Report on the 58th JASIC Asia Expert Meeting in Indonesia on R83-05

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Dates: Monday, August 26, 2019 09:00 - 16:30

: Tuesday, August 27, 2019 09:30 - 16:20

Place: Meeting Room, Vehicle Testing and Certification Center (VTCC), Indonesia

Participants

Indonesia

VTCC: Ms. Caroline, Messrs Heri Surya, A. Yoga, Bagus, Taufiq R., Choirul S., S. Hakiwan, Singgih Subekf, Sunarso, Ade Piko A., Danang

Mitsubishi Motors KSI: Messrs Eri Surya, Tao Re Lahay

Japan: Mr. Tomita (Honda), Mr. Hitoshi Torii, Type Approval Engineers, Automobile Type Approval Test Department, National Traffic Safety and Environment Laboratory (NTSEL) and members of Pollution and Energy Subcommittee, JASIC

JASIC: Mr. Nakatani, Chief representative of JASIC Jakarta Office

Mr. Utami (JASIC Jakarta Office); Mr. Ishibashi (JASIC), and Mr. Zaki Primaclani (Interpreter)

Overview:

- At the request of the Vehicle Testing and Certification Center, Indonesia, JASIC experts gave presentations on the requirements and test methods of R83-05 (on Euro 4), including the certification tests of Type 1, Type 2, and Type 3 and hybrid vehicle emission tests (Annex 14). A list of questions from the VTCC delivered in advance helped them to focus on and share the knowledge VTCC wished to deepen specifically.
- For the presentation of the emission test method, Mitsubishi Motors Indonesia let the experts use an actual PHEV (Outlander) to make the presentation more realistic, specific, and

interesting to the audience.

- In the presentation of hybrid vehicle tests, we were unable to demonstrate part of test procedures due to the unavailability of a power analyzer, but managed to present most of the testing process from the check of vehicle settings to calculation of the test results.

Day 1: Monday, August 26, 2019 9:00 -16:30

1. Opening Speeches

1.1 Welcome address by Ms. Caroline, Director of VTCC

Good morning, everyone. I am very delighted today to be able to welcome here an expert team from JASIC and representatives of Mitsubishi Motors for a two-day training session on emission tests. I am particularly grateful to Mr. Nakatani of JASIC Jakarta Office for the efforts he made coordinating this meeting between us. Recently in Indonesia, the president has issued a new decree to promote the spread of electric vehicles and we are facing the need to test hybrid vehicles emissions. With ten participants from VTCC and two from Mitsubishi Motors, this meeting will give us all a very good opportunity to learn how to test those vehicles. Thank you.

<Indonesian participants introduced themselves>

1.2 Greetings by Mr. Nakatani from JASIC

Good morning everyone, I'm Nakatani from JASIC Jakarta Office. First of all, on behalf of JASIC, I would like to thank Ms. Caroline, Director of VTCC and all the other participants for hosting the JASIC Asia Expert Meeting in Jakarta today. As you all know, controlling vehicle emissions is critically important for reducing air pollution. Today, we are going to learn about R83. If you have anything unclear, feel free to ask questions at any time during the presentation. I hope that today's meeting will be something meaningful for all of you. Lastly, I hope that JASIC's activities will keep contributing to the activities of Indonesian government. I hope also we keep developing the good relationship between the two countries. Thank you very much.

<JASIC participants introduced themselves>

2. Expert Meeting

2.1 Introduction of the technical requirements of R83

Mr. Tomita and Mr. Torii first gave an overview of the environmental regulations, the history of control under R83, and the importance of fuel qualities, and then presented the requirements and test methods for Type 1, Type 2 and Type 3 of R83-05.

Q&A

Q: In the requirements for crankcase emissions, What kind of substance comprises blow-by gas?

A: Crankcase emissions mean Type 3 testing and specifies HC, CO, NOx, etc.

Q: In the World EM Regulation Chart, what are those white colored countries?

A: They are countries whose government have not implemented yet proper emission control regulations.

Q: What is a durability test?

