FÉDÉRATION INTERNATIONALE
DE MOTOCYCLISME

FIM FUELS REGULATIONS

2023

FIM Fuels Regulation

Règlement FIM pour les essences

Modifications log		
Version	**Applicable as from**	**Modified articles**
0	01.01.2023	

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A.REGULAR FUEL

If not specified in the Technical Rules of the Championships, Cup or Prize or in the Supplementary regulation of the event, regular fuel coming from Public Fuel station can be used.

By regular fuel. It is to be understand fuel available at the fuel station with a fuel gun and with an Octane not more than 98.

B. RACE FUELS

Fuel companies which supply “race” fuels (fuels other than those obtained at public pump stations) to participating teams/riders must test their fuel at against all the FIM specifications set out in Art. D of this regulation.

1. Conformed fuels

If the specifications of the fuel are in conformity to Art. D of this regulation, a certificate containing a test report and batch number will be issued to the fuel company.

The fuel company shall be able to provide a copy of such certificate to their client rider/teams before they take part in a race.

A list of fuels which are in conformity with FIM specifications are listed in Art. I of this regulation.

2. Appointed supplier(s) to event(s)

In the cases in which only fuel from the appointed supplier is permitted (for a specific event or the entire World Championship, Prize or Cup), the aforementioned fuel shall have been previously tested in a FIM appointed laboratory in order to test its conformity with the FIM specifications as set out in Art. D of this regulation:

- in case of conformity, a certificate of conformity (including test report and tested batch number) shall be available and Art. I of this regulation applies in case of controls for the riders/teams;

- in case the conformity is not achieved, the FMN of the organising country/the Organiser/the Promoter shall ask the FIM for a waiver in order to enable the use of fuel not corresponding to FIM specifications. If the waiver is granted, the riders/teams will be responsible for using the fuel provided without changing its composition. Controls may be carried out by FIM.

C. TESTING LABORATORY

For question regarding the “race” fuels and/or the testing of the fuels please contact the aforementioned testing laboratory:

Intertek (Schweiz) AG
Analytical Testing - Fuel, Lubricants & Combustible
Wagistraße 2
8952 Schlieren
Switzerland

Telephone: +41 43 433 78 10
Fax: +41 43 433 78 19
Email contact: fimfuels@intertek.com.

D. FIM SPECIFICATIONS FOR UNLEADED FUELS OR MIXTURES OF UNLEADED FUELS, CATEGORY 1

The following fuels specifications are valid for these FIM Competitions:

- MotoGP™
- Moto2™
- Moto3™

The following properties shall be within the following thresholds (for each property, the relative test methods to be used for the measurement are indicated):

Property	Units	Min.[1]	Max.[1]	Test Methods[2]
Density at 15°C	[kg/m3]	720.0	775.0	ASTM D4052
RON	-	95	102	EN ISO 5164
MON	-	85	90	EN ISO 5163
Oxidation stability	[min]	360		ASTM D525
Vapour pressure (DVPE)	[kPa]		90	EN 13016-1
Aromatics	% (V/V)		35.0	EN ISO 22854
Benzene	% (V/V)		1.0	EN ISO 22854
Diolefins total	% (m/m)		1.0	GC-MS HPLC
Existent Gum	[mg/100 mL]		5.0	EN ISO 6246
Lead	[mg/L]		5.0	ICP-OES or-EN 237
Manganese	[mg/L]		1.0	ICP-OES
Nitrogen	% (m/m)		0.2	ASTM D 4629
Olefins	% (V/V)		18.0	EN ISO 22854
Oxygen	% (m/m)		2.7	EN ISO 22854
Sulphur	[mg/kg]		10.0	ASTM D5453
Distillation:				EN ISO 3405
E at 70°C	% (V/V)	22.0	50.0	
E at 100°C	% (V/V)	46.0	71.0	
E at 150°C	% (V/V)	75.0		
Final Boiling Point	[°C]		210	
Residue	% (V/V)		2.0	
Copper Corrosion	Rating		Class 1	ISO 2160

Table 1 : Specifications and test methods (does not include the visual inspection)

[1] All reported min. and max. thresholds do not include the tolerance, which needs to be calculated in accordance with ISO 4259 and taken into account to correct the min. and max. thresholds
[2] In case of dispute the test method listed in **bold** will be the reference

Only the following oxygenates will be permitted:

- Methanol
- Ethanol
- Iso-propyl alcohol
- Iso-butyl alcohol
- Methyl tertiary butyl ether
- Ethyl tertiary butyl ether
- Tertiary amyl methyl ether
- Di-isopropyl ether
- n-Propyl alcohol
- Tertiary butyl alcohol
- n-Butyl alcohol
- Secondary butyl alcohol

In addition to these specifications, the appearance of the fuel, controlled by visual inspection must be clear, bright and free from solid matter and undissolved water.

