



# Conditioning Aerobic and Anaerobic

Designed Specifically for  
Novice/Junior/Senior  
Skaters and Coaches

## TYPES OF CARDIOVASCULAR FITNESS

(Conditioning)

Conditioning is the process of getting the cardiovascular and pulmonary systems working efficiently for a sport by training the different energy systems (immediate, short-term and long-term). When a skater is in top physical condition, he/she will be stronger to skate his/her program, and is more likely to hit more of the elements. The skater will be able to fight fatigue for a longer period of time, thus delaying the onset of lactic acid in the muscles, which can be a contributing factor in missing key elements such as jumps, centered spins, or step sequences. The body is more tolerant of the lactic acid that builds up in the muscle fibers during the anaerobic phase (skating program) when it has been trained anaerobically.

Aerobic and Anaerobic Energy Systems			
Energy System	Power (Calories/Min)	Capacity (Total calories)	Duration of Activity
ATP-CP (anaerobic or immediate)	High	Low	0-30 Seconds
Lactic Acid (anaerobic or short-term)	Moderate	Moderate	30-120 Seconds
Oxidative (aerobic or long-term)	Low	High	greater than 120 Seconds

\*Please note the following guidelines are set up for athletic performance, not for health/fitness guidelines for the general population.

**Aerobic Conditioning:** The first step in training is to develop a good aerobic base. In order to achieve this, you should perform *aerobic training* three to five *times per week*. You must work hard enough to get the heart rate into your *training zone (70-90% maximum heart rate)* – you should feel as though you are working somewhat hard, and your workout should be *non-stop for 20-30 minutes*. It is important that oxygen gets to the working muscles throughout the workout so there is no lactic acid build-up in the muscles. This is the long-term energy system at work. Both warm-up and cool down phases are recommended for each workout.

Depending on the age and fitness level of the skater, some benefit can be gained by two to three short bouts of aerobic work per day for 10 to 15 minutes in length. However, as the skater gets older and/or his fitness level improves it will be necessary to lengthen the time of the workouts to 20-30 minutes and only once per day to realize the gains necessary for the sport.

**Anaerobic Conditioning:** Once you have built a good aerobic base, you should then develop your short-term energy systems (anaerobic - without oxygen, lactic acid will build up in the muscles causing fatigue). You will need to perform *interval training*, where you will warm-up at a comfortable level, then begin *working at short periods of high intensity alternating with brief periods of low intensity work load*. This process will *continue for 15 to 20 minutes* - then a cool down period is recommended. The high intensity period should be intense enough that you feel as if you cannot go on much longer – you are working hard, to very, very hard (about 85-95% *maximum heart rate*). At this point in time, your muscles are not able to get enough oxygen and there is a build up of lactic acid in the muscle fibers (research has shown that these are the same physiological responses that happen when you skate your program). As you move into the low intensity phase, your body recovers by refueling the muscle fibers. You can then resume the workout at the higher intensity.

**Putting It Into Practice:** You are probably wondering how you are going to fit all of this into your schedule, what to start with first and if this will be too much for you to handle. ***Please refer to the periodization schedule*** for number of training sessions per week for the skating season, and what is age appropriate for the skating level. Younger skaters can also participate in the periodization schedule with some minor adjustments. Frequency and duration workouts for both aerobic and anaerobic conditioning should be reduced for younger skaters. The intensity level can remain the same or slightly lower, but you need to find a workout that you will enjoy.

## SUMMARY OF CONDITIONING

### Aerobic Conditioning

- A. Calculate your individual aerobic training zone:
- 1) Take  $220 - \text{age (years)} = \underline{\hspace{2cm}}$  Max Heart Rate ( $220 - 15 \text{ yrs} = \text{bpm}$ )
  - 2) Max HR  $\underline{\hspace{2cm}} \times 70 = \underline{\hspace{2cm}}$  bpm ( $205 \times 70 = 143 \text{ bpm}$ )  
 Max HR  $\underline{\hspace{2cm}} \times 85 = \underline{\hspace{2cm}}$  bpm ( $205 \times 85 = 174 \text{ bpm}$ )
  - 3) Your Aerobic Training Zone is  $\underline{\hspace{2cm}}$  to  $\underline{\hspace{2cm}}$  bpm (143 to 174 bpm)
- B. Activities appropriate for off-ice aerobic training:
- 1) slide board
  - 2) in-line skating
  - 3) Stairmaster
  - 4) bicycling
  - 5) treadmill or running on a track (soft surface)
  - 6) aerobic circuit program
- C. Refer to your year-long periodization schedule for the time in the season to perform aerobic conditioning as well as frequency (times per week) and duration (minutes).

