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Information for Coaches and Scientists

2013-2016 Australian Rowing Team Ergometer Protocols

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1. Introduction

This document encapsulates all ergometer assessments and monitoring that the coaches and scientists would deploy for the 2013-2016 Olympic cycle. There may be some additions to this document during the Rio Olympic cycle but the protocols outlined here will form the basis of most assessments that are undertaken. As there have been a number of changes proposed in ergometer protocols for this Olympic cycle it is important that all athletes, coaches and scientists operating in the High Performance rowing network be familiar with the specific details of each protocol. This document supersedes all other National Rowing protocol documents.

The physiological testing protocols are designed to gather data from athletes to meet a number of objectives;

1. Profile emerging athletes as they enter a new training environment
2. Profile current athletes at key times of both the domestic and international seasons
3. Evaluate and / or measure the effectiveness of specific training blocks
4. Determine individual training thresholds and intensity bands that will subsequently be used to guide training prescription
5. Monitor training

2. Ergometer Modality - Sliders / Stationary

The Australian Rowing Leadership Team have decided that for a number of the ergometer assessments individual athlete and coach will have the option to choose between using a stationary or sliding ergometer. Listed below are the ergometer modality options available to the athlete for the assessments that the Australian Rowing Team are prescribing. For a valid comparison of data it is suggested that the modality adopted for each individual test be replicated as often as possible. All data captured for nationally prescribed tests will require ergometer modality and drag factor to be recorded and submitted.

Listed below are the recommendations for each test;

1. National 2km and 5km selection ergometer tests - Stationary ergometer only
2. 30 min open rate test - Stationary ergometer only (drag factor need to be consistent across tests 2, 3, 4)
3. 10 min threshold efficiency - Stationary ergometer only (drag factor need to be consistent across tests 2, 3, 4)
4. 4 min all out rowing performance trial - Stationary ergometer only (drag factor need to be consistent across tests 2, 3, 4)

Trial of different ergometer modality and drag factors are encouraged during the weekly ergometer monitoring sessions. Bear in mind that workloads prescribed from a stationary 30 min open rate test will be easier if the 6 x 6 or 6km @ 95% are undertaken in the sliding modality – our initial estimations would suggest the workloads are 10-15 W harder on a fixed ergometer compared with a sliding ergometer.

5. 6 x 6 submaximal monitoring – Athlete / Coach choice for sliding or stationary ergometer (self selected drag factor but must be recorded and submitted with data)
6. 6km @ 95% - Athlete / Coach choice for sliding or stationary ergometer (self selected drag factor but must be recorded and submitted with data)

3. Drag Factors

In the past specific drag factors have been prescribed for each category. In the last Olympic cycle when all testing moved to using sliding style modality the drag factors were reduced simultaneously with the specific aim to attempt to bring average stroke rates and drive:recovery ratios during maximal performance tests closer to that seen during 2000m racing. For this Olympic cycle the Australian Rowing Leadership Team will prescribe a drag factor range for each category. This range will be specific to the category and the ergometer modality chosen. Once an athlete and coach choose a drag factor for a specific test and ergometer modality it is ideal for it to remain at that level for nationally prescribed tests. All data captured for nationally prescribed tests will require ergometer drag factor to be recorded and submitted. The table below outlines the drag factor ranges for each ergometer modality and rowing category.

Category	Stationary Ergometer	Sliding Ergometer
Heavyweight Men	110 - 140	110 - 140
Lightweight Men	90 - 120	100 - 130
Heavyweight Women	90 - 120	100 - 130
Lightweight Women	70 - 100	85 - 115
Junior Men	90 - 120	100 - 130
Junior Women	70 - 100	85 - 115

4. Testing Dates

Nationally prescribed tests will occur regularly throughout the domestic and international rowing seasons. Tests that are employed as part of the National Team Selection Event Supplement will be done by all athletes on a specific day of the season. Most other nationally prescribed assessments will have 7-14 day window as to when those tests must be completed. Data for each test should be forwarded through to the Leadership Team via the National Sports Science Coordinator at reasonable intervals throughout the testing window and clearly marked indicating which data has been added or updated. The table below outlines the specific date or date ranges when specific ergometer tests are to be undertaken.