A: Under Euro 4, you drive your vehicle for 80,000 km and see how the emission performance degraded; Under Euro/5/6, you drive it for 160,000 km. In some countries, you drive it for 200,000 km. In practice, you have three options: drive an actual vehicle, drive it on a bench, and calculate the emission using a degradation factor. You don't necessarily have to actually drive a vehicle on a real road.

Q: In the Philippines, do they have the same testing facilities as yours? I understand they don't at VTCC.

A: Me too, I understand they don't.

Q: What are the major differences between those series of regulation?

A: They differ in the types of controlled substances and regulatory values. Now I'm going to show you in detail.

Q: Is it from Euro 6 that we start measuring PM emissions?

A: It's from Euro 4 for gas vehicles and from Euro 6 for diesel vehicles that we start measuring PM emissions.

Q: Some data say they regulate PN in Euro 5. How should we take this?

A: Let me check and answer later.

Q: PM is measured by weight and PN by quantity. Do you need some instrument to measure this?

A: Yes, you will need an instrument to measure that.

Q: For diesel, is there any relationship between the components of bio gasoline and the amount of sulfur?

A: Putting biofuel into diesel has nothing to do with the amount of sulfur.

Q: Wouldn't an increase in the biofuel ratio raise sulfur?

A: Biofuel won't raise your sulfur, but lower sulfur is still better.

Q: In relation to bio and sulfur, it looks like the use of B20 improves test results, but do they truly get better?

A: We don't know specific fuel properties, so it's hard to figure out what affected the results.

Q: What I wanted to ask is, can this legislation be applied using B20?

A: I think it depends on the ability of the fuel manufacturer that makes the diesel fuel.

Q: Can we use B20 when conducting tests, or shouldn't we?

A: There are many more specifications on fuel properties than this one, and they must be met. In R83-05, there's a provision for the fuel to be used. If you mix biofuel and still satisfy this provision, then it will be OK.

Q (JASIC): How do you purchase Euro 4 fuels for testing at VTCC?

A (VTCC): For the time being, we leave it to the automakers' discretion. I believe the automakers are using right fuels, but, with imported vehicles, occasionally they use dubious fuels.

Q (JASIC): Do you mean they test imported vehicles using the fuel the automaker had put in their tank?

A (VTCC): That's right.

Q: Regarding fuel components, can I understand that you can use a fuel for testing if it satisfies the three provisions in the table?

A: There are other provisions than these three; Annex 10 prescribes fuel compositions.

Q: Is satisfying these fuel provisions a recommendation or a must?

A: It's a must.

Q: At Japanese technical services (TS), is it the TS who provides gasoline or is it the automaker?

A: At Japanese TS, they ask gasoline manufacturers to make compliant fuels.

Q: When testing at a TS, is it the TS who changes fuels?

A: When doing a type approval test, you use a compliant fuel. There are two cases: one is where NTSEL prepares a compliant fuel and the other is where they ask the automaker to bring a compliant one. When using the automaker's fuel, you check the certificate issued by the fuel company. When testing evaporative emissions, you empty the fuel tank once. There, you put the fuel checked by the TS.

Q: Does R83-05 apply to the vehicles of categories M3 and M2?

A: Yes, it is safe to assume there's almost no gasoline vehicle in the category M3.

Q: Which type of test applies to gasoline vehicles of categories M2 and M3?

A: The test items on the left side of this chart apply.

Q: Sorry, what we wanted to know is whether the Type 1 to 6 tests apply to M3/N3 vehicles.

A: In Japan, if you are to test a gasoline vehicle of over 3.5 tons, then you test it on an engine bench.

Q: We asked this question because we've once had a CNG bus of over 3.5 tons.

A: It's R49 that applies to CNG vehicles.

Q: Do you test with the auto start/stop system turned off or on?

A: Turned on. HEVs may not be completely free even in neutral, so we do it discussing with the automaker. When testing the road load, we make adjustments so there's no drag.

Q: Is it a must to drive 3,000 km before the test?

A: The 3,000 km run is in the regulation, but it's a requirement for the automaker, so all you have to do is make sure they have run that distance.