The total of individual hydrocarbon components present at concentrations of less than 5% (m/m) must constitute at least 30% (m/m) of the fuel. The test method will be GC-FID (gas chromatography-flame ionisation detector) and/or GC-MS (gas chromatography-mass spectrometry).

The total concentration of naphthenes, olefins and aromatics classified by carbon number must not exceed the values given in the following table:

% (m/m)	C4	C5	C6	C7	C8	C9 +
Naphthenes	0	5	10	10	10	10
Olefins	5	20	20	15	10	10
Aromatics	-	-	1.2	35	35	30

Table 2 : Naphtenes, Olefins and aromatics contents

Bicyclic and polycyclic olefins are not permitted. The fuel must contain no substances which are capable of exothermic reaction in absence of external oxygen.

E. FIM SPECIFICATIONS FOR UNLEADED FUELS OR MIXTURES OF UNLEADED FUELS, CATEGORY 2

The following fuels specifications are valid all FIM Competitions not included in Category 1.

The following properties shall be within the following thresholds (for each property, the relative test methods to be used for the measurement are indicated):

Property	Units	Min.[3]	Max.[1]	Test Methods[4]	
Density at 15°C	[kg/m3]	720	785	EN ISO 12185	ASTM D4052
RON	-	95	102	EN ISO 5164	ASTM D2699
MON	-	85	90	EN ISO 5163	ASTM D2700
Oxidation stability	[min]	360		EN ISO 7536	ASTM D525
Vapour pressure (DVPE)	[kPa]		100	EN 13016-1	ASTM D5191
Aromatics	% (V/V)		35.0	EN ISO 22854	ASTM D6839
Benzene	% (V/V)		1.0	EN ISO 22854	ASTM D6839 or D5580
Diolefins total	% (m/m)		1.0	GC-MS	HPLC
Lead	[mg/L]		5.0	ICP-OES or-EN 237	AAS
Manganese	[mg/L]		2.0	ICP-OES	AAS
Nitrogen	% (m/m)		0.2	**ASTM D 4629**	ASTM 5762
Olefins	% (V/V)		18.0	EN ISO 22854	ASTM D6839
Oxygen (includes 10% ethanol allowance)	% (m/m)		3.7	**EN ISO 22854**	EN 13132 or elemental analysis
Sulphur	[mg/kg]		10.0	EN ISO 20846	ASTM D5453
Distillation:				EN ISO 3405	ASTM D86
E at 70°C	% (V/V)	20.0	52.0		
E at 100°C	% (V/V)	46.0	72.0		
E at 150°C	% (V/V)	75.0			
Final Boiling Point	[°C]		210		
Residue	% (V/V)		2.0		
Oxygenates:				**EN ISO 22854**	EN 13132
Methanol	% (V/V)		3.0		
Ethanol	% (V/V)		10.0	The only oxygenates permitted are paraffinic mono-alcohols and paraffinic mono-ethers (of 5 or more carbon atoms per molecule) with a final boiling point below 210°C.	
Isopropanol	% (V/V)		12.0		
Isobutanol	% (V/V)		15.0		
tert-Butanol	% (V/V)		15.0		
Ethers (C5 or higher)	% (V/V)		22.0		
Others	% (V/V)		15.0		

Table 3 : Specifications and test methods (does not include the visual inspection)

[3] All reported min. and max. thresholds do not include the tolerance, which needs to be calculated in accordance with ISO 4259 and taken into account to correct the min. and max. thresholds

[4] In case of dispute the test method listed in **bold** will be the reference

In addition to these specifications, the appearance of the fuel, controlled by visual inspection must be clear, bright and free from solid matter and undissolved water.