### Anaerobic Conditioning

- A. Calculate your individual anaerobic training zone:
- 1) Take  $220 - \text{Age (years)} = \underline{\hspace{2cm}}$  Max Heart Rate ( $220 - 15 \text{ years} = 205 \text{ bpm}$ )
  - 2) Max HR  $\underline{\hspace{2cm}} \times 85 = \underline{\hspace{2cm}}$  bpm ( $205 \times 85 = 174 \text{ bpm}$ )  
 Max HR  $\underline{\hspace{2cm}} \times 95 = \underline{\hspace{2cm}}$  bpm ( $205 \times 95 = 196 \text{ bpm}$ )
  - 3) Your Aerobic Training Zone is  $\underline{\hspace{2cm}}$  to  $\underline{\hspace{2cm}}$  bpm.
- B. Activities appropriate for off-ice anaerobic training:
- 1) slide board
  - 2) anaerobic training circuit
  - 3) bicycling
  - 4) jump rope
  - 5) running on a track (soft surface)
- C. Refer to the periodization schedule for the time in the season to perform anaerobic conditioning.

### HEART RATE CHART

AGE	MHR	70%	85%	95%
10	210	147	178	199
11	209	146	177	198
12	208	145	176	197
13	207	144	176	196
14	206	144	175	195
15	205	143	174	194
16	204	142	173	193
17	203	142	172	192
18	202	141	171	192
19	201	140	170	191
20	200	140	170	190

AGE	MHR	70%	85%	95%
21	199	139	169	189
22	198	138	168	188
23	197	138	168	187
24	196	137	166	186
25	195	136	166	185
26	194	136	166	184
27	193	135	164	183
28	192	134	163	182
29	191	133	162	181
30	190	133	161	180

## **INTERVAL TRAINING SUMMARY APPLICATION TO ON-ICE TRAINING**

This training consists of **CONTINUOUS** paced skating for an extended period of time – a minimum of 15 minutes to perhaps a 30-minute duration. This effort is steady and continuous and can include various stroking and crossover drills. Intensity is such that the heart rate is approximately 75-85% of maximum.

Ideally, the heart rate would be matched to the work level that just begins to tax the anaerobic energy systems, resulting in lactic acid accumulation. This level can be determined by monitoring training sessions.

With some ingenuity (and lots of work by the coach), on-ice activities can be coordinated to best utilize time for both skill and physiological development. Proper training, in the long run, will enhance performance and reduce potential for injury. Power training can be incorporated into any skater's daily routine.

- ✓ Establish a weekly plan which provides a specific list of elements with rests to be conducted in the unsupervised on-ice sessions.
- ✓ The athlete should be responsible for the execution of the program with no deviation.
- ✓ The program should be progressive in that as development occurs, additional repeats are added, their length increased, or rest decreased.
- ✓ Test periodically. This should be a version of the Power Circle drill, for example, how many double jumps can be executed in 10 minutes (or 15 minutes); or how long does it take to execute 50 jumps.
- ✓ Keep records of goals, test results, off and on-ice training programs; injuries, weight, etc.

The following Power Stroking/Fatigue Training program could be organized at your rink as a one-half hour session two or three times per week with 20-30 skaters on the ice. Sample cuts of music could be divided into the various work and rest sessions could signal the changes in the program. As an alternative, Power Circles or the Simulated Program will also promote Fatigue Training.

## POWER CIRCLES

Select three to five jumps which the skater can execute

### 1. FIRST SET

- execute strong progressives, a Mohawk, then first chosen jump  
Skate at greatest possible speed.
- repeat four more times (start with jumps, level according to athlete skill)
- circle counterclockwise if skater jumps left to right
- rest 30-45 seconds

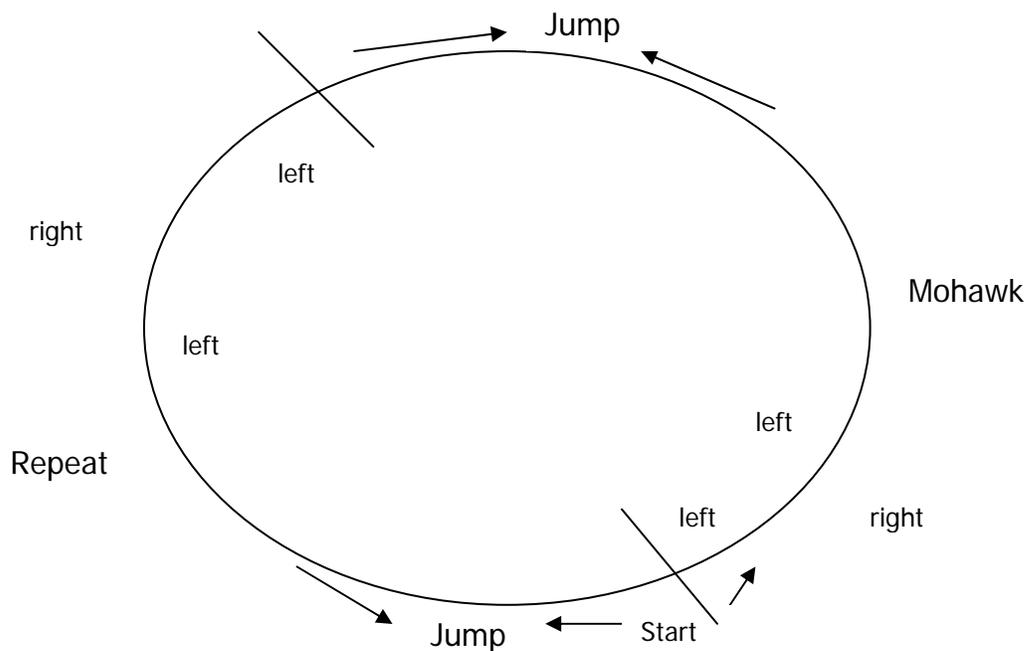
2. **SECOND SET** – repeat above using same chosen jump, then rest 45-60 sec.