Q: With imported vehicles, you bring the actual vehicle to the TS. If you drive it 3,000 km in advance, then it's considered a used vehicle. How should we handle this?

A: For type approval tests, the 3,000 km run is a requirement. If it's not a type approval test, sometimes we do that with a less-than 3,000 km run. It is understood that new vehicles have poor EM performance and, taking this into account, they may be tested at less than 3,000 km. An example of this is when testing imported vehicles, of which there are only a small number. This is not a type approval test.

Q: What kind of approval does an import vehicle have in Japan?

A: To drive a car in Japan, you must get a license plate. To get a license plate, you must get a certificate that it has passed the emission test and there are two ways to get it. One is where you put every actual vehicle to an EM test to have it certified. The other is where, for mass-produced vehicles, you put a sample vehicle to an EM test and get a type approval.

Q: Are the emission control items the same in both cases?

A: The control items are the same in both cases.

Q: You have to drive at 120 km/h during the test, but if the car is fitted with things like traction control (T/C), you can't run at a high speed. In such a case, we do the test with the T/C disabled, but does this have any influence elsewhere?

A: Consult the automaker for any adjustments you possibly need. Before testing your vehicle with the T/C turned off, you need to know what kind of impact it will have. In a recent case, the vehicle had an automatic brake, the camera recognized a cooling fan, and stopped the vehicle. In this case, we discussed with the automaker and conducted the test with the automatic brakes disabled.

Q: You don't recommend that the T/C be forced into an error?

A: We prefer proceeding in discussion with the automaker. We don't recommend doing that forcing the T/C into an error.

Q: With a 4WD vehicle, we can test it in 2WD. Do we really need to test it in 4WD?

A: It depends on the vehicle. If it's a simple 4WD that's not an HEV, you can test it in 2WD, with the shaft taken off.

Q: If a car has a choice between 4WD and 2WD, should the test be done in 4WD or in 2WD?

A: Depends on the circumstances. For example, with a vehicle that mechanically switches the center differential, you mostly run in 4WD. Some cars run in 4WD only in snow mode, only when the car slips. With such a car, you test it in 2WD. In EM testing, the test is basically done in a worst-case scenario. In such a case, you use 4WD. The point is, however, to know what kind of use the vehicle is originally intended for. If the vehicle gets 4WD only in special cases, then it is tested in 2WD. That's the Japanese way of thinking. So all depends. In the past, there were vehicles that got 4WD only when they started. The point is how the vehicle is primarily used in the real world, so it's important to discuss with the automaker.

Q: Recent vehicles have various driving modes, but which driving mode should we use for the test?

A: R83 doesn't have any provision on it, but WLTP does. Basically use the default mode. If there is no default mode, average the best and worst to determine the fuel consumption. Emission tests are conducted in the worst case.

Q: Does R83 have a provision for selecting a default mode?

A: No, R83 doesn't have such a provision. If you don't find a provision in R83, maybe you can use WLTP for reference. Currently Europe and Japan are working to develop a draft WLTP for UNR.

Q: Should we use the default mode for HEVs, too?

A: If you find it good for the purpose, then use the default mode.

Q: If an HEV runs on electricity at low speeds and on gasoline at high speeds, how do you do the measurement?

A: It's difficult to answer in the abstract, but, for example, if you press a switch and it turns EV, then you judge it's not the default.

Q: The test is mostly performed at low speeds running on electricity, but, in practice, you run mostly at high speeds on gasoline. In terms of the validity of the test, how should we conduct the test? Should we always turn to the worst-case scenario?

A: All I can say is everything depends on the vehicle. Take BMW's I3, for instance. The car runs almost always on electricity, scarcely using gasoline. In such a case, there is no need to force the engine to run. What's important is to discuss the characteristics of the vehicle with the automaker.

Re: Soak

Q: Do you have to start over if you exceed the prescribed soak time?

A: The test was unsuccessful, so you need to start over from the pre-conditioning.

Q: Is it a no-no to start the engine after pre-conditioning?

A: Yes, it's a no-no, that would change the predetermined conditions.

Q: What if the temperature exceeds 20°C and 30°C during the test?