The total of individual hydrocarbon components present at concentrations of less than 5% (m/m) must constitute at least 30% (m/m) of the fuel. The test method will be GC-FID (gas chromatography-flame ionisation detector) and/or GC-MS (gas chromatography-mass spectrometry).

The total concentration of naphthenes, olefins and aromatics classified by carbon number must not exceed the values given in the following table:

% (m/m)	C4	C5	C6	C7	C8	C9 +
Naphthenes	0	5	10	10	10	10
Olefins	5	20	20	15	10	10
Aromatics	-	-	1.2	35	35	30

Table 4 : Naphtenes, Olefins and aromatics contents

Bicyclic and polycyclic olefins are not permitted. The fuel must contain no substances which are capable of exothermic reaction in absence of external oxygen.

F. FIM SPECIFICATIONS FOR MIXTURES OF UNLEADED FUEL(S) AND LUBRICANT

The lubricant must not:

1. change the composition of the fuel fraction when added to the fuel
2. contain any nitro-compounds, peroxides or any other engine power boosting additives
3. contribute to an improvement in overall performance in any way
4. show a reduction in mass by evaporation of more than 10% (m/m) during the distillation up to 250°C (test method: simulated distillation GC)
5. contain more than 10% of anti-knock agents (lead, manganese, iron) (test method: ICP-OES).

Moreover, the following specifications are set for the mixture of unleaded fuel(s) and lubricant:

The following properties shall be within the following thresholds (for each property, the relative test methods to be used for the measurement are indicated):

Property	Units	Min.	Max.[1]	Test Methods	
Density at 15°C[5]	[kg/m^3]	690	815	EN ISO 12185	ASTM D4052
RON	-		102	EN ISO 5164	ASTM D2699
MON	-		90	EN ISO 5163	ASTM D2700

[5] For the density measurement, the min. and max. thresholds do include the tolerance

G. FUELS CONTROLS

The FIM may require fuel controls, i.e. controls of the unleaded fuel, mixture of unleaded fuels or mixture of unleaded fuel and lubricant, used by riders/teams at events. These controls involve an initial sampling at the event and further testing in the FIM appointed laboratory.

3. Sampling

1) The FIM Technical Director (or the FMNR Chief Technical Steward when there is no FIM Technical Director appointed) is the sole official responsible for the sampling management and supervision.
2) Riders/teams selected for fuel controls are directed to proceed with their vehicles to the area that has been designated for this purpose.
3) The FIM Technical Director/FMNR Chief Technical Steward collects the fuel from the motorcycle by using only new sample containers and pipettes/hand pumps.
4) The fuel is transferred through the use of the pipette/hand pump directly from the fuel tank into three containers, denominated A, B and C. The containers are closed and sealed by the FIM Technical Director/FMNR Chief Technical Steward.
5) The FIM Technical Director/FMNR Chief Technical Steward fills in (in all its parts) and signs the Fuel Sample Declaration Form (see forms). The rider or a team representative also signs this Form, after verifying that all the information is correct.
6) The FIM Technical Director/FMNR Chief Technical Steward prepares an appropriate shipping box containing the collected A, B and C samples and a copy of the respective, signed, Fuel Sample Declaration Form. The box is then shipped to the FIM appointed laboratory by courier.

4. Testing

1) One or more properties to be checked (following the relevant testing method as per Art. D, E or F) are set by the FIM for each selected rider/team.
2) Sample A is the first sample to be tested by the FIM appointed laboratory.
3) Sample B can be used for a second analysis if required by the FIM. The test result of the A or B sample more favourable to the rider/team is taken into account. Costs for the shipping and testing of sample A and B are paid by FIM.
4) As soon as possible after completing the testing, the FIM appointed laboratory reports the test results directly to the responsible CTI Coordinator.
5) For negative cases (i.e. conformity of the tested property(ies) with the specification), the riders/teams concerned will be individually informed by the FIM in due course, copying the rider/team's FMN, the FIM Technical Director/FMNR Chief Technical Steward, the competent authority (e.g. Race Direction, International Jury), the CTI Director, the Director and Coordinator(s) of the sporting Commission concerned.

6) Only for positive cases following testing of sample A or B or A and B (i.e. non-conformity of one or more properties*), the responsible CTI Coordinator notifies by electronic mail* the rider/team concerned (including the testing results) and, 24 hours after, forwards the relevant information to the rider/team's FMN, the FIM Technical Director/FMNR Chief Technical Steward, the competent authority (e.g. Race Direction, International Jury), the CTI Director, the Director and Coordinator(s) of the sporting Commission concerned.

