

SPECIFIC SUPPLY CONDITIONS FOR TESTING ACTIVITIES

(June 2023)

Foreword:

These Specific Supply Conditions for carrying out tests, in addition to the general conditions reported in the "General Supply Conditions" document, are intended to regulate the provision of the following services to the Client:

- "Vehicle mass measurement/static load per wheel".
- "Test for measuring the vertical force on the wheels" - EN15654-2:2019.
- "Verification of traction current components. Harmonic current (0-1000 A)".
- "Technical interoperability and functionality of the ETCS".
- "Test for the acceptance of the running characteristics of railway vehicles - dynamic behaviour test" EN14363:2005 and EN14363:2016+A1:2018.
- "Test for verifying the braking performance of railway vehicles".
- "Test for measuring the Signal/Noise ratio on RSC equipment".
- "Verification of the quality of current collection and of the parameters relating to the interaction between the pantograph and the overhead contact line".
- "Braking tests on the dynamometer test bench".

For the applicable legislation, in cases not defined above, please refer to the annexes to this document:

- List of accredited tests at site A.
- List of accredited tests at site B.

These conditions concern all the activities necessary to implement a fluid process that may satisfy the requests and requirements of both Parties involved.

The Client of the test service is expressly informed here that, in order to carry out the activities indicated in the relative Offer document, it is necessary that all the requirements mentioned in the document "General Terms and Conditions for Supply" and in this document are respected.

With this scope, Italcertifer Laboratories require the client to undertake to open a communication channel at an appropriate level with the Italcertifer Laboratories personnel in charge and, through this interface, implement a process of support, exchange of documentation and information regarding the aforementioned activity. The personnel appointed by the Laboratories for each test is the Technical Manager of the test (in Italian, *Responsabile Tecnico Prove* - RTP), hereinafter referred to as RTP.

Specific conditions for testing activity:

- Weighing test of railway vehicles according to CEI EN 50215:2011 (with fixed test bench)

The load condition in which the sample arrives at Italcertifer Laboratories must comply with the load requirements of the reference standard and must be communicated to Italcertifer (in particular to the RTP of the test) via specific email.

In particular, the client must provide the RTP with:

1. A formal declaration of the loading conditions of the sample, undertaking to guarantee the correspondence between the conditions of the sample sent to Italcertifer Laboratories for carrying out the weighing test and the conditions indicated in the reference standard.



2. Tested Vehicle Element(s) Identifier(s) or NEV (*Numero Europeo di Veicolo*, European Vehicle/Coach Number).

- **Vertical wheel forces according to EN 15654-2:2019/ CEI EN 50215:2011 (with mobile test bench)**

The load condition in which the sample arrives at Italcertifier Laboratories must comply with the load requirements of the reference standard and must be communicated to Italcertifier (in particular to the RTP of the test) via specific email.

In particular, the client must provide the RTP with:

1. A formal declaration of the sample loading conditions, undertaking to guarantee the correspondence between the conditions of the sample sent to Italcertifier Laboratories for carrying out the weighing test and the conditions indicated in the reference standard.
2. Tested Vehicle Element(s) Identifier(s) or NEV (*Numero Europeo di Veicolo*, European Vehicle/Coach Number).
3. Wheelbase, bogie centre distance and lateral distance between axleboxes centers for bogie railway vehicles.
4. Wheelbase and lateral distance between axleboxes centers for axles railway vehicles.
5. Axleboxes design.

- **Testing of running behaviour - Stationary tests. Only safety against derailment on twisted track, according to EN14363:2005 ed EN 14363:2016+A1:2018, UNI14363:2019 (with mobile test bench)**

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In particular, the client must provide the RTP with:

1. A formal declaration of the sample loading conditions, undertaking to guarantee the correspondence between the conditions of the sample sent to Italcertifier Laboratories for carrying out the weighing test and the conditions indicated in the reference standard.
2. Tested Vehicle Element(s) Identifier(s) or NEV (*Numero Europeo di Veicolo*, European Vehicle/Coach Number).
3. Wheelbase, bogie centre distance and lateral distance between axleboxes centers for bogie railway vehicles.
4. Wheelbase and lateral distance between axleboxes centers for axles railway vehicles.
5. Axleboxes design.
6. Possible failure conditions of the secondary suspension (deflated air springs).

- **“Technical interoperability and functionality of the ETCS”**

Italcertifier Laboratories require that the electrical connection of the target to the test bench is carried out in the presence of the Client or that a document of specific connections is provided.

Furthermore, concerning sample preparation and initial checks, the following actions are required:

- ✓ A HW and SW configuration declaration.
The client must issue a specific declaration supported by verification by the laboratory staff that the HW delivered is complete and correctly functioning. Furthermore, the client must also issue a specific declaration supported by verification by the laboratory staff that the loaded SW is correct (this



verification must be carried out through software signatures and accompanying specification documentation).

✓ A HW and SW version conformity declaration.

The client must issue a specific declaration certifying that the target under test (intended as a set of HW and SW) has completed the CENELEC safety cycle.