A: You need to keep the temperature at 20-30°C to make it a successful test. A stable temperature is desirable to get stable test results, too.

Re: Running

Q: There's an error margin specified for the running speed during the test. Must they be observed?

A: Yes.

Q: With a cheap car with a manual transmission, it's not easy to adjust the vehicle speed selecting the gear and it's not easy to keep the vehicle speeds. Are minor deviations tolerated?

A: In Japan, the deviations of vehicle speed is not acceptable, even with a manual transmission. The tolerance is specified, however, and as long as your speed is within that limit, there is no problem.

Q: Is that written anywhere?

A: Yes, it's written in the regulation.

Q: What to do if your car cannot achieve 120 km/h?

A: There are provisions on how to deal with the lack of speed. Step on the accelerator pedal fully, keep it to the floor, even if you are not running fast.

(Show how to drive within the prescribed range using the driving regulations chart)

Q: How do you judge when the test ended up a failure, but the results improved?

A: The results have no values other than reference. Can't be used for certification. You need to test it again.

Q: Is there a way to get it done with a machine, without a human driving?

A: It can be done by a robot. Horiba has the machine. But setting up the machine takes a huge amount of time.

Re: CVS

Q: How do you choose your bag?

A: That depends on what the bag's dilution rate will be, but based on the value told by the manufacturer, I poke around it and choose one.

Q: Any way to find a right value?

A: I try change values depending on it's an HEV or a turbo, etc. All we can do is to gain experience with the same displacement and when the test vehicle arrives, judge it based on that experience.

Q: The type approval test is a one-shot deal, you can't repeat trials like research tests. What's the best way to nail it in one?

A: The only way to get it on the first try is to be based on your similar experience in the past.

Q: What should I look for to find the right value?

A: As far as there's no water interference in the measuring range of the analyzer, it's OK. The reason for dilution is because of the effect of water coming out of the exhaust gas. If the dilution is too little, there'll be effect of water, so you should check that. If it is a type approval, there is an emission regulatory value, so you can predict what level of emission the car will give. Within the range of that measurement, determine the dilution rate not affected by water. As a tendency, HEVs have less exhaust gas, so if you dilute it too much, you can't measure it. On the other hand, if your car gives off a lot of emissions, you can dilute it more.

Q: We can do the same way for turbo cars of 1500 cc to 2000 cc, right?

A: Maybe so or maybe not. It depends on the type of car. Even between the same turbos, it's different depending on it's a sports car or others.

Re: Type 2 Test

Q: Is there a specific order for the high idle >> normal idle speed tests?

A: The normal idle test cools the engine, so we do in the order of the high idle test to the normal idle test.

Re: Type 3 Test

Q: Where should I mount the pressure gauge?

A: Where the oil level gauge is.

Q: What to do with engines like BMW V, which has no oil level gauge?

A: One of the ways to do this is to check with the automaker as to how you can prove compliance.

Q: How many times do you take the data? How does it work in Japan?

A: Three times. In Japan, compliance is judged based on the explanation of structural requirements. No testing is done.

Q: Do you start measurement after you reached 50 km/h?

A: Yes.

Q: What happens if the negative pressure is different?

A: The gas is released into the atmosphere without passing through the catalyst.

Answers to questions asked in advance

Mr. Tomita and Mr. Torii answered to the questions asked in advance from VTCC as well as to additional questions from the audience.

No. 1: Vehicle inspection

(a): What should we check when checking the vehicle before putting it to the emissions test?

A: Check the consistency of the test vehicle with its data (in the application documents). In particular, check that the emission control devices are installed in the same way as declared in the application documents.

(b): What should we do if we find any device that may interfere with the emissions test?

(e.g., traction control, forward collision prevention system, automatic parking brake, etc.)

A: The examination body will discuss with the automaker how to deal with such devices (systems) that may interfere with emissions testing and take action to disable the interfering system.

(c): If the vehicle has multiple driving modes (e.g., normal, eco, sports modes, etc.), in which driving mode is the emissions test performed?

A: With R83-05 not specifying how to select the driving mode, the examining body checks with the automaker and chooses a typical driving mode (e.g. default driving mode).

