

IMLEC
THE INTERNATIONAL MODEL LOCOMOTIVE EFFICIENCY COMPETITION
for the
MARTIN EVANS TROPHY AND PRIZE MONEY

RULE BOOK

IMLEC COMMITTEE

Model Engineer shall appoint a Rules Committee periodically. This committee shall endeavour to ensure at least one member is present during the competition.

The host club shall appoint a Judge. (The Judge may be an IMLEC Committee member.)

Any member of the IMLEC Committee is allowed to enter the competition.

The purpose of the competition is to test the efficiency of a model locomotive and the ability of its Driver to operate the locomotive to its maximum potential efficiency under the prevailing conditions.

The winner will be the Driver who obtains the highest recorded efficiency from his or her locomotive on the day.

DEFINITIONS

Judge: A person appointed by the host club to be the person who shall be responsible for making all final decisions with regard to the competition.

Applicant: The person who applies to the host club for a place in the competition.

Competitor: The Driver and his or her locomotive. (The combination of these two.)

Winner:	The competitor that achieves the highest recorded efficiency.
Observer:	A person appointed by the host club to record the performance of the competitor. The host club may appoint more than one Observer.
Retirement:	To decide not to complete the course either before starting or during the attempt. Upon retiring the competitor is no longer deemed to be competing for the prize.
Disqualification:	A decision by the Judge that the Driver has contravened a rule thereby eliminating himself or herself from the competition.

Competition Classes

There shall be two competition classes:

Class A	5 inch gauge locomotives
Class B	3 ½ inch gauge locomotives.

The prize money will be as follows:

Class A:

1 st place	£150.00
2 nd place	£100.00
3 rd place	£ 75.00

Class B:

1 st place	£ 50.00
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(The amount of prize money may be amended by *Model Engineer* and any amendments will be published.)

In the event that a competitor in **Class B** is the overall competition winner, the Class B prize will be awarded to the second placed competitor in Class B.

RULES

Section 1) Applications and allocation of places

1. The competition shall be open to any applicant on the proviso that he or she can provide a valid current boiler certificate for the locomotive to be used and evidence of adequate public liability insurance. The locomotive must be 5 or 3 ½in. gauge, able to run on raised track and the Driver must not ride on the locomotive or tender.
2. Each year's winner shall be invited once, in the following year's competition, to defend his/her title with the same locomotive. Regardless of whether he/she accepts this invitation and regardless of the result of this competition, thereafter he/she may not enter the competition with the same locomotive - nor may that locomotive be entered - for the next three years clear. (N.B. This does not preclude the Driver from entering the competition with a different locomotive.)

3. Application Procedure

- a. The *Model Engineer* will publish a date by which expressions of interest in competing in IMLEC should be made to the host club.
 - b. The host club IMLEC Applications Secretary will post out application forms to those having expressed interest, indicating the latest date by which they should be returned.
 - c. The host club IMLEC Applications Secretary will acknowledge receipt of completed forms as soon as possible.
 - d. The host club IMLEC Applications Secretary will collate and number applications in order of receipt.
 - e. The host club will determine a tentative schedule of operation to determine the number of potential competitors it may be possible to accommodate.
 - f. Should there be insufficient applications to fill the schedule determined by the host club, late applications may be accepted at the discretion of the club. Further invitations may be published in *Model Engineer*.
 - g. If the number of applications is within the capacity of the club to accommodate within its schedule, with extension of the running schedule where possible, the host club will attempt to accommodate all applicants.
 - h. Should the event be oversubscribed, in the interests of the competition the host society will allocate places using the following guidelines:
 - i. Maintain a general priority under the first come first served principle
 - ii. Increase priority for overseas competitors and those subject to postal delays
 - iii. Increase priority for previous applicants who have failed to secure a place
 - iv. Seek to achieve appropriate participation of a mix of 5 and 3 ½in. gauge entries
 - v. Maintain a balance of locomotive classes to avoid over or under representation which would be detrimental to the competition and spectacle of the event.
 - i. The host club may create a reserve list of competitors not allocated places under the rules above (the applicant shall indicate on the application form whether or not he/she wishes to be placed on a reserve list if not allocated a confirmed place in the initial allocation). Acceptance of a reserve place does not guarantee a place in the competition.
 - j. The applicant shall declare, on his/her application form, the name of the Driver and the precise identity of the locomotive with which he/she shall be competing.
 - k. Applications will only be accepted on the Official Application Form.
4. The order of running shall be decided by the host club. (Attempts will be made by the host club to accommodate individuals' requirements.)
 5. The host club shall contact each successful applicant as soon as possible after the closing date for applications. Each competitor shall be provided with written instructions explaining the procedure for running his or her locomotive.