- **“Test for the acceptance of the running characteristics of railway vehicles - dynamic behaviour test”**

The Client must deliver the documentation necessary for carrying out the tests according to agreements and methods previously shared in a formal manner (e-mail or other) between its own Interface and Italcertifier RTP.

In particular, the client must provide the RTP with a formal notice of:

1. Vehicle serial number assigned by the manufacturer to the vehicle under test.
2. Tested Vehicle Element Identifier (NEV).
3. Failure conditions to be tested (air suspension if present/anti-yaw dampers if present).
4. General data of the vehicle elements (length, bogie wheelbase, bogie centres distance).
5. Declaration of the representativeness of the sample with respect to the parameters that influence the dynamic behaviour, as required by paragraph 5.3.1 of the EN 14363:2016 + A1:2018 Standard
6. Load conditions to be verified during tests according to EN 15663.
7. Vehicle operating parameters (speed and uncompensated acceleration/cant deficiency).
8. Nominal mass of the bogies of the tested vehicle elements.
9. Nominal axle load of the tested vehicle elements.
10. Wheel profile identifier of the tested elements.

Italcertifier declines any responsibility for the data provided by the manufacturer that influence the choice of test method (complete, simplified, simplified accelerometric) and on the parameters that are influenced by them (e.g., limit values).

- **“Test for verifying the railway vehicles braking performance”.**

The Client must deliver the documentation necessary for carrying out the tests according to agreements and methods previously shared in a formal manner (e-mail or other) between its own Interface and Italcertifier RTP.

In particular, the client must provide the RTP with formal notification of:

1. Vehicle serial number assigned by the manufacturer to the vehicle under test.
2. Tested Vehicle Element Identifier (NEV).
3. Clear and unambiguous indication of the normative references to be respected (Rule Reference List or similar document).
4. Braking System technical features:
 - a. Pneumatic diagram.
 - b. Brake calculation.
 - c. Vehicle commissioning report, if any.
 - d. Estimated weight of the vehicle under test.
 - e. Data sheet of the main components of the braking system (brake handle, distributor, self-continuous device or other device for varying the pressure to the brake cylinders according to the load, brake cylinders, brake discs).
 - f. All types of brake pads or blocks with which you intend to carry out the tests on the vehicle under test.
 - g. All software releases installed on the vehicle relevant to the tested component (if any).



All documentation must be provided updated to the latest available revision.

Test points preparation (electric and pneumatic) is in charge of the client/commitment.

This test points preparation shall not modify representativeness of the sample and the safety of brake system. For tests on vehicles not equipped with brake handle, an external brake handle, property of ITCF Laboratories, will be used in order to simulate test conditions.

If, in any part of the homologation process and for any reason, the intervention of the vehicle manufacturer or the supplier of the braking system is necessary to carry out modifications on the vehicle under test (HW and/or SW), it will be necessary to evaluate the impact of these interventions in order to decide whether to repeat all or part of the static and/or dynamic tests carried out up to that moment.

Italcertifier decline any responsibility for the data supplied by the manufacturer which have an impact on the test results.

- **“Verification of traction current components. Harmonic current (0-1000 A)”**

The Client must deliver the documentation necessary for carrying out the tests according to agreements and methods previously shared in a formal manner (e-mail or other) between its own Interface and Italcertifier RTP.

In particular, the client must provide the RTP with formal notification of:

1. Vehicle description.
2. Sample name
3. Sample identification code (type and serial number).
4. Maximum test speed.
5. Description of the traction chain.
6. Maximum power.
7. Maximum current absorption.
8. Number of auxiliary converters.
9. Auxiliary converters power.
10. Modulation frequency of power converters.
11. Frequency of the voltage generated by the auxiliary converters.
12. High voltage Wiring Diagrams.
13. Interior and exterior sketch/vehicle drawing.
14. Sketch/drawing of the vehicle roof.
15. Composition of the test train.
16. Position of the vehicle under test respect to the train composition.
17. List of possible degraded traction and auxiliary configurations declared as compatible with the normal operational service of the vehicle.
18. Line filter description and sizing.
19. Diagrams related to the electrical power architecture.
20. Description of the power converters and their ratings, especially the switching frequencies of the choppers and/or inverters.
21. Traction curves relating to continuous and temporary service.
22. Rated data relating to traction motors and those dedicated to auxiliary services.
23. Pantograph installed (manufacturer and identification code) and relative pneumatic law.

At the time of the start of the tests, the list of the SW that have an impact on the test results must be provided together with the related releases.

The start of the tests is subject to the client declaration of the end of the commissioning.



Italcertifier Laboratories inform the client that the test in question is carried out with a current transducer which was developed according to the technical specification ST370582 and has a transfer function similar to that required by the specification.

This instrumentation was used without interruption for the tests carried out by the former Trenitalia S.p.A. Laboratory. before and from that of Italcertifier S.p.A until the issue of the reference Specification. The AC current measurement uncertainty requirements are those expressed by the new CEI 9-173 Standard.

- **“Test for measuring the Signal/Noise ratio on RSC equipment”.**

The Client must deliver the documentation necessary for carrying out the tests according to agreements and methods previously shared in a formal manner (e-mail or other) between its own Interface and Italcertifier RTP.