(d): How could we make sure that the vehicle is fitted with the right tyres before the testing?

A: Annex 1 of R83-05 prescribes the information to be provided in the application form, of which part 6 is a space to be filled with tyre and wheel information. While inspecting the vehicle, the examination body verifies the consistency of this information with its equipment. The most important of this information in terms of the emissions test is the effective radius and air pressure of the tyres, which makes them important check points for the examiners.

Q: Regarding the settings for Type I test, is there anything we should do in checking the moving radius of the tyres?

A: The radius and air pressure are particularly important. Check also that the tyres are the same as those specified in the application.

(e): How should we handle and check hybrid vehicles before testing?

A: Hybrid vehicles are fitted with numerous control devices that vary from an automaker to another. The examination body checks with the automaker before conducting the test and gather information they need for the emission test. They check also how to check the battery current because they need to measure the battery capacity.

Q: With a PHEV, how do you check the state of charge (SOC)?

A: There is a stipulation that it does not have to be zero. This is done by measuring the current during the test cycle.

Q: Where do you measure the battery current?

A: Somewhere near the battery.

Q: Could you provide us with a video, etc. on how to take measurements?

A: Here's Hioki's video. Let me show you now (Presents the video).

<u>No.2: Dynamometer setting</u>

(a): How do you set a part-time 4WD on the dynamometer? Is it OK to set it as 2WD? If so, is it necessary to multiply the drive shaft by the coefficient 1.3 as prescribed in Annex 4, Appendix 2/3.2.2?

A: In R83-05, there is no reference to how to test part-time 4WDs, so it is accepted to remove the shaft and perform the emissions test in 2WD mode. The coefficient 1.3 prescribed in Annex 4, Appendix 2/3.2.2 is applicable only, when setting the running resistance to the chassis dynamo,

you use *the alternative method* specified in 3.2 instead of *the standard method* prescribed in paragraph 3.1.5 of Annex - Appendix. If the 4WD vehicle's running resistance has been measured, it is possible to set the running resistance to the chassis dynamo using *the standard method* prescribed in paragraph 3.1.5. If you use *the standard method*, it is not necessary to use the coefficient 1.3 prescribed in paragraph 3.2.

(b): How do you know that the coasting data presented by the automaker is not from another vehicle? You're going to check? (In cases where the coasting data was measured by the automaker and not by the TS)

A: You ask the automaker to explain why the road resistance data provided by the automaker can be applied to the test vehicle. The *vehicle selection requirements* in measuring road resistance data are defined in paragraph 4, Annex 4 Appendix 3 of R83-05. The automaker can explain using the data measured according to those *vehicle selection requirements*.

Q: How were the problems in Japan uncovered?

A: Whistleblowing.

Q: What kind of measures did you take after that?

A: We increased the number of attendances at the test. We also enhanced the system of attendance at the measurement of coasting data and made punishment heavier. Some automakers committed fraud, but others had no problems.

(c): When validating coasting data, which parameters should we pay attention to?

A: The requirements for measurement of road resistance are specified in R83-05, Annex 4 Appendix 3. You can check that by asking the automaker for the results of the tests performed in accordance with this regulation.

(d): How could we properly set the running resistance to the chassis dynamometer?

A: Regarding setting running resistance to the chassis dynamo, R83-05 Annex 4 Appendix 2, paragraph 3.1.5 specifies the standard method. You need to set that according to this provision.

<u>No. 3: Pre-conditioning</u>

(a): What are the pre-conditioning procedures for OVC and NOVC hybrid vehicles in accordance with R83-05 Annex 14?

A: Annex 14 prescribes test procedures that includes pre-conditioning procedures for four kinds of hybrid vehicles:

Paragraph 3.1: OVC without an operation mode switch

Paragraph 3.2: OVC with an operation mode switch

Paragraph 3.3: NOVC without an operation mode switch

Paragraph 3.4: NOVC with an operation mode switch

(b): What are the gear shift procedures for manual transmissions in accordance with the regulations?

