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A. FITNESS TRAINING ADVICE FOR FIREFIGHTER APPLICANTS

The role of a firefighter can, at times, place great physical demands on the body. To be able to cope with these demands you will need a higher than average level of fitness. During the recruitment process your aerobic fitness and muscular strength and endurance will be tested. The aim of this guide is to provide some general guidance on improving the elements of fitness that will be tested.

Physical preparation may help you pass the physical tests during the recruitment process, but there can be no guarantee that by following this or any other advice you will pass the physical tests.

Participation in any physical training programme is undertaken purely on a voluntary basis and the Fire and Rescue Service accepts no responsibility for any injury caused as a result.

If you have any doubts about your health or ability to take part in a physical training programme you are advised to consult your doctor prior to starting your training.

Always consult an appropriately qualified fitness adviser / instructor if you are not familiar with any exercises or techniques detailed in this guide.

B. GENERAL TRAINING GUIDELINES

Do not train if you have a cold or feel unwell.

If at any time you experience pain, dizziness or nausea during your training session STOP. If pain persists consult your doctor.

After an injury only resume training when advised to do so, as continuing to exercise could aggravate the injury further and prevent you from attending the selection tests.

Always warm up thoroughly before your main activity and cool down and stretch at the end of your session.

To avoid dehydration make sure you drink plenty of water before, during and after training.

Always wear suitable clothing and footwear for the activity you are participating in, and make sure the environment and equipment you are using are safe.

C. AEROBIC FITNESS

Cardiovascular fitness is the ability of the heart and blood vessels to deliver an adequate supply of oxygen to the working muscles.

To improve this ability the demand placed on the heart and lungs during exercise must be greater than the body is normally used to. This is called overload.

Overload can be applied in a number of ways:

1. Increasing the **intensity** of exercise – this is the load or speed
2. Increasing the **duration** of exercise – how long each exercise session lasts
3. Increasing the **frequency** of exercise – refers to the number of training sessions over a period of time

Once overload has been provided the body adapts by becoming more efficient at dealing with this increased workload. To continue to improve a new overload should be progressively applied.

Heart rate training zones

Heart rates are used to monitor exercise intensity, as the heart rate will increase proportionately with any increases in exercise intensity.

In order to improve cardiovascular fitness the exercise has to be sustained for long enough within a suitable range of intensity or training zone.

The heart rate can be checked by taking your pulse at your wrist or side of the neck or by using a heart rate monitor. If you take your pulse count for 15 seconds and multiply by 4 – this will give you your heart rate in beats per minute.

Before your training zones can be determined you need to have an idea of what your maximum heart rate (MHR) is. The simplest way to calculate MHR is using the following formula:

$$220 - \text{age} = \text{MHR}$$

An example for a 25 year old: $220 - 25 = 195\text{bpm}$

(Note this method of predicting MHR is not 100% accurate and there can be a discrepancy of 15 – 20 beats either way.)

Your training zone indicates the levels at which you should aim to work during exercise and is expressed as a percentage of your age-predicted MHR.

To increase fitness the American College of Sports Medicine recommend exercising between 60% and 90% of your MHR for 20 - 60 minutes, 3 – 5 times per week.

Suggested workouts

It is likely that when exercising you do so at a pace that feels natural and comfortable and can be maintained for a relatively long period of time – this is your *aerobic threshold* or *comfortable pace*, and usually occurs around 70% MHR in reasonably fit people.

To improve fitness you workouts during which you are placing greater demands on the cardio-respiratory system, and working above your comfortable pace.

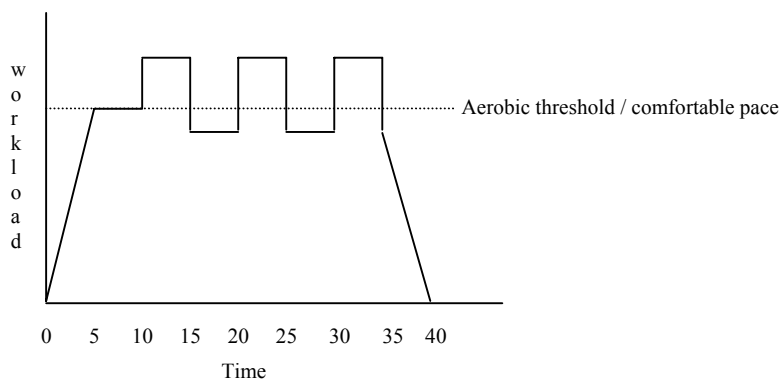
1. Interval training.

This method of training enables the exerciser to improve the workload by alternating periods of intense activity with recovery periods of slower activity. Over time the increased demands put upon the body cause the adaptations required leading to improved performance of the cardiovascular system.

