

# **FIT TO FIGHT: DEVELOPING AND DELIVERING OPERATIONALLY RELEVANT FITNESS STANDARDS FOR THE CANADIAN FORCES**

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## **BACKGROUND**

### **Current fitness standards in the Canadian Forces**

Canadian Forces (CF) members must be physically fit to meet military operational requirements, to perform under a wide range of geographical and environmental conditions, to cope with the stresses of sustained operations, and be ready to respond on short notice. In order to ensure this operational readiness, fitness training and testing are integral part of military life. In the mid-eighties, the Canadian Forces developed a Minimum Physical Fitness Standard (MPFS) for all military personnel, regardless of trade classification, age or gender. Five common military tasks were identified as ones that all personnel might be expected to perform in time of emergency (Stevenson, Andrew, Bryant & Thomson, 1985).

This Common Military Task Fitness Evaluation consists of:

1. Sea evacuation.  
Aim: Simulate casualty evacuation during a fire on board a ship.  
Men and women under 35: 210 seconds  
Men and women 35 and above: 277 seconds
2. Land stretcher evacuation.  
Aim: Simulate a land evacuation of a casualty on a stretcher over 750m.  
Men and women under 35: 900 seconds  
Men and women 35 and above: 1188 seconds
3. Low-high crawl.  
Aim: Simulate conditions of self-protection when under enemy fire.  
Men and women under 35: 140 seconds  
Men and women 35 and above: 185 seconds
4. Entrenchment dig.  
Aim: Simulate self-protection by digging an entrenchment.  
Men and women under 35: 510 seconds  
Men and women 35 and above: 673 seconds
5. Sandbag carry.  
Aim: Simulate self protection or protection of others from natural elements.  
Men and women under 35: 12 sandbags in 10 minutes  
Men and women 35 and above: 9 sandbags in 10 minutes

Given the logistical issues involved with administering such a test to nearly 100 000 CF members on a yearly basis, the Canadian Forces Exercise Prescription (CF EXPRES) evaluation was developed as a predictor of one's ability to successfully perform these 5 Common Military Tasks and achieve the minimal physical fitness standards. The CF EXPRES evaluation is administered annually to all CF members except those subject to environment or occupation-

specific standards (e.g., those under Land Forces Command, Special Operations Forces, Fire fighters, Search and Rescue Technicians). The CF EXPRES evaluation consists of 4 test items:

- A 20-metre Shuttle Run
- Handgrip dynamometer to predict muscular strength;
- Push-ups to predict upper body muscular endurance; and
- Sit-ups to predict abdominal muscular endurance.

Table 1 shows the standards for males and females based on age groups for the CF EXPRES evaluation. Though the minimal physical fitness standard which is being predicted by this test is identical for males and females, regression equations showed that the inherent biomechanical and physiological differences between the 2 genders yielded different predictive standards. The difference in standards based on age is reflective of a 90% maximal heart rate restriction which was imposed on persons aged 35 years and above at the time.

*Tab. 1 Minimal Physical Fitness Standards as predicted by the CF EXPRES Test.*

	Male		Female	
	Under 35 yrs	35 yrs+	Under 35 yrs	35 yrs+
<b>20 MSR - stage</b>	<b>6.0</b>	<b>5.0</b>	<b>4.0</b>	<b>3.0</b>
<b>Hand Grip</b>	<b>75</b>	<b>73</b>	<b>50</b>	<b>48</b>
<b>Push-ups</b>	<b>19</b>	<b>14</b>	<b>9</b>	<b>7</b>
<b>Sit-ups</b>	<b>19</b>	<b>17</b>	<b>15</b>	<b>12</b>

Adapted from [www.cfpsa.com /en/psp/fitness/general\\_e.asp](http://www.cfpsa.com/en/psp/fitness/general_e.asp)

The CF EXPRES Test is also used to assess the overall fitness level of the member in order to provide a personalized exercise prescription based on results.