   *Note: The non-conformity of one property (except the Appearance) is sufficient for declaring non-conformity of the fuel or the mixture.

7) If the rider/team wishes to request a counter-expertise, he must notify the responsible CTI Coordinator by electronic mail* accordingly, within 72 hours of receipt by the FIM of the delivery status notification pertaining to the notification of the test results to the rider/team.

   - If a counter-expertise is requested, the sample dedicated to the counter-expertise is sample C and the test shall aim at checking the same property(ies) previously checked on sample A/B. The rider/team can request that sample C be tested at one of the available FIM appointed laboratories. Costs for shipping and testing of sample C are paid by the rider/team concerned.

     Upon notification of the sample C results, the responsible CTI Coordinator notifies by electronic mail[6] the rider/team concerned (including the testing results) and forwards the relevant information to the rider/team's FMN, the FIM Technical Director/FMNR Chief Technical Steward, the competent authority (e.g. Race Direction, International Jury), the CTI Director, the Director and Coordinator(s) of the sporting Commission concerned.

   - If no counter-expertise is requested within the time limit, the responsible CTI Coordinator forwards the relevant information by electronic mail* the rider/team's FMN, the FIM Technical Director/FMNR Chief Technical Steward), the competent authority (e.g. Race Direction, International Jury), the CTI Director, Director and Coordinator(s) of the sporting Commission concerned.

8) The competent authority of the event concerned (e.g. Race Direction, International Jury) makes a decision based on the information received. The Coordinator of the sporting Commission concerned notifies the rider/team concerned regarding the decision by electronic mail*.

   The non-conformity of :

   - A sample (in the cases B sample was not used) or
   - B sample (in the cases A sample result was not conclusive) or
   - A and B samples or

[6] The receipt of a delivery status notification will be deemed as proof of delivery

- A and B and C samples (in the cases B sample was used and a counter-expertise was requested) or
- A and C samples (in the cases B sample was not used and a counter-expertise was requested)

automatically results in the disqualification of the rider/team from the entire event.

No disqualification will be applied in case of conformity of sample C.

Furthermore, in any case, other penalties may be applied.

9) The rider/team has the right to appeal against the decision of competent authority of the event concerned (e.g. Race Direction, International Jury) in accordance with FIM Disciplinary and Arbitration Code applicable to the relevant discipline.

H. FUEL SAMPLE DECLARATION FORM

FIM Fuel Sample Declaration Form

Discipline	
IMN (xxx/xx)	
Rider/team's name	
Rider/team's number	
Rider/team's email or telephone number	
Team	
Vehicle's make	
Fuel's make and type	
Fuel origin (public station or race supplier)	
Fuel samples taken on date (dd/mm/yy)	
Fuel samples taken at (right before or after):	

MOTOCROSS	**TRIAL**	**TRACK RACING**	**ENDURO /ISDE**	**RALLIES /BAJAS**
Practice ☐	Day 1 ☐	Heat n°__ ☐	Day 1 ☐	Day 1 ☐
Qualifying race ☐	Day 2 ☐		Day 2 ☐	Day 2 ☐
Race 1 ☐			Day n°__ ☐	Day n°__ ☐
Race 2 ☐				

		Container seal n°
Sample A		
Sample B		
Sample C		

The above listed details refer to fuel samples taken from the fuel tank of the motorcycle specified.

Sample A is the first testing sample to be used by the FIM appointed laboratory

Sample B can be used for a second analysis if required by the FIM

Sample C is used if a counter-expertise is required by the rider/team.

The serial numbers of the vial seals and the accuracy of the listed information have been verified.

Rider or team responsible name	
Rider or team responsible signature	
FIM Technical Director/ FMNR Chief Technical Steward name	
FIM Technical Director/ FMNR Chief Technical Steward signature	

I. LIST OF APPROVED FUELS

This list can be obtained by requesting it to cti@fim.ch.

FÉDÉRATION INTERNATIONALE
DE MOTOCYCLISME

FIM-MOTO.COM
11, ROUTE DE SUISSE | CH - 1295 MIES
cti@fim.ch

65 790 06