Australian Rowing Team Prescribed Test	Dates	Data required by
National 2km selection test	February 17, 2015	Same Day
National 5km selection test	December 2, 2014	Same Day
30 min open rate test	As outlined in <i>ARTeam National Training Blueprint</i> (~ every 4 weeks)	ASAP
10 min threshold efficiency + 4 min all-out rowing performance	As outlined in <i>ARTeam National Training Blueprint</i> (~ every 8-12 weeks)	ASAP
6 x 6 submaximal test	As outlined in <i>ARTeam National training Blueprint</i> (~ every 2 weeks)	ASAP
6km @ 90-95% test	As outlined in <i>ARTeam National Training Blueprint</i> (~ every 2 weeks)	ASAP

NOTE: The Annual Plan outlined in the ARTeam National Training Blueprint outlines these dates in a visual format

5. Aims and Outcomes of Nationally Prescribed Tests

The test battery outlined in this document are a series of well-planned and constructed protocols that aim to extract as much information regarding the current fitness status of each athlete with as minimal interruption to the coach and athlete's training routine as possible. Key physiological variables required for elite rowers have been identified and are specifically tested and measured in these protocols. The information gathered during these tests enable coaches and sports scientists to evaluate the effectiveness of a previous training block, identify fitness traits that have improved and / or can be improved further as well as reset individual training and racing performance standards. All tests should be completed in the specific test order ([see section 6.2](#)) and within a 7-14 day window to ensure that the information is specific to the athlete's current fitness capabilities.

Each test of the nationally prescribed test battery has been carefully selected or designed to measure an important aspect of rowing fitness. Listed below are the tests, the key variables measured and how they are intended to be used to assess the impact of rowing training or influence on-water performance.

Test	Variables Measured	Aim / Use
30 min open rate test (All tiers)	Distance covered in 30 min 30 min power, HR, SR, RPE, Bla Functional Threshold Power (FTP) HR and SR at FTP	This test provides valuable data on rowing threshold power and associated metabolic variables. Data is used to evaluate fitness progression and reset training thresholds for the ergometer (power, HR, SR, Bla) and possibly on-water HR and Bla
10 min threshold efficiency (All tiers) T1-3 athletes – undertaken in laboratory with full metabolic and ergometer measures T3-5 athletes – undertaken in rowing sheds with HR, RPE and ergometer measures	VO ₂ (and all metabolic data consistent with a VO ₂ measurement), HR, SR, Bla, RPE at FTP measured from the 30 min test	This test will confirm FTP data obtained from the 30 min test. It will allow scientists to measure metabolic efficiency as measured by VO ₂) at FTP and use these data to prescribe training loads and assess changes in rowing fitness at a key training intensity band
4 min all-out rowing performance (All tiers) T1-3 athletes – undertaken in laboratory with full metabolic and ergometer measures T3-5 athletes – undertaken in rowing sheds with HR, RPE and ergometer measures	VO ₂ peak (and all metabolic data consistent with a maximal VO ₂ measurement) Maximal performance over a moderate duration time trial	This test will profile the athlete's ability to pace a moderate duration maximal effort. VO ₂ peak will be measured. This test can assist with preparation for 2000m ergometer trials and racing

<p>6 x 6 (All tiers, bloods done with T1-3)</p>	<p>Power, Bla, HR, SR and RPE during incremental protocol that ends at power output ~ 5% (W) greater than FTP measured during the most recent 30 min open rate assessment</p> <p>Is a good training set that has the rower working in the 2-6 mmol/L blood lactate range for ~40 min</p>	<p>Incremental Bla and HR profile to determine power at fixed Bla concentrations (2, 4 and 6 mmol/L) plus routine training monitoring that can be done bi-weekly with or without blood analysis</p>
<p>6km @ 90-95% (All tiers)</p>	<p>Power, HR, SR and RPE during a single or repeated 6km efforts</p> <p>Is a good training set that has the rower working at or slightly above threshold (4-6 mmol/L) for 20-25 min durations</p>	<p>Routine training monitoring that can be done bi-weekly</p>

6. Specific Ergometer Protocols

6.1 National Team Selection Ergometers

These events will be specifically outlined in the National Team Event Supplement. They are to be performed on a stationary ergometer with the athlete's choice of drag factor (within category guidelines; see [Table in section 3](#)). Drag factor must be recorded for all National Team ergometer tests.