Section 2) Drivers and locomotives

1. Once the Driver has accepted the offer of a competitor's place he or she must either compete in or retire from the competition. The place is not transferable to another Driver or locomotive.
2. Once the Driver has accepted the offer of a competitor's place he or she is obliged to compete only with the locomotive identified in the application.
3. In the event that a competitor withdraws from the competition in advance of the competition date, or on the day of the competition, the competitor first named on the reserve list shall be invited to compete. (Subsequent such invitations shall be issued in number order as required.)
4. Ballast (including water) added externally to the scale outline of the locomotive (or in the case of a freelance model, the likely scale outline) is not permitted.

Section 3) Preparation for the run

1. The host club shall prepare a suitable timetable for the duration of the competition.
2. The steaming bay Marshal's instructions with regard to movements shall be obeyed during steam raising.
3. Competitors should arrive at the track at least one and a half hours before their run and report to the steaming bay reception. At this point the competitor shall :-
 - a. Present the necessary documentation including boiler certificate
 - b. State the amount and grade (size) of coal required for the run. The coal will be weighed and allocated in presence of the Driver.
4. Ample preparation time shall be allocated to the competitor and the competitor shall be ready to run at his or her allocated time. Failure to run on time may be regarded as a retirement. The Judge shall use discretion and make the final decision.
5. The Driver shall use his or her discretion with regard to the appropriate time to light up. (The Driver will be notified of any foreseeable delay to the running time before lighting up.)
6. The Driver will be provided with as much dry, or paraffin soaked, charcoal and wood as is required to raise steam. The Driver may use his own *wood* for lighting up purposes but this must be approved by the steaming bay Marshal.

7. Any coal used during steam raising will be from the measured allocation.
8. The Driver may decide when to start to use coal but the locomotive must be burning coal before leaving the steaming bay.
9. The train will be prepared for the Driver with the dynamometer car at the front and sufficient passenger cars to carry the number of passengers he or she requires. For safety reasons this must be limited to a maximum of 28 persons including the Driver and Observer. (For practical reasons it may be necessary to limit the load or number of carriages pulled in the contest.) The train will be made ready before the locomotive leaves the steaming bay.
10. The Driver will be allocated an Observer. The Observer will oversee all procedures between raising steam and completing the run.
11. The Observer shall give an instruction to move to the start line at an appropriate time. The Driver shall advise the Observer of the number of passengers he/she wishes to take.
12. All coupling and uncoupling of the locomotive must be carried out by the host club Marshals, to the Driver's satisfaction.
13. The Observer will record the initial dynamometer car readings in the presence of the Driver.
14. The Driver shall inform the Observer when he is ready to start the run and the Timekeeper shall give the Driver permission to start.
15. If the Driver is unable to commence the run within a reasonable time of the designated start time he/she will be deemed to have retired.

Section 4) The run

1. The run length is nominally 30 minutes.
 - The Timekeeper shall inform the Driver when he has been running for a) 15 minutes and b) 20 minutes.
 - The Driver will be notified when he/she has completed 25 min of the run, at which point the Driver can either finish the run at the finish line or continue for one (or more, if time permits) further lap but in any event the Driver must start the last lap no later than 30 minutes after the start time.

- Recording will commence and conclude at the Start/Finish Line. (A slight over-run at the finish line will be disregarded.)
2. In the event that the Driver does not complete his/her run, he/she shall be deemed to have retired. ('Completing the Run' means bringing the train to a stand upon reaching the Finish Line, the locomotive having reached the Finish Line entirely under its own steam.)
 3. The total period the train may be stationary during the run will be eight minutes. If this is exceeded then the competitor will be deemed to have retired.
 4. Water will be provided in suitable containers during the run to enable locomotive water tanks to be topped up without stopping. The amount of water used shall not be recorded or limited in any way.
 5. Additional coal will be available to the Driver during the run and its use recorded.
 6. Unused coal will be weighed and recorded in the presence of the Driver upon completion of the run. This will be debited to the recorded coal consumption.
 7. Only the total weight of coal burnt will be used in the calculations. No allowance will be made for any unburnt coal in the firebox.

