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## **Factors Affecting the Aerodynamic Drag of Alpine Skiers**

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### **Abstract**

This paper documents a five year testing program that identified factors affecting the aerodynamic drag of alpine skiers. Wind tunnel drag measurements of world class alpine skiers and air permeability measurements of ski suits were conducted to determine the effect of fabric permeability on suit drag. Frontal area measurements were combined with drag data to determine the drag coefficient of the athletes in various skiing positions. Differences in drag of ski suits were most pronounced between downhill race suits and those designed for Giant Slalom (GS) competition where protective padding increased drag by up to 7.1%. In general, suits that were stretched from multiple wearing or that were undersized had greater permeability and higher drag. Alternatively, skiers who wore a loose fitting suit or multiple suits that increased the skier's frontal area experienced up to 5.2% of additional drag, estimated to slow a skier by 0.19 sec over a 250 m straight glide section of a downhill race course. Pre-season wind tunnel testing to optimize body positioning and ski suit size selection, followed by custom suit fitting have been important to the competitive success of the Canadian Alpine Ski Team.