6.2 Order of Prescribed Tests

The order of the prescribed test battery is important as the results from one test are used to set the parameters for the subsequent tests. Given this requirement the protocol order below should be followed by all athletes undertaking nationally prescribed tests.

Test number	Test	Days from previous test	Location
1	30 min open rate		Rowing sheds / laboratory or other temperature stable facility
2	10 min submaximal efficiency (5 min recovery) then 4 min all-out rowing performance	1 – 7 days following 30 min open rate	Rowing shed or indoor training facility if no VO ₂ measurement is undertaken Laboratory if VO ₂ measurement undertaken
3	6 x 6 submaximal	Bi-weekly to monthly	Rowing sheds / laboratory or other temperature stable facility
4	6km@90-95%	Bi-weekly to monthly	Rowing sheds / laboratory or other temperature stable facility

6.3 30 min Open Rate Test

6.3.1 Background

The inclusion of the 30 min Open Rate has been intentional and aimed specifically at determining the rower's Functional Threshold Power (FTP: <http://home.trainingpeaks.com/articles/cycling/what-is-threshold-power.aspx>). FTP is analogous to the LT2 measure that we previously interpolated from the 7x4 Step Test. In reality FTP has a high degree of relevance to events with a duration of 2-15 min. Improvements in FTP have been shown to correlate highly with improvements in both maximal aerobic power and rowing performance. This means that we can use these measures to re-focus training intensity thresholds as well as infer changes in 2000m racing performance. The training intensities thresholds will be most specific to ergometer training but will cross over with a high degree of transfer to most other training modalities as well (i.e. rowing, running, cycling).

FTP can be *estimated* or *calculated*. Obviously the most accurate way is to calculate it from the 30 min test data but this can be time consuming for large training groups or coaches with little external support. In this case we suggest you estimate the FTP from the 30 min test. Outlined below are the two methods that are available to obtain the FTP from a 30 min open rate test.

How to calculate FTP from the 30 min open rate test: to calculate FTP you MUST record from the concept II work monitor; power output, HR and stroke rate from min 6 to min 26 of the 30 min test. To do this you need to reset the work monitor to record the 30 min open rate data at 2 min intervals. By using the 20 min time period (min 6 to min 26) and excluding the start and end of the 30 min effort ensures that a true sustainable work load is taken as the athletes current FTP. The FTP data then become very accurate and valid measures of LT2 training HR, power output, stroke rate.

NB We suggest that if you want to review the power output and stroke rate pacing strategy adopted by the athlete during their 30 min effort then you record the data in 2 min intervals and use [this template](#) to graph the data and produce a report for the athlete.

How to estimate FTP from the 30 min open rate test: to estimate FTP from the 30min test all you need do is multiply the 30 min average power by 0.98. This value will then be a very good estimate of FTP as calculated by the method outlined above. The average SR and HR for the full 30 min are valid measures to use as the values for FTP in this setting.

Calculating heart rate and power training zones: upper and lower HR and power output training zones can then be determined from the FTP (calculated or estimated) *as long as the 30 min test is performed as an "all-out" maximal test* ([please see section 6.3.5](#)).

It is very possible that the 30 min all-out measure could be done more frequently than is prescribed here. This has the value of regularly assessing training induced changes with a valid and reliable tool of which the output can be used to immediately reshape training workloads. It has the additional benefit of being a very solid training effort if done regularly where athletes learn to better pace (dose) their effort each time they undertake the test.

6.3.2 30 min Open Rate Test Administration

6.3.2.1 Training

The athlete should have already conducted the 30 min open rate step test 1-7 days prior to beginning this test. There should be no heavy weight training or intense endurance exercise to which the athlete is not accustomed in the preceding 24 hour period.

6.3.2.2 Diet

A normal meal (incorporating a high carbohydrate component) should be eaten on the evening preceding the test and, if scheduling allows, also on the day of the test. No alcohol should be consumed in the 24 hours preceding the test. The athlete should give special attention to ensuring good hydration in the lead-up to the test.

