



Advisory Circular

Subject: Crew Member Uniform Materials and Protective Clothing

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1.0 Introduction

- (1) This Advisory Circular (AC) is provided for information and guidance purposes. It describes an example of an acceptable means, but not the only means, of demonstrating compliance with regulations and standards. This AC on its own does not change, create, amend or permit deviations from regulatory requirements, nor does it establish minimum standards.

1.1 Purpose

- (1) The purpose of this AC is to inform air operators of the potential hazards for crew members when crew member uniforms do not provide adequate protection while fighting a fire or during an evacuation of the aircraft. It is recommended that this AC be taken into consideration when air operators update, modify, or replace existing crew member uniforms.

1.2 Applicability

- (1) This document applies to all TCCA employees and to individuals and organizations. This information is also available to aviation industry for information purposes.

1.3 Description of changes

- (1) This AC has been updated to expand the guidance to include all crew member uniforms.

2.0 References and requirements

2.1 Reference documents

- (1) It is intended that the following reference materials be used in conjunction with this document:
 - (a) Part 6 of the *Aviation Occupational Health and Safety Regulations – Safety Materials, Equipment, Devices and Clothing*
 - (b) Final Report of the Commission of Inquiry into the Air Ontario Crash at Dryden, Ontario
 - (c) Transport Canada Publication (TP) 12296, Issue 03, 2008-04-01 — Flight Attendant Training Standard
 - (d) Transportation Safety Board of Canada, Marine Investigation Report M04M0013
 - (e) M Saner, OHS Canada, 2017-02-08 — Flammable Materials You Should Never Wear on the Job
 - (f) United States National Transportation Safety Board (NTSB) recommendation A-96-088
 - (g) Federal Aviation Administration (FAA) Flight Standards Information Management System 8900.1, CHG 650, 2019-03-05 – Flight Attendant Apparel While Performing Duties Associated with Flight
 - (h) Flight Safety Foundation, Cabin Crew Safety, March-April 1999 – Uniform Materials Affect Flight Attendant Safety and Ability to Help Passengers Evacuate Burning Aircraft
 - (i) Federal Aviation Administration (FAA), FAA-RD-75-176, 1976-08-01 – Development of a Proposed Flammability Standard for Commercial Transport Flight Attendant Uniforms
 - (j) UNSW Aviation, Air Transport Safety II, AVIA 3710, 2000-11-16 – Flammability of Cabin Crew Uniforms, by Palak Bhatt; and

- (k) M C Silva-Santos, M S Oliveira, A M Giacomini, M C Laktim and J Baruque-Ramos, IOP Conference Series: Materials Science and Engineering, Volume 254 (052006), 2017-10-6 — Flammability on textile of flight crew professional clothing

2.2 Cancelled documents

- (1) As of the effective date of this document, the following document is cancelled:
 - (a) Commercial and Business Aviation Advisory Circular (CBAAC) 0136, 1997-12-05 — Flight Attendant Attire
- (2) By default, it is understood that the publication of a new issue of a document automatically renders any earlier issues of the same document null and void.

2.3 Definitions and abbreviations

- (1) The following **definitions** are used in this document:
 - (a) **Air operator**: means the holder of an air operator certificate;
 - (b) **Air operator certificate**: means a certificate issued under Part VII that authorizes the holder of the certificate to operate a commercial air service;
 - (c) **Commercial air service**: means any use of aircraft for hire or reward;
 - (d) **Crew member**: means a person who is assigned to duty in an aircraft during flight time;
 - (e) **Critical phase of flight**: includes all ground operations involving taxi, take-off and landing, and all other flight operations conducted below 10,000 feet, except cruise flight;
 - (f) **Flight attendant**: means a crew member, other than a flight crew member, who has been assigned duties to be performed in the interest of the passengers in a passenger-carrying aircraft;
 - (g) **Flight crew member**: means a crew member assigned to act as pilot or flight engineer of an aircraft during flight time; and
 - (h) **Operator**: means the person that has possession of the aircraft as owner, lessee or otherwise.
- (2) The following **abbreviations** are used in this document:
 - (a) **AC**: Advisory Circular;
 - (b) **CBAAC**: Commercial and Business Aviation Advisory Circular;
 - (c) **TC**: Transport Canada;
 - (d) **TCCA**: Transport Canada Civil Aviation; and
 - (e) **TSB**: Transportation Safety Board

3.0 Background

- (1) The most obvious reason for having a uniform is that crew members are easily identifiable in the event of an emergency. If the emergency involves a fire, the uniform can provide an extra layer of protection and therefore help in the ability for the crew member to respond. If the flight attendant is incapacitated through injury, they may be unable to assist passengers resulting in a slower evacuation. The uniform can provide impact protection and fire protection, which can contribute to a successful evacuation.
- (2) Survival factor observations addressed in the Commission of Inquiry into the Air Ontario Crash at Dryden, Ontario also included clothing worn by flight attendants. These observations are based

on the investigation conducted by the human factors investigators, as reported by them in writing and in testimony before the Inquiry. In his Final Report, Justice Virgil P. Moshansky wrote "another cabin safety issue involves the clothing worn by the flight attendants. Flight attendant Hartwick's outer clothing comprised of slip-on shoes, a light dress, and a sleeveless vest. She lost one shoe in the aircraft and the other outside the aircraft, in the snow. She eventually borrowed a pair of shoes from a passenger, enabling her to better help survivors. I see a need for there to be more attention paid to clothing all flight attendants in a manner that will allow them to better provide the leadership required of them in an emergency."