A: The gear shift timing in driving mode is prescribed in R83-05, Annex 4 - Appendix 1. For the allowable time for gear shift, it is specified 2 seconds in the same Annex – Appendix, Fig. 1/2, Table 1.3, Fig. 1/3.

(c): What is the response to the limits of time and distance (variability) when the actual speed deviates from the reference value for the driving mode?

A: R83-05 Annex 4, paragraph 2.4 specifies the tolerances for the reference values for the driving mode and tells you not to deviate from these tolerances. Otherwise, you need to take the test again.

(d): After the pre-conditioning, is it OK to move the vehicle to the soak room with the engine started?

A: Moving the vehicle to the soak room after pre-conditioning with the engine started affects the test results of some automakers. So we don't move the vehicle with the engine started.

<u>No. 4: Soak</u>

(a): When soaking the vehicle for less than 8 hours, is it OK to use a fan to lower the vehicle temperature?

A: The vehicle soak requirements in R83-05, Annex 4, paragraph 5.3.1 doesn't' say either it's OK or not to use a blower fan, so we allow the use of a fan if care is taken so that the vehicle is uniformly cooled.

However, considering that the regulation requires at least six hours of soak, we don't accept a soak shorter than six hours even if it satisfies the temperature conditions using a blower fan.

Q: Is there any provision on temperature differences between the soak room and the test site?

A: None.

(b): What is the correct soak procedure for hybrid vehicles according to R83-05, Annex 14?

A: As in Question 3-a, the Annex prescribes the test procedures including the soaking procedure for the four types of hybrid vehicles.

No. 5: Pre-check

(a) When the temperature of the soak room and the vehice are within ±2°C (within the legal tolerance), is it acceptable if there is a difference in between the soak room and the test room? (e.g. 23°C in the soak room, 24°C in the vehicle, 25°C in the test room)

A: What R83-05, Annex 4, paragraph 5.3.1 etc. prescribes is the temperature difference between the soak room and the vehicle. Therefore, if the temperature in the test room meets the requirements, I think it is acceptable.

(b) With a vehicle without a hole through which to insert an oil level gauge, it is difficult to measure the vehicle temperature. How could we properly measure the temperature?

A: An idea is to put an oil drain bolt with a thermocouple.

No. 6: Dynamometer check

(a) Is there any specific procedure for warming up the dynamometer?

A: R83-05 says nothing about that, so you follow the dynamometer manufacturer's recommended procedure.

Q: How do you warm up the chassis rollers?

A: The manufacturer (Meidensha) recommends that you turn the roller at 100 km/h for at least 30 min.

(b) What should we do if the vehicle is fitted with an automatic parking brakes that cannot be released when the engine is off? (Can't the vehicle be moved when the engine is off?)

A: The examination body checks with the automaker and deactivates the automatic parking brakes.

No. 7: Results calculation and battery condition

(a) What should we do when errors occurred in the emissions calculation results, while the instantaneous data during the test appear to have been measured correctly? Should we test all over again? Or should we recalculate by adding up instantaneous data?

A: it's difficult to say anything if you don’t know the cause of the error, but if you can't re-analyze the bag, you’ll have to do the test again. If you can finish analyzing the bag within the valid time frame, then we believe a retest is not necessary.

Additional note: if you can re-analyze the bag within 20 min, do that. If not, do the retest.

(b) What are the battery requirements for hybrid vehicles under R83-05?

A: The battery requirements for hybrid vehicles are prescribed in R83-05, Annex 14. However, considering that how hybrid vehicles control the battery varies from a vehicle to another, you will, if you want to complete the test smoothly and reliably, need to check with the automaker whether any special procedure is necessary or appropriate.