6.3.2.3 Test Preparation

Each laboratory may have information and consent forms that may need to be completed prior to the test.

6.3.2.4 Equipment Checklist

- Concept IID or IIE rowing ergometer (Sliding or fixed modality allowed but consistency of modality is strongly encouraged, see [Section 2](#))
- Heart rate monitor (mandatory)
- Stopwatch
- Lactate analyser (SIS/SAS choice of analyser type)
- [Data recording sheet](#)

6.3.2.5 Ergometer Drag Factor Settings

Please use the table and recommendations provided in [Section 3](#)

6.3.2.6 Test Administration

Athletes will be allowed to individualise their warm-up prior to the measurement but are asked to replicate as closely as possible the same specific warm-up adopted for each distance the next time they undertake the test.

The following list represents the order in which each test should be completed.

1. The athlete should weigh-in and report the weight to the supervising coach or scientist
2. Attach a heart rate monitor (mandatory) and ensure it is working correctly and the data is being displayed on the Concept II work monitor as well as the athletes watch (if possible)
3. Adjust the ergometer drag factor to that appropriate to the category ([see Table in Section 3](#)) or to the exact value you have used in previous assessments
4. Undertake individual warm-up or similar warm-up that had been used for previous tests
5. Select 30 min on the Concept work monitor and ensure the data (including HR) is being recorded at 2 min intervals (if calculating FTP as outlined above)
6. Start rowing when ready

7. Complete as much distance in the 30 min allocated time as possible (there is no rating cap). This is best achieved by maintaining a high average pace throughout the entire test rather than conserving and then ramping the pace in the final 2-3 min
8. Pacing is critical to a successful test and as a very basic guide athletes should look to hold 8-10 sec / 500m slower than their 2000m personal best (this will be less if their best 2000m is on a fixed ergometer and their 30 min open rate is undertaken on a sliding ergometer)
9. At the end of the test, the coach or scientist will record the relevant data from the work monitor on the [supplied data template](#)
 - a. FTP data: 2 min time points for av. power, av. stroke rate, av. heart rate
 - b. Full 30 minute data: distance covered, RPE, blood lactate, av. power, av. stroke rate, av. heart rate
10. An earlobe or fingertip blood sample should be collected and analysed at the completion and 4 min post completion of the test (if available)

Note: It is often asked if you should go hard for the first 10 minutes. The answer is yes. Go full on for the entire 30 minutes. But be aware that most people doing this test go too hard the first few minutes and then gradually slow down for the remainder. That will give you inaccurate results. The more times you do this test the more accurate your FTP is likely to become as you will learn to pace yourself better at the start.

6.3.3 Submission of ergometer test data

The Australian Rowing Team uses an XL based spread sheet as the means by which to submit the [30 min Open Rate](#) test data. Data is to be submitted to your respective State High Performance Coordinators in a timely manner and they will forward the information to the National Head Coach and Sports Science Coordinator. If for any reason an athlete is unable to begin or complete a nationally prescribed test this must be recorded on the appropriate medical exemption form and forwarded to the Sports Medicine Coordinator (Larissa.Trease@rowing.ausportnet.com).

6.3.4 Data Template Download

30 min Open Rate Data Submission Sheet:

<https://www.box.com/shared/static/2kf8c6d54r1yd61aj22v.xls>

30 min Open Rate Data Recording Sheet and FTP Output Calculator / Graphing Sheet:

<https://www.box.com/shared/static/kwzcczyzh1a3hz21qwj9.xls>

6.3.5 Use the following guide to establish each zone by sport.

Rowing and Running Zones from FTP calculated during 30 min open rate

	Low % of FTP _{HR}	High % of FTP _{HR}
T1 (light aerobic)	45	85
T2 (moderate aerobic)	85	89
T3 (heavy aerobic)	90	94
T4 (threshold)	95	99
T5 (maximal)	100	106

Cycling Zones from FTP calculated during 30 min open rate

	Low % of FTP _{HR}	High % of FTP _{HR}
T1 (light aerobic)	45	81
T2 (moderate aerobic)	81	89
T3 (heavy aerobic)	90	93
T4 (threshold)	94	99
T5 (maximal)	100	106