8. Maximum speed.

The host club shall have discretion in respect of safe operational speed limits and make them known to each Driver. The dynamometer car shall provide a speed indication at the Driver's position. The Observer will issue a warning to the Driver of the speed limit if necessary. Three such warnings may result in disqualification. The Observer will have the power to end the run should the Driver be considered to be driving unsafely. In the event of a disagreement the Judge's decision will be final.

9. The use of a hand pump is not permitted once the run has commenced. However, it may be used in emergencies when all other means of water feed have failed and in which case the locomotive must be retired and the run terminated immediately.
10. The Driver may elect to set down passengers during the run but only when the train is stationary and it is safe to do so. Passengers may not be picked up at any time. In the interest of safety, the guard may, at his discretion, instruct that passengers be redistributed throughout the train.
11. No external assistance is to be given to the train in any way whatsoever, at any time during the run.
12. The Driver shall have access to a train brake *for emergency use only*. Any use of the brake under non-emergency conditions may result in disqualification. This includes use of the brake to slow the train at any point. The brake may be used to stop the train at the end of the run.
13. The use of sand to improve adhesion will be at the discretion of the host club. Any Driver may *request* that the track be sanded. (If the host club has a strict policy on the use of sand on the track, this shall be made clear on the application form.) However, any locomotive fitted with working sanders shall be allowed to use them for the purpose of sanding the track.
14. The host club will endeavour to post the results of each run as soon as possible following the end of the run.
15. In all matters relating to the competition, the decision of the Judge is final.

Section 5) Calculations and results

The dynamometer car measures and gives readings of the 'Total Work Done' in foot-pounds and 'Total Distance Travelled' in feet. In addition the 'Overall Run Time' in minutes and 'Weight of Coal' in pounds are recorded.

From these parameters the following calculations can be made :-

$$\text{Overall Thermal Efficiency \%} = \frac{\text{Work Output} \times 100\%}{\text{Heat Input}}$$

The calorific yield of the coal is assumed to be 14,000 B.T.U. per pound.

The number of ft-lbs per B.T.U. is 778. Thus :-

$$\text{Overall Thermal Efficiency \%} = \frac{\text{Total Work Done} \times 100}{\text{Weight of coal used} \times 14,000 \times 778}$$

The locomotive that returns the highest efficiency is the winner.

Appendix 1) Additional calculations

These calculations shall be made public alongside the Results Table for interest only.

$$\text{Average Drawbar Horsepower} = \frac{\text{Total Work Done (ft-lbs)}}{\text{Overall Running Time (mins)} \times 33000}$$

$$\text{Coal Consumption Rate} = \frac{\text{Weight of Coal Used (lbs)} \times 60}{\text{Overall Run Time (mins)}}$$

$$\text{Specific Fuel Consumption (SFC)} = \frac{\text{Coal Consumption Rate}}{\text{Average Drawbar Horsepower}}$$

$$\text{Average draw bar pull} = \frac{\text{Total work done}}{\text{Total distance travelled}}$$

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Date of event:

OFFICIAL APPLICATION FORM

HOST CLUB:	
Name and address of the Secretary to whom this application is to be sent:	
Closing date for applications:	

Applicant's details

Name and address of applicant to whom all correspondence will be sent: <i>(This may or may not be the Driver)</i>		
Telephone number		Mobile 'phone
Email address		
In the event that you are not allocated a place in the competition, would you like to be placed on a 'reserve' list?	Yes/No <i>(Delete as applicable)</i>	
Name of Driver:		
Identity of locomotive: <i>Please give brief details. There is space overleaf for further details.</i>		
Gauge of locomotive:		
This locomotive has a current boiler certificate and	Yes/No <i>(Delete as applicable)</i>	

the Driver has adequate Public Liability insurance. <i>(Please give details of club membership if applicable.)</i>	
Signature of applicant and date:	

Note on the use of sand: The host club does / does not have a strict policy on the use of sand on the track.

The host club will / will not / may allow hand sanding of the track if the Driver requests it.

(Host club Secretary to delete as applicable)

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