Additional questions asked from the audience

1. What is the worst-case definition of emissions testing under R83-05? (e.g., vehicle type selection, selection procedures and methods, etc.)
A: You need to check with the automaker to know how it is primarily intended to be used. You can't just pick up a case and say, "Hey this is the worst case." It's not that simple.
2. What is the worst-case definition of emissions testing under R83-05?
A: For running resistance, R83-05 Annex 4, Appendix 3, paragraph 4 prescribes vehicle selection requirements. However, considering that the vehicle performance significantly varies with the way differences in specifications generate different effects and the way devices are combined, I find it important to discuss with the automaker before making decision.
3. What is the correct procedure for Type II testing? Should we measure emissions at low and high speeds?
A: As prescribed in R83-05, Annex 5, the test conditions for Type-2 don't depend on such a thing like high or low engine speeds. They are intended to perform the test at all positions adjustable by the control device (idling speed adjusting component) that adjusts the idling speed. However, in determining the adjustment positions at which to perform the test, the upper and lower limits of the rotation speeds are used as one of the conditions for determining the adjustment position as prescribed in Annex, paragraph 2.5.2.5.
4. In Type III test, what are the settings and correct procedures for "Condition 3" (multiplying by a coefficient of 1.7)?
A: From the table in R83-05, Annex 6, paragraph 3.2, the coefficient 1.7 applies to the "Power absorbed by the brake". Since it is a dynamo that is applying the brake here, you should multiply by 1.7 the output value from the dynamo brake at 50 km/h obtained by the procedure for setting the driving resistance of the Type I test to the dynamometer. For the setting procedure above, follow the operating instructions of the dynamo manufacturer.
Additional note: Multiply the results obtained from Type I test by 1.7.

5. What are the emission testing rules for a chassis vehicle like the one in the photo?

A: Chassis vehicles have different bodywork depending on their use, so it may be difficult for the automaker to know right conditions for testing a complete vehicle fitted with bodywork (equivalent inertia, road load coefficients). In such a case:

(1) Perform the test by building a standard bodywork on the chassis vehicle and measure the running resistance as specified in R83-05 Annex 4, Appendix 3 and set the running resistance to the dynamometer; or

(2) Perform the test assuming only the vehicle weight and setting the running resistance to the dynamo according to Annex 4, Appendix 2/3.2;

Q: Is the test on the vehicle with bodywork performed with actual weights on the vehicle or is it dealt with by setting up the dynamometer?

A: This can be dealt with only by setting the dynamometer, but, if the tyres slip, it's better to put the weight on.

6. To identify the cylinder capacity of the vehicle to be tested, how could we determine the proper CVS flow rate according to R83?

A: Same as the answer to CVS.

7. In sampling particulate matter, the sampling pump of the VTCC system has a flow rate of 35 to 70 L/min. Which flow rate should we choose under the R83 requirements?

A: Answered during the sampling in the morning.

This ends Day 1

Day 2: Tuesday, August 27, 2019, 9:30-16:20

1. Explanation of Hybrid Vehicle Emission Testing Methods

Mr. Tomita and Mr. Torii explained in detail the testing method for hybrid vehicle emissions prescribed in Annex 14, R83-05.

Q&A

Q: Is the test under conditions B, too, performed with the battery almost dead?

A: Yes. With less than 3% of the battery capacity.

Q: Sometimes there is more than 3% of the capacity, how should we do?

A: Condition A refers those in which the vehicle is being charged from outside source. The battery never gets 100% exhausted.

Q: Do you test first under Condition A and then test under Condition B?

A: Yes.

Q: Is the Condition A test performed after or while being discharged?

A: The Condition A test is done when the battery is 100% charged. The battery is charged during the soak. No external charging is done while running, regardless of it's at the Condition A test or at the Condition B test.

Q: What is the definition of SOC?

A: A state where the battery is charged to its full capacity.

Q: Is that the value specified by the manufacturer?

A: Yes, it's the manufacturer who says when the battery is SOC.

Q: With the Condition B test, is it OK if we don't measure the voltage?

A: Yes, that's OK.

Q: The measurements using a power analyzer. In which paragraph exactly is it dealt with in Annex 14?

A: That's dealt with in paragraph 3.2.2.6.2.2.

Q: With hybrid vehicles, is the emissions sampling the same as others?

A: Yes, the same.

2. Demonstration of Hybrid Vehicle Testing

With Mitsubishi Outlander (PHEV) set on C/R, Mr. Torii and Mr. Tomita demonstrated how they are tested.

Q&A

Q: What kind of instruments are used to measure the tension of cables that fix the vehicle?