T1-5 Training Zones (as per NSQAA guidelines) from maximum HR

	Low % of HR _{max}	High % of HR _{max}
T1 (light aerobic)	45	70
T2 (moderate aerobic)	70	80
T3 (heavy aerobic)	80	88
T4 (threshold)	88	92
T5 (maximal)	92	100

FTP Power Zones (FTP_w) from 30 min open rate

	Low % of FTP _w	High % of FTP _w
T1 (light aerobic)	10	55
T2 (moderate aerobic)	55	74
T3 (heavy aerobic)	75	89
T4 (threshold)	90	104
T5 (maximal)	105	120

<http://www.trainingbible.com/joesblog/2009/11/quick-guide-to-setting-zones.html>

6.4 10 min Metabolic Efficiency Test @ FTP wattage followed by 4 min All-Out Rowing Performance

6.4.1 Background

This test is designed to confirm functional threshold power (FTP) data measured during the 30 min open rate test as well as measure metabolic efficiency associated with a steady state power output equivalent to anaerobic threshold or LT2 (a common rowing training intensity). It is a short test that should serve as a good warm-up for the subsequent 4 min all-out rowing performance test 5 min later. The combined data from these tests will aid with routine training prescription, especially with regards to ergometer sessions as well as measure maximal rowing performance.

6.4.2 Laboratory Environment and Subject Preparation

6.4.2.1 Training

The athlete should have already conducted the 30 min open rate step test 1-7 days prior to beginning this test. There should be no heavy weight training or intense endurance exercise to which the athlete is not accustomed in the preceding 24 hour period.

6.4.2.2 Diet

A normal meal (incorporating a high carbohydrate component) should be eaten on the evening preceding the test and, if scheduling allows, also on the day of the test. No alcohol should be consumed in the 24 hours preceding the test. The athlete should give special attention to ensuring good hydration in the lead-up to the test.

6.4.2.3 Test Preparation

Each laboratory may have information and consent forms that may need to be completed prior to the test.

6.4.2.4 Equipment Checklist

- Concept IID or IIE rowing ergometer (Sliding or fixed modality allowed but consistency of modality is strongly encouraged, see [Section 2](#))
- Heart rate monitor (mandatory)
- Expired gas analysis system (as per laboratory specific guidelines , T1-3 athletes only)
- Stopwatch
- Lactate analyser (SIS/SAS choice of analyser type) and blood gas analyser if possible

6.4.2.5 Ergometer Modality

Sliding or stationary ergometer allowed but ergometer modality and drag factor must be consistent for that testing period across 30 min open rate, 10 min efficiency and 4 min maximal performance assessments

6.4.2.6 Ergometer Drag Factor Settings

Please use the table and recommendations provided in [Section 3](#)

6.4.2.7 Test Administration

Athletes will undertake the test protocol with a FTP output calculated from their 30 min open rate test conducted 1-7 days earlier. The calculation of FTP is described in Section 6.3 and the most recent FTP output should be used as the 10 min steady state work load for this test.

Listed below are some valid exceptions to using the most recent calculated FTP value as the wattage for the 10 min efficiency test

- When measuring change from a recent intervention (training block or acute perturbation) where ensuring the athlete completes the same amount of work in the 10 min period is critical
- At the start of a season and a 30 min open rate assessment is yet to be undertaken but a metabolic measure is required