- (3) The requirements for uniform/protective clothing are referenced in the Aviation Occupational Safety and Health Regulations. However, the regulations offer no guidance as to what fabrics may constitute suitable uniform/protective clothing.
- (4) In its investigation (M04M0013) into a furnace explosion on board a passenger ferry, the TSB included observations regarding uniforms and protective clothing. Fabrics are manufactured from natural or manufactured fibres, or a combination of the two. Natural fibres are produced from either plants (cellulose) or animals (protein). Manufactured fibres are produced by combining simple compounds (monomers) to form more complex compounds or polymers. Each fibre, whether natural or manufactured, has its own unique durability and flammability characteristics. Fabrics made from cellulose fibres tend to be more durable, but exhibit poor flammability characteristics. Fabrics produced from protein fibres, on the other hand, are less durable, but demonstrate good flammability properties. Manufactured synthetic fabrics, although durable, are generally heat sensitive. Modern textiles are often produced by combining natural and manufactured fibres to obtain the flammability properties of one and the durability characteristics of the other.

4.0 Information management

- (1) Not applicable

5.0 Document history

- (1) CBAAC 0136, 1997-12-05 — Flight Attendant Attire

6.0 Contact us

For more information, please contact:
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We invite suggestions for amendment to this document. Submit your comments to:
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Appendix A — Guidance for Crew Member Attire

Overview

(1) Each row of this matrix provides an item number for ease of reference.

Item Number	Guidance Information
1	<p>Fabrics</p> <ol style="list-style-type: none"> 1. Research has shown that outer and inner garments made from natural fibers, such as wool and cotton, provide better protection than synthetic fibers, as natural fibers <ol style="list-style-type: none"> a. do not flare up vigorously when brought into contact with ignition sources b. tend to self-extinguish once the ignition source has been removed c. normally char rather than shrink or melt d. do not transmit heat as readily as synthetic materials, and e. are more resistant to destruction by radiant heat. 2. Synthetic materials pose a hazard during a fire situation. Application of an ignition source to synthetic material will generally cause ignition of the material, and vigorous burning will continue when the ignition source is removed. Transmitted or radiant heat will cause synthetic material to shrink before it finally melts. 3. Many synthetic fibers burn easily and, when ignited, tend to melt down quickly and stick to a person's skin.
2	<p>Style of Clothing</p> <ol style="list-style-type: none"> 1. The purpose of a uniform is to clearly distinguish and identify a crew member to passengers in a normal or emergency situation. A uniform design should be durable, practical, and inspire confidence in passengers. 2. Wearing a second layer garment, such as a uniform jacket or vest, should be encouraged for protection during critical phases of flight. Breathability of the fabric helps to mitigate skin irritation and allows layering of garments for protection without discomfort. A uniform could consist of several different items that the crew member can combine according to the season, work duties and their own preferences. 3. Long sleeve shirts and pants are preferred over short sleeve shirts and skirts or shorts. Generally, the more of a person's body that is covered the better protection that will be offered against fire or environmental elements. 4. Air operators should also consider clothing that is suitable for evacuating an aircraft and will not restrict the movement of a flight attendant.
3	<p>Footwear</p> <ol style="list-style-type: none"> 1. Shoes without laces, straps or functional buckles may be thrown off as a result of significant impacts causing high g-forces during an aircraft incident or accident, may be lost when the wearer is moving on or near aircraft wreckage or debris, or in very soft terrain such as desert sand or deep snow. 2. Shoes with laces, straps or functional buckles should be encouraged rather than shoes without as they provide more protection during aircraft incidents or accidents.

	<ol style="list-style-type: none"> 3. High heeled shoes or sandals should be discouraged as they may not be suitable for use during an evacuation. 4. Enclosed, low heeled shoes are encouraged as they provide the wearer with more protection during an evacuation.
4	<p>Inclement Weather Operations</p> <ol style="list-style-type: none"> 1. Wearing outer clothing for take-off and landing during cold or inclement weather operations should be considered for improved protection to crew members from environmental elements during an evacuation or an aircraft incident or accident.
5	<p>Recommended Procedures</p> <ol style="list-style-type: none"> 1. TCCA recommends that air operators take the following into consideration when updating, modifying or replacing crew member uniforms to ensure that the uniforms are best suited for crew member safety duties during both normal and emergency situations: <ol style="list-style-type: none"> a. Select natural fibers, such as cotton or wool, or select blends with a high percentage content of natural fibers; b. Select long sleeved shirts; c. Select pants over shorts or skirts; d. Select a second layer garment, such as a jacket/blazer, cardigan or vest; e. Select enclosed, low heeled shoes with laces, straps, or functional buckles; and f. Select appropriate footwear for cold or inclement weather operations 2. TCCA also recommends that air operators adopt the following operational procedures: <ol style="list-style-type: none"> a. Flight attendants don their full uniform before taking their assigned station for the safety demonstration, take-off and landing; b. Flight attendants wear outer clothing for take-off and landing during cold or inclement weather operations; c. Where possible, flight attendants don their uniform jackets before conducting fire-fighting procedures; d. Flight attendants should not wear high heeled or open toed shoes during taxi, take-off, and landing, or during abnormal and emergency situations; and e. Lanyards worn around the neck should have a quick release and be removed for take-off, landing, and during critical phases of flight.