A: There are no regulations, so you can test your vehicle without that, but if you have something with which to manage what you do in figures, then that means you can build up the same test whoever does it.

Q: Is there adverse effects if you give too much tension to the vehicle fixing cables?

A: That changes the test conditions.

Q: Why do you string the fixing cable horizontally?

A: The way you string the cable changes the load on the vehicle. Strung horizontally, they give least problems.

Q: Is there anything specific to hybrid vehicles that should be checked?

A: Check the position of the battery and motor.

Q: Where do you measure the power analyzer from?

A: Where the instruments are closest to the battery.

Q: Do you do that when pre-conditioning, too?

A: We do when the automaker so wishes. To align all the conditions, I think it's better to do pre-conditioning.

Q: When exactly should we put the power analyzer?

A: You put it after you put the vehicle on the dynamometer.

Q: The charging during the soak. Do you remove the cable once it's charged? Or do you leave it connected?

A: Basically, we leave it connected. Disconnect for some vehicles. Depends on what you call "fully charged," but basically we leave them connected.

Q: For example, when if soak extends into the night, can we all go home?

A: There's a large current flowing. It's better if someone stayed. At NTSEL, we contract with a security service.

Q: In Japan, how do you recharge your batteries?

A: We leave it connected.

Q: When you test it connected, is the test cycle the same even without emission?

A: Yes, we follow the same test cycle.

Q: What do you do as the test cycle?

A: We repeat Part 1 and Part 2 three times.

Q: What is the driving mode?

A: Basically the default mode.

Q: What do you call the default mode?

For Mitsubishi, the EV mode is default.

A: We drive in EV mode until the battery runs out.

Q: Do you mean until the engine stops starting?

A: Until the battery is discharged to less than 3%. Judgment criteria is till the current goes down below 3%.

Q: When do you calculate for Type I?

A: The test is the same as the ordinary Type I test.

Q: You measure EM only once at last?

A: Actually we measure every time. We can take data either continuously or during a 10-min break.

Q: (Mitsubishi) You do Type I only once at last. For the rest, you repeat Type I endlessly. You measure only once. Correct?

A: We measure all test cycle results and put them into the formula.

- After this, to demonstrate cases where you measure multiple times, we actually performed Part 1+Part 2 mode test once and for the second time, used fictitious test results and checked how to calculate the formula with n=2.

Q: For how many cycles can this vehicle actually run?

A: Around 10 cycles, I think.

Q: How many cycles have you actually run so far?

A: Under Condition A, I've run more than 50 times.

Q: 50 cycle runs by yourself?

A: You may take turns, but between tests, you have to do that in less than 10 min.

Q: In paragraph 5.3.3.1.2 on the requirements for Type I testing, they require two tests. Why?

A: If the test results are close to the regulatory values, we ask you to repeat two times of tests.

Q: Do you use the same measuring bag for diesel and gasoline?

A: In Japan, we use a measuring bag in common.

- Additional answer regarding CVS dilutions: For venturi, Outlander did 9 m^3. So I think that was either 9 m^3 or 6 m^3. 4.5 m^3 is too small and 12 m^3 is too large.

3. Closing Speeches

3.1 Greeting by Mr. Yoga, VTCC

Thank you very much for all participants here. This was really a very good training. If you have any

questions to ask Japanese experts, let me know and I'll send them to Japan. Also, on behalf of the Head of Mitsubishi, I would like to thank you for this training. We all extended knowledge of EM testing, which is very valuable considering the presidential decree on EV. The lectures were highly informative and helpful. I'll make a summary of this event and report back to my supervisor, which will inform and enhance policy on EM testing. I think everyone here will have many more questions to ask in the years to come. Thank you so much for your support.

3.2 Greetings by Mr. Nakatani from JASIC

Thank you very much for your support to this two-day expert meeting. Thanks a lot to Mitsubishi for letting us use actual car. I'm pleased to hear Mr. Yoga say this JASIC training was very helpful. I suppose the two days of expert meetings was a great opportunity that triggered new discoveries for each of the VTCC people. New discoveries lead to new questions. If you have any questions that come up, please send them to me.