In the example below 5 minutes of comfortable pace activity follow a gradual warm up period. The pace is then increased to take the heart rate to 80% - 90% MHR for 5 minutes. After this active period the pace is lowered for 5 minutes recovery at or below comfortable pace. Three to five of these sets are usually performed per session.

When starting interval training you may not be able to sustain the active period for 5 minutes - aim for at least 1 minute of increased pace activity.

Interval training technique can be applied to any CV activity such as running, cycling, swimming, rowing etc.



Progression is achieved by any of the following:

Increasing the length of the active period

Increasing the pace of the recovery

Decreasing the recovery period

Only one variable should be adjusted at a time.

All changes should be gradual in nature and take place over a period of time.

The above example is a very structured form of interval training however periods of higher intensity activity can be incorporated in a more random way to any CV activity – this is called **Fartlek training**.

Using running as an example, at any point during your run use lampposts or trees as targets and increase the pace of your running until you reach that point. After each burst you should continue running at a slower pace to catch your breath and when ready set another target and increase the intensity accordingly. Remember to warm-up and cool down, including stretching, thoroughly.

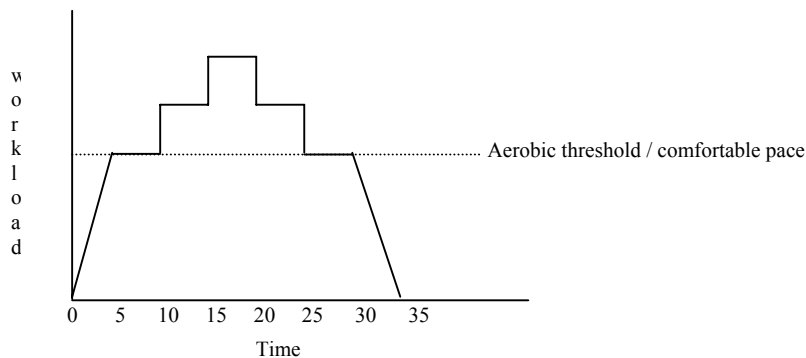
2. Pyramid training

This is another method of challenging the body by working above your comfortable pace.

As this is a progressive session it will also help you become accustomed to the progressive demands of the shuttle run.

This session is more easily controlled on CV equipment in the gym. In the example below 5 minutes of comfortable pace activity follow a gradual warm up period. You then increase the intensity by one or two workload levels for 5 minutes; the intensity is then increased again for a further 5 minutes, at this stage your heart rate should be 80% - 90% MHR. You are now at the top of the pyramid and start to decrease the levels in 5-minute blocks back to comfortable pace.

As with interval training, if you cannot achieve 5 minutes of increased activity aim to do at least one minute and build up the duration.



Progression is achieved by any of the following:

Increasing the length of the levels

Increasing the workloads at each level

3. Comfortable pace training

As interval and pyramid training are more demanding on the body they should not be carried out during every session. These sessions should be mixed with comfortable pace work to improve your endurance.

You should find as your cardiovascular fitness improves from interval and pyramid training your comfortable pace begins to feel easier as the body has adapted to become more efficient at working at the higher intensities. So again the principle of overload should be applied to your comfortable pace activities.

If your comfortable pace is running at 10kph for 30 minutes on a 1% gradient you can overload in the following ways:

1. Maintain the speed and gradient but extend the time to 35 minutes
2. Increase the speed to 11kph on a 1% gradient and continue for 30 minutes
3. Maintain the speed and time but increase to a 2% gradient

Training principles

When planning your training you should bear in mind the following principles

1. Specificity

Adaptations to cardiovascular training are specific to the muscles used. These changes are not transferable across activities. For example, adaptations are seen in the legs of runners, but not in their upper body muscles.

As the initial fitness test is the shuttle run it is advisable to include running in your exercise schedule but also consider other CV activities that work other muscle groups for all over conditioning and variety to keep you interested.

Rowing and swimming are excellent CV activities that also use the upper body muscles. The cross trainer and bike are good for non / low impact sessions for the lower body. Try some circuit training classes, which are designed to provide a full body workout for CV fitness, strength and flexibility. Group exercise classes such as aerobics and spinning are really motivating if you don't always want to exercise on your own.

Remember, if you are offered a position with a Fire and Rescue Service you will have to pass a medical examination, which includes the Chester step test.

This is another assessment of your aerobic fitness, which involves stepping on and off a 30cm step. If you are successful at the shuttle run you should continue to maintain your fitness levels and consider incorporating some step training into your programme to target the specific muscles that will be used during the next aerobic fitness test.

2. Reversibility

Fitness cannot be stored. Exercise must be performed regularly at the level the body has adapted to in order to maintain noticeable benefits.

People often take a break from training and expect to return to exercise at their previous level of intensity and duration – this will not be the case and there is a risk of injury when attempting to do so.

