static pressure across the contraction cone is reached by observing the inclined manometer at the contraction cone.
9. Allow the tunnel to run until the system and hydraulic oil reach a steady state.

*All hydraulic and bypass valves are labelled.

3 BASIC SHUTDOWN PROCEDURE

Actions required to shut down the wind tunnel are listed below in their required order:

1. Slowly close the Spool Valve until the air speed and inclined manometer pressure readings go to zero. Then cautiously continue to close the Spool Valve to the fully closed position.
2. Adjust Bypass Valve #1 to the fully open position.
3. Turn off the motor by setting the Motor Starter to its OFF position
4. Close the Hydraulic Valve.
5. Turn off the cooling water.

4 EMERGENCY SITUATION

In case of an emergency, close the Hydraulic Valve and turn off the motor, if deemed appropriate and safe to do so.

Security services may be reached at 474-9341 by using the phone located at the entrance of the wind tunnel laboratory or the red emergency phone in the nearby stairwell.

In the case of an accidental triggering of the fire sprinklers, a sprinkler stop device is located in plain view above the lower test section on the wind tunnel's structural beam. To use the sprinkler stop device, place the device into the sprinkler head with the rubber seal down and turn the device's handle. Fire sprinkler wedges and a hammer are also located beside the sprinkler stop device in case multiple fire sprinklers are triggered accidentally.

5 ADDITIONAL REFERENCES

Stumpf, P., "Determination of Aerodynamic Forces for Iced Single and Twin-Bundled Conductors," *M.Sc. Thesis*, University of Manitoba, Winnipeg, Canada, 1994.

Fleming, P.H., "Refurbishment and Recommissioning of the Department of Mechanical and Manufacturing Engineering's Low-Speed Wind Tunnel," *Mechanical Engineering - MECH 4560 Selected Topics in Fluid Mechanics - Technical Report*, University of Manitoba, Winnipeg, Canada, 2008. Located in the Wind Tunnel Laboratory.