10 min metabolic efficiency procedure

1. Have the athlete read and complete any informed consent forms.
2. Adjust the drag factor within the range recommended in Section 3 (It is to be no different to that chosen for the athletes 30 min open rate assessment from which FTP wattage is calculated)
3. Ergometer modality must be identical to the 30 min open rate assessment where the FTP wattage is calculated
4. Inform the athlete of their required power output as calculated from their 30 min open rate test (FTP calculation – please read [here](#))
5. Undertake a self-selected individual warm-up or similar warm-up that had been used for previous tests (experience suggests that some short (10-20 sec) intense efforts above the required power output should be undertaken as part of the individualised warm-up)
6. Position the gas collection apparatus (T1-3 athletes only) and ensure that the athlete is as comfortable as possible. Take several light strokes and make any necessary adjustment to respiratory hoses or other apparatus to ensure that the hose is not pulling on the breathing apparatus at any stage during the stroke.
7. Collect a pre-exercise blood sample from the earlobe or fingertip using a lactate analyser.
8. Set the Concept II work monitor to display watts for each stroke as well as average watts for the full 10 min single interval.
9. Sync the heart rate monitor to the Concept II work monitor
10. Attach the nose clip and prepare to start the test if the test requires gas analysis (T1-3 athletes only).
11. Start rowing when instructed and complete the 10 min period ensuring the average power is as close to the FTP as possible. It is vital that there are no surges or fades in pace during the 10 min period and that the rower is within 1-2 watts of the required average at all times
12. Blood is collected from the earlobe or fingertip at the end of the 10 min period and again at 4 min post.

6.4.3 Analysis of Test Results

Submaximal metabolic data (VO_2 and HR) are calculated by averaging the readings recorded during the final 4 min of the FTP submaximal workload. The corresponding blood lactate is taken as the highest value from the immediate post or 4 min post measure although given the steady state nature of the test this should not be significantly different.

The data will be used to confirm the metabolic requirements of training workloads for LT2 / FTP output. These data will assist sports scientists and coaches to more accurately program ergometer training intensities as well as give an indication of change in metabolic efficiency over a series of time points.

6.4.4 Data Template Download

10 min efficiency + 4 min Data Submission Sheet: <https://www.box.com/shared/static/njbxagrm8qb8ksk45ydf.xls>

6.5 4 min all-out rowing performance

6.5.1 Background

The 4 min maximal rowing performance test will begin exactly **5 min** after the completion of the 10 min metabolic efficiency test. This test is designed to measure maximal rowing capabilities and the associated metabolic variables that underpin it. The test duration has been chosen to be the most optimal mix between time required to get a valid and reliable maximal physiological response as well as ensure that the aerobic system dominates the energy provision pathway.

6.5.2 4 min All-Out Test Administration

Equipment Checklist: all equipment and set-up will be as per the 10 min metabolic efficiency test

The following list represents the order in which this test should be undertaken;

1. The rower will have already weighed in
2. Ensure the heart rate monitor is still working correctly
3. Re-check the ergometer drag factor is the same as used for the 30 min open rate and 10 min metabolic efficiency tests
4. Select a single 4 min workload on the Concept work monitor (with no recovery interval) and ensure the data is being recorded at 1 min intervals for later analysis
5. Sync the heart rate monitor to the Concept II work monitor
6. Set the work monitor to display the preferred information for the athlete (watts, time per 500m, distance covered etc.)
7. Ensure the athlete is seated on the ergometer and ready for the test 90 secs prior to the completion of the 5 min recovery interval
8. For Tier 1-3 athletes a pre-test blood lactate should be measured in the final min of the 5 min rest period. This measure will serve both as the post 4 min lactate sample from the 10 min collection (to ensure steady state lactate values immediately post) as well as the pre-maximum effort blood lactate value
9. Start rowing when instructed
10. Remember the aim of the test is for the rower to cover as many meters as possible in the 4 minutes. They should be exhausted at the completion of the 4 minutes of rowing. If possible have the rower even split the 4 minutes rather than starting conservatively and then coming home strong. The rowers should be able to hold or better their average 2000m split for the entire 4 minutes. Coincident with the maximal performance assessment will be the attainment of maximal heart rate, blood lactate concentration and oxygen consumption.
11. At the end of the test, the coach or scientist will record the relevant data from the work monitor on the supplied data template as well as the exact time the test ceased.
12. An earlobe or fingertip blood sample should be collected and analysed at the completion and 4 min post completion of the test (if available)

6.5.3 Submission of ergometer test data

The Australian Rowing Team uses an XL based spread sheet as the way to submit 4 min all-out test data. The template supplied is the same template used to complete the 10 min metabolic efficiency information. Data is to be submitted

to your respective State High Performance Coordinators in a timely manner and they will forward the information onto me. If for any reason an athlete is unable to begin or complete the test this must be recorded on the appropriate medical exemption form and forwarded to the Sports Medicine Coordinator (Larissa.Trease@rowing.ausportnet.com).