3. **THIRD AND FOURTH SETS** – same as above only use second chosen jump

4. **FIFTH and SIXTH SETS** – same as above using third chosen jump

5. **Total** = 30 jumps in about seven to eight minutes.

Vary rest intervals and number of repeats and sets as training level improves and competitive peaks are reached.



## ON-ICE TRAINING POWER STROKING – INTERVAL TRAINING PROGRAM

TIME	EXERCISE
Two minutes rest 30 seconds	1) Perimeter - counter clockwise - forward
Two minutes rest 30 seconds	2) Perimeter - clockwise - forward
Two minutes rest 30 seconds	3) Perimeter - counter clockwise - backward
Two minutes rest 1 ½ minutes	4) Perimeter - clockwise - backward
Two minutes rest 30 seconds	5) Circle (forward crossovers) - change of pace counter clockwise - 20 seconds of long strong stroking, 20 seconds of quick stroking - repeat for the two minutes
Two minutes rest 30 seconds	6) Back crossovers (counter clockwise); basic crossovers (30 seconds), back outside three--Mohawk (30 seconds), back inside double three (30 seconds), final 30 seconds power crossovers.
Two minutes rest 30 seconds	7) Same as #5 except clockwise
Two minutes rest 90 seconds	8) Same as #6 except clockwise
Three minutes rest 90 seconds	9) Use back crossovers, step forward, inside three checked to the landing position or perform a waltz jump or axel. Alternate clockwise and counter clockwise.
	10) Power circles

## THE PERIODIZATION CONCEPT OF OFF-ICE TRAINING

Prioritizing the goals of off-ice training requires that the skater, coach and conditioning specialist manipulate the fitness and training components so the skater is peaking at the appropriate time. This systematic approach to training is called periodization of training. The purpose of an off-ice periodization schedule for skating is to provide the coach and skater with a realistic overview of the off-ice training year, prevent injury and over-training and to encourage coaches and skaters to prioritize competitions so the skater is peaking at the appropriate time. **Figure 2** depicts how the off-ice training season would be divided into four parts and what fitness components should be addressed. The year is divided in the following manner: Early Off-Season, Late Off-Season, Pre-Season, and In-Season.

### Early Off-Season Program:

- ✓ Skaters should have complete rest after the last major competition or event so the body can recover from a long season. How long a skater should rest is dependent on the skater's individual physical and psychological condition. It may range from several days to weeks.
- ✓ Following the rest component, it is recommended that skaters engage in fun, cross-training, recreational activities to maintain fitness levels.

### Late Off-Season Program:

- ✓ Should be preceded by a sport specific fitness evaluation to provide guidelines for off-season and pre-season training.
- ✓ The training program should emphasize building a good aerobic base and developing muscular strength and flexibility.

### Pre-Season Program:

- ✓ Starts three months before the first major competition.
- ✓ Training focuses on sport specific activities that develop anaerobic capacity (high intensity interval training), and muscular power (plyometric training) while maintaining the aerobic, strength and flexibility achieved in the off-season.

### In-Season:

- ✓ Training emphasis is on maintaining the sport specific fitness developed in the pre-season.
- ✓ For approximately two weeks prior to a competitive event, the off-ice training should be scaled back while the skater concentrates on on-ice training.
- ✓ The more intense off-ice training should occur after the competitive event.

**Month by Month Periodization Schedule:** A month by month explanation of a periodization schedule appropriate for novice through senior level competitors who are targeting Nationals as their time to peak is found in the periodization section. Aerobic training in the late off-season would consist of exercising continuously on a slide board, bicycle, rope skipping, treadmill or other aerobic training equipment for approximately 30 minutes, three times per week at 75-85% of their predicted maximal heart rate three times per week. Anaerobic training in the pre-season consists of high intensity interval training at a heart rate that is equal to 85-95%. It is recommended that a sport specific training device like the slide board be used for anaerobic training but other cardiovascular conditioning equipment like the bicycle, rope skipping or treadmill may also be appropriate for anaerobic training. Establishing a periodization program for your skaters will be facilitated by consulting a conditioning specialist.

**How Do I Find an Off-Ice Trainer?** To contact a certified conditioning specialist in your area, you may want to contact a certifying agency such as:

American College of Sports Medicine at 1-800-486-5643

American Council on Exercise at 1-800-825-3636.

National Strength & Conditioning Association (NSCA) at 719-632-6722.

Be sure that the specialist that you choose is knowledgeable about working with young athletes and has an understanding of the requirements of skating.