Subsequent to the development of the Minimal Physical Fitness Standards, a series of occupation and environment-specific tests were developed to reflect the particular physical demands of various operations. These include specific tests for CF Divers, Firefighters, Search and Rescue Technicians and Special Operations Forces. (Detailed descriptions of these standards as well as others currently under development are available at <http://www.cfpsa.com/en/psp/HumanPerformance/projects/index.asp>)

Changes in equipment, operations and the very nature of warfare over the past 20 years have led some to question the relevance and applicability of Common Military Task Fitness Evaluation and the corresponding EXPRES test . Furthermore, recent legal rulings by the Supreme Court of Canada have yielded new guidelines for the development of fitness standards to ensure their scientific and legal foundations. It is for these reasons that, in conjunction with the release of the Canadian Forces Health and Physical Fitness Strategy, the Chief of Military Personnel mandated a review of physical fitness standards in the Canadian Forces in the spring of 2008.

### **Canadian legal/human rights context**

The landmark case of *Meiorin vs the British Columbia Government (British Columbia (Public Service Employee Relations Commission) v. British Columbia Government Service Employees' Union* [1999] 3 S.C.R. 3) yielded a series of definitions and guidelines for the acceptance of occupational fitness standards in Canada (Supreme Court of Canada 1999). In essence the Supreme Court of Canada ruling in this case stated that

*“It is not discriminatory practice to refuse, exclude, expulse, expend, limit, specify or prefer in relation to any employment if the employer establishes the practice to be based on a BONA FIDE OCCUPATIONAL REQUIREMENT (BFOR)”*

The ruling went on to define a BFOR as a standard or policy put in place by an employer

1. for a purpose **rationaly connected** to the performance of the job and in an honest and good faith belief that it is **necessary** to the fulfillment of that legitimate, work-related purpose
2. and for which it has been demonstrated that it is impossible to **accommodate** individual employees sharing the characteristics of the claimant without imposing **undue hardship** upon the employer

Subsequent to this decision, a consensus forum was held on establishing bona fide requirements for physically demanding occupations in the fall of 2000. The proceedings of this forum yielded a step-by-step process to developing fitness standards for physically demanding occupations based on best scientific practices, human rights legislations and court rulings (Gledhill, Bonneau & Salmon, 2001). This process has been applied to the development of standards for several physically demanding occupations including the military, firefighters, police officers and corrections officers.

Surveys, focus groups with subject matter experts as well as in-field assessment of biomechanics and physiological responses to work are employed in order to establish the necessity and the rational connection criteria set forth in the 1999 ruling. (Please see section below on Fitness Standard Development Process for a more detailed description of methods)

## **CURRENT RESEARCH AND DEVELOPMENT MANDATE**

### **Health and Fitness Strategy**

In April 2008, the Chief of Defence Staff released the Canadian Forces Health and Physical Fitness Strategy (Canadian Forces, 2008). In addition to lines of operation addressing healthy nutrition, maintaining a healthy weight and an addiction-free lifestyle, one of the main objectives of this strategy is to increase the level of physical fitness of Canadian Forces Personnel. To this end, four research teams were assembled to address the specific needs of each of the Navy, Army, Air Force and Special Operations Forces. Though the research teams are focused on identifying the physical demands of each environment and establishing fitness standards, the overarching goal transcends well beyond fitness testing, to the promotion of a culture of health and physical fitness in the Canadian Forces exemplified by a lifelong lifestyle commitment by all personnel (Canadian Forces, 2008).

## **FITNESS STANDARD DEVELOPMENT PROCESS**

### **Phase 1: Job familiarisation**

This first phase of research aims to essentially understand the nature of the job and identify the physical demands associated with its successful performance. The information gathered in this step will provide critical information on essential tasks required for safe and efficient completion of job duties (Taylor & Groeller, 2003). Particular emphasis is placed on recording tasks which are common (could conceivably be required of all personnel regardless of occupation, rank or position) and critical (where a failure to complete these tasks could result in injury to oneself, a colleague or the public or in significant loss or damage to crown property).