6.5.4 Data Template Download

10 min efficiency + 4 min Data Submission Sheet: <https://www.box.com/shared/static/njbxagrm8qb8ksk45ydf.xls>

7. Training Monitoring

7.1 Background

Included for this quadrennium the Australian Rowing Team would like to see if a number of routine training sets can become standard across the Junior, U23 and Senior Teams with the aim for the individual athletes and their coaches to internally track progress within and across training cycles. The sessions will serve as good training as well as being valid and reliable measures of training induced change. It is envisaged that the list of suggested sessions will grow across the 4 years but in the early instances only a few will be suggested and deployed. The National Head Coach and Sports Science Coordinator would like to view some data from these routine measurements for informational purposes only. It must be stressed that these workouts are purely for the rower and their coach to better inform themselves of progress and change.

7.1.1 6 x 6 Incremental Set

The 6 x 6 incremental set resembles the first 6 steps of the previous 7 x 4 step test. The fundamental differences are that the set is designed around good training and physiological data is captured as a secondary aim whereas the 7 x 4 was designed primarily as a measurement tool. As such the workloads chosen for the 6 x 6 incremental set are significantly tighter in the range of power outputs employed with the aim to have the athlete reside in the 1.5 – 6 mmol/L range for the entire 6 steps. Given that the 30 min open rate forms the basis of our training prescription the 6 x 6 protocol uses %'s of FTP wattage for calculation of the initial 6 workloads (listed below). Once the initial workloads have been determined the coach, athlete and scientist have complete flexibility to slide the range of power output to suit the athlete and their current rowing fitness but if possible it would be desirable not to alter the actual increments used.

7.1.1.1 Training

As this is predominantly a training set previous training sessions need not be standardised

7.1.1.2 Ergometer Modality

Sliding or stationary ergometer allowed; bear in mind that workloads prescribed from a 30 min open rate test on sliders will be more difficult if the 6 x 6 is undertaken in the fixed modality – our initial estimations would suggest the workloads are 10-15 W harder on a fixed ergometer

7.1.1.3 Ergometer Drag Settings

Please use the table and recommendations provided in Section [3](#)

7.1.1.4 6 x 6 Incremental Set Administration

Equipment Checklist

- Concept IID or IIE rowing ergometer (sliders or stationary but ideally consistent with 30 min open rate test – see section 7.1.1.2)
- Heart rate monitor (mandatory)
- Stopwatch
- Lactate analyser (for Tier 1-3 athletes)
- Data recording sheet (see below)

The following list represents the order in which each test should be completed.

1. The rower should weigh in and have it recorded on the recording sheet
2. Ensure the heart rate monitor is working correctly and the data is being recorded on the Concept II work monitor as well as the athletes watch (if possible)
3. Check the ergometer drag factor to that appropriate to the category ([see Table in section 4](#))
4. Select a the appropriate workload on the Concept work monitor (6 min with 1 min rest interval) and ensure the data is being recorded for later analysis
5. Ensure the 6 workload values are on hand (67.5%, 75%, 82.5%, 90%, 97.5%, 105% of 30 min FTP). These workloads should only be used as a guide to set the first 1-2 tests after which the starting workload should be increased or decreased (in 5-10 watt increments) so that the athlete completes the training set in the 1.5-6.0 mmol/L range (RPE range: 7-17)
6. For Tier 1-3 athletes a pre-test blood lactate should be measured
7. Start rowing when instructed
8. Blood is collected from your earlobe or fingertip during each rest period and analysed. During the 1 min rest period you can drink and stretch however, it is important to ensure you are back in position well before the start of the next work bout (approximately 10–15 sec)
9. At the end of the test, the coach or scientist will record the relevant data from the work monitor on the supplied data template
10. Athletes can directly submit their data to the National Head Coach using the online data submission form (URL is outlined below)

7.1.2 6km at 90-95%

The 6km ergometer training set is a standard test distance for Australian rowers and is designed to have the rower undertake 1-3 repetitions of a 6km effort at 90-95% of their current physical capabilities. This should have the athlete operate in the 3-6 mmol/L blood lactate range for 18-24 min. At the start of the season it would be suggested that one repetition would be sufficient but in the build up to the hardest block of a season it would not be uncommon to have a rower undertake two or possibly three of these intervals (depending on the athlete and the specific goal in mind). As a guide the initial power for these efforts should be slightly above the FTP obtained during the 30 min open rate test.