After any break from activity intensity and duration should be built up gradually.

3. Recovery

This is an extremely important training principle – without adequate recovery there can be no adaptation.

Make sure you plan rest days or days of lighter activity following a hard session.

If rest is not planned into your training schedule there is a risk of *overtraining*. If you are overtraining the body starts working against itself and performance will decline.

Some symptoms of overtraining are:

Tiredness

Aching joints and muscles

Repetitive loading injuries

Excessive weight loss

Increased time to reach fitness goals

You are advised to consult your doctor if you are in any doubt about your health or ability to take part in an exercise programme or are recovering from illness or injury.

D. RESISTANCE TRAINING

In this type of exercise the body's muscles apply force to an external resistance such as body weight, resistance machines, free-weights or exercise bands.

During stage 2 of the firefighter recruitment process muscular strength and endurance will be tested using the deadlift, ladder extension and hose run.

This information is intended to give you some guidelines for preparing for Stage 2 of the recruitment process.

There are many health benefits of regular resistance training:

1. Muscle tissue burns more calories than fat even at rest, so the more lean muscle tissue you have the more calories you will burn, which has a positive impact on body weight.
2. Aerobic fitness is affected by excess body weight. If you are struggling with the shuttle run incorporate some resistance training into your schedule to improve body composition and you may see some improvements in your aerobic capacity.
3. Regular resistance training can increase bone density, which is important in the prevention of osteoporosis (brittle bone disease).
4. Stronger bones, ligaments, tendons, joints and muscles will lead to a decreased risk of injury in training and sporting activities.

Resistance training guidelines: (Source: Westcott 1996)

Frequency:	2 to 3 times per week
Repetitions:	8 – 12 are effective for increasing strength and mass.
Sets:	1 – 3
Weight:	Choose a weight that is sufficient to work the muscles for each rep with good technique.
Speed:	6 seconds per rep; 2 seconds lifting the weight, 4 seconds lowering the weight.
Range of movement:	Aim for full range of movement within a joint but never to a position of discomfort.
Progression:	When you can complete 12 reps with good technique you should increase the weight by up to 5%. The reps should then be dropped back to 8.

Example progression:

	Week 1 – 2	Week 3 – 4	Week 5 - 6
<i>Large muscles</i>			
Reps	8	10	12
Sets	2	2	2-3
<i>Small muscles</i>			
Reps	8	10	10-12
Sets	1	1	2

The goal of any resistance training programme is to provide progressive overload to the body.

The above example assumes training is starting at a basic level and applies overload gradually, firstly by increasing the number of reps and then secondly the number of sets. After the 6 weeks the weights and exercises used should be reviewed.

For more advanced trainers this may not be a realistic or effective method.

Suggested exercises

Before starting any resistance training you should warm up thoroughly to raise core body and muscle temperature, increase blood flow to the muscles, raise heart rate and mobilise the joints.

5 - 10 minutes of aerobic activity is recommended along with joint mobilisation targeting joints to be used.

Group A

Press up / bench press
Deadlift
Shoulder press
Lunge
Squat
Upright row
Lat pulldown

Group B

Bicep curl
Calf raise
Triceps dip
Isometric lateral raise
Isometric front raise

Group C

Abdominal curl
Back extensions

- Group A exercises target the larger muscle groups and should be completed before group B, which target the smaller muscles. Training the smaller muscles first would lead to these muscles fatiguing before the larger muscles are trained to their full potential.
- Group C exercises, for the stomach and back muscles, should be completed at the end of your session, as they are required to support the core section during the other exercises.
- Each group of exercises can be completed in any order. The order of the exercises should be varied occasionally to provide the muscles with different training stimulus.
- To minimise the rest periods required you could perform the exercises as a circuit. You should ensure that you are not working the same muscle with consecutive exercises e.g. deadlift followed by lat pulldown.
- You could try adding some CV exercises to your circuit such as skipping, jumping jacks or step-ups.
- As you start to increase the number of sets you are performing it will become too time consuming to complete all exercises in one session.
- It is suggested that you split the body into muscle groups and exercise different groups on different days, here are a couple of examples:

Mon: chest and back
Wed: arms and shoulders
Fri: legs

Mon: chest, shoulders and triceps
Wed: back and biceps
Fri: legs

Make sure you allow adequate recovery time. Smaller muscle groups recover more quickly (24 – 48 hours) than larger muscle groups (48 – 72 hours).

All the muscles used during your training session should be stretched before they cool down. Stretches should be held for at least 10 seconds or up to 30 seconds to see improvements in flexibility.

Seek the advice of a qualified instructor if you are not familiar with any of the exercises.

Sources:

Dalgleish and Dollery, Health and Fitness Handbook, 2001
Premier Training and Development, Training Manuals 2 and 3