Firstly a Project Management Team is populated, consisting of key stakeholders and subject management experts. This can include senior incumbents, representatives from personnel management, legal advisors, medical advisors and others as needed. The main duties of the Project Management Team are establish the foundations for the project, define common, critical tasks and assist in steering the project through the various phases. Job familiarisation then involves interviews, focus groups, surveys, and reviews of literature (including available training, operations and specifications manuals) in order to identify the demands associated with the occupation or environment. Oriented by the information gathered in the job familiarisation step, the physical demands analysis involves site visits and job shadowing to quantify the requirements of the job. Wherever possible, precise weights, distances, heights and frequencies are measured and recorded in order to facilitate subsequent selection steps.

### **Phase 2: Quantification of physical demands**

The primary output of Phase 1 is a database containing detailed descriptions of as many as several hundred tasks, such as *“lifting 30 kg from floor to shoulder height, carrying for 100m and placing on overhead shelf”* or *“walking at a pace of 3km/hour for 9 hours”*. Phase 2 relies in large part on the expertise of subject matter experts to distil this list to a manageable subset of tasks which are judged to be physically demanding, critical and common. It is vital in this phase to obtain approval of the Project Management Team and of the most senior levels of leadership, particularly when determining whether specific tasks are truly common (could be expected of all personnel in the group regardless of occupation, rank or position). Once a subset of approximately 5-10 representative tasks are identified, their precise demands as well as the physiological responses they elicit are measured on a large, stratified sample of incumbents. Measurements can include heart rate responses, metabolic demands and specific biomechanical analyses.

### **Phase 3: Test and standard development**

At the end of Phase 2, the subset of tasks is refined, reduced if similar demands are found between tasks and quantified in terms of physical demands. Phase 3 involves taking these tasks and designing a representative test battery. More specifically, the Project Management Team helps to determine whether the fitness test designed will included task simulations (such as the Common Military Task Fitness Evaluation) fitness components as predictors (such as the CF EXPRES) or a hybrid test containing elements of both approaches. Though task simulation tests are often better accepted by incumbents and commanders (there is a clear link between the job and the test) they tend to be more logistically complex and resource-intensive to administer. Once a test battery is developed, it is important to establish its accuracy in measuring the element or task of interest. This is usually done by comparing the heart rate response, metabolic demands, rate of perceived exertion and time to completion (where applicable) of the simulated test battery to actual field measurements. Performance standards are developed using a variety of converging methods. Firstly Subject Matter Experts view videos of the tasks being performed at various speeds (usually at increments of 0.5 standard deviations from the mean) and are asked to rate whether each video clip is being performed at an acceptable and safe pace. To further validate the ratings of the experts, natural breaks are sought in the distribution of performance scores.

Once a standard is set, it is important that adverse impacts on subgroups are avoided or mitigated. Concretely this means that the passing rate of any sub-group (e.g., persons of a certain height, females, members of certain ethnic or racial groups) can be no less than 4/5 the pass rate of the overall group of incumbents tested (US Department of Labor 1971). For example, if the overall pass rate of incumbents pilot tested on the new standard is 82%, the pass rate of any single sub-group can be no less than 65.6%. In the event that any subgroup is found to be negatively

affected by the test, accommodations to the test or the actual task are explored in order mitigate these effects. The final step involves implementing the test (often as a training objective for a set period of time) and addressing any issues that arise. These issues can include acceptance by incumbents and commanders, the mobilisation of resources needed for testing, issues related to predictive errors in fitness component tests, associated programs and remedial measures, policy/career implications for those who do not attain the standard (both incumbents and applicants), standards and quality control in the administration of the test (particularly in multi-centre organisations such as the Canadian Forces) and the establishment of feedback loops to ensure continued relevance and validity of the test.

## **CONCLUSIONS**

For the Canadian Forces, basing fitness standards and programs on specific common, critical and physically demanding tasks not only ensures operational readiness of our personnel but it also helps to safeguard their legal human rights. Since the fitness test is a clear reflection of actual job demands, incumbents understand the relevance of the standard to which they are being held and are in a position to easily relate it to their occupational reality. It is important to mention however that this process tends to be extremely resource-intensive for the employer, with one test sometimes taking as long as 3-5 years and several hundred thousand dollars to develop. It is the belief of the Canadian Forces however that this investment is well worthwhile when the payoff is the confidence that the right person is being placed in operations at the right time.

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