7.1.2.1 Training

As this is predominantly a training set previous training sessions need not be standardised

7.1.2.2 Ergometer Modality

Sliding or stationary ergometer allowed; bear in mind that workloads prescribed from a 30 min open rate test on sliders will be more difficult if the 6 x 6 is undertaken in the fixed modality – our initial estimations would suggest the workloads are 10-15 W harder on a fixed ergometer

7.1.2.3 Ergometer Drag Settings

Please use the table and recommendations provided in [Section 3](#)

7.1.2.4 6km @ 90-95% Administration

Equipment Checklist

- Concept IID or IIE rowing ergometer (sliders or stationary but ideally consistent with 30 min open rate test – see section 7.1.1.2)
- Heart rate monitor (mandatory)
- Stopwatch
- Lactate analyser (for Tier 1-3 athletes)
- Data recording sheet (see below)

The following list represents the order in which each test should be completed.

1. The rower should weigh in and have it recorded on the recording sheet
2. Ensure the heart rate monitor is working correctly and the data is being recorded on the Concept II work monitor as well as the athletes watch (if possible)
3. Check the ergometer drag factor to that appropriate to the category ([see Table in section 4](#))
4. Select a the appropriate workload on the Concept work monitor (6000m) and ensure the data is being recorded at regular intervals for later analysis
5. Start rowing
6. At the end of the test you or your coach can record the relevant data from the work monitor on the supplied data template
7. Athletes can directly submit their data to the National Head Coach using the online data submission form (URL is outlined below)

7.1.3 Submission of ergometer monitoring data

The Australian Rowing Team uses an online form for the method of data submission for the ergometer monitoring sessions. XL based spread sheet as a way for you to track progress and change. Data can be submitted at regular intervals to the Australian Rowing Team by simply emailing the “6x6 Data Input” tab from the Graphing Template (URL supplied below) to the National Sports Science Coordinator.

7.1.4 Data Template Download

Handwritten Data Recording Template:

<https://www.box.com/shared/static/3v285bd85opur1nc5mb6.xls>

Graphing Template (including Handwritten Recording Template):

<https://www.box.com/shared/static/buz0ffourmaqbj1j4j.xls>

Online Data Submission Form:

<https://docs.google.com/a/rowing.ausportnet.com/spreadsheet/viewform?formkey=dGcwQ1NSbEhIM0FoazIvdVpRYUtqb3c6MQ#gid=0>

8. Appendix

8.1 Useful Data Sheet or Templates

- RPE Data Sheet:
<https://www.box.com/shared/static/9z000pnxqtug0bpinz5e.doc>
- 30 min Open Rate Data Submission Sheet:
<https://www.box.com/shared/static/2kf8c6d54r1yd61aj22v.xls>
- 30 min Open Rate Data Recording Sheet and FTP Output Calculator / Graphing Sheet:
<https://www.box.com/shared/static/kwzcczyzh1a3hz21qwj9.xls>
- 10 min efficiency + 4 min Data Submission Sheet:
<https://www.box.com/shared/static/njbxagrm8qb8ksk45ydf.xls>
- 6 x 6 Handwritten Data Recording Template:
<https://www.box.com/shared/static/3v285bd85opur1nc5mb6.xls>
- 6 x 6 Graphing Template (including Handwritten Recording Template):
<https://www.box.com/shared/static/buz0ffourmagbhj1j4j.xls>
- Online ergometer monitoring URL:
<https://docs.google.com/a/rowing.ausportnet.com/spreadsheet/viewform?formkey=dGcwQ1NSbEhIM0FoazlvdVpRYUtqb3c6MQ#gid=0>
- HR Zone Calculator:
<https://www.box.com/shared/static/dbzzdj95wsvf6vehkayd.xls>
- Concept II Workload Calculator:
<https://www.box.com/shared/static/xbkthgk91k3e5qcvpf0v.xls>