In particular, the client must provide the RTP with formal notification of:

1. STB Architecture.
2. Vehicle name.
3. Identification code (type and serial number).
4. Maximum test speed.
5. Maximum power consumption (current absorption).
6. Maximum operating speed.
7. Maximum power at the wheel.
8. Maximum power in electric braking.
9. Maximum power in rheostatic braking.
10. Traction force at starting.
11. Maximum force in electric braking.
12. Number of engines.
13. Relationship between motor power frequency (output frequency of traction inverters) and vehicle speed.
14. Signalling system software installed on the vehicle.
15. Identification code of the traction software installed on the rolling stock.
16. At the time of the start of the tests, the list of the SW that have an impact on the test results must be provided together with the related releases.

- **“Verification of the quality of current collection and of the parameters relating to the interaction between the pantograph and the overhead contact line”.**

The Client must deliver the documentation necessary for carrying out the tests according to agreements and methods previously shared in a formal manner (e-mail or other) between its own Interface and Italcertifier RTP.

In particular, the client must provide the RTP with formal notification of:

1. Full name, serial number and NEV of the vehicle.
2. Technical description of the vehicle.
3. Description of the traction chain.
4. Interior and exterior sketch/vehicle drawing.
5. Vehicle roof sketch/drawing.
6. Composition of the test train.
7. Indication of any certificate as an interoperability component.
8. Roof layout in the pantograph area.
9. Description of the pantograph, identification code and serial number.
10. Dimensional drawings of the pantograph provided by the manufacturer.
11. Characteristics and specifications of the damping and elastic elements that make up the pantograph.



12. Information on aerodynamic setup (when present).
13. Pneumatic diagram of uplift force impressed by the control unit and relative SW (when present).
14. Static force indication.
15. Indication of the contact force in case it increases according to the speed.
16. Indication of pantograph working heights.
17. Maximum speed of use.
18. Height in rest position of the pantograph.
19. Tension of the catenary using the pantograph.
20. Configuration to test (in case there are more pantographs raised on the train).
21. Distance between the pantographs of the configuration to be tested (in case there are several pantographs raised on the train).
22. Declaration relating to the applicability of the pantograph to the vehicle under test.
23. Type of overhead contact line on which to carry out the tests.
24. Section of overhead contact line on which to carry out the tests.

Italcertifer Laboratories inform the client that, at the time of completion of the pantograph instrumentation, it must not be installed on the train under test or undergo modifications¹ in the absence of personnel or written authorization by Italcertifer Laboratory.

Italcertifer Laboratories inform the client that, in the case of a measurement of aerodynamic forces, the vehicle must be able to operate simultaneously with two raised pantographs in which the instrumented pantograph is not in contact with the catenary therefore it must have the circuit breaker open. If not, the vehicle software must be changed accordingly. If the vehicle has only one pantograph, it must be brought to the test speed set by the regulations by an alternative drive (e.g., Diesel) or towed by another rolling stock.

Italcertifer Laboratories inform that the instrumentation used for the tests complies in terms of maximum error and accuracy with the requirements indicated in the EN50317:2012 standard (§7.1, §7.5, §8.2, §8.3, §9.1). Unless specifically agreed with the customer, conformity assessments are performed by applying a binary type of decision rule, with zero guard band, in accordance with ILAC G8:09/2019 §4. The applied decision rule is indicated in the test report.

- **“Braking Tests on dynamometer test bench”**

The dynamometer brake test bench located in the ITCF facility in Via Lanzi can perform tests up to 1500 rpm (or $V_{max} = 250 \text{ km/h}$ considering a wheel with a diameter of 890 mm) therefore the Client is required to comply with the operational limits mentioned above.

The Client is required to provide the RTP with the following preliminary information:

1. Type of test (UIC, EN, Custom).
2. Number of samples to be tested.
3. Chronological order of tests.

In the case of custom tests, it is necessary to indicate at least:

- Maximum Speed.
- Wheel radius.
- Disc radius.
- train mass to simulate.
- Normal force.
- Restart braking temperatures.
- In the case of tests in wet conditions, the flow rate shall be indicated.

¹ regulation of the static force, modification in aerodynamic setup, verticality of the contact strips, etc.



In addition, any other indication necessary to define the test program and the respective measures.

The customer must provide the RTP with all the documentation proving the design and construction quality of the object to be tested, for example:

- Calculations.
- Construction drawings.
- Assembly drawings.
- Certificates or test reports attesting to the mechanical and chemical characteristics of the material.
- The Product Safety Data Sheet (SDS).
- The Product Technical Data Sheet (TDS).

Any other document necessary for the execution of the test program and the respective measures.

In case that the Client supplies brake discs/wheels or other components, necessary for the test, but not subject to be tested, it is required to provide all the documentation necessary to prove its technical and constructive quality for the purposes of the test.

In any case, the Client is fully responsible for the quality of the specimens sent to the Laboratories for tests on the dynamometric bench or in any case necessary to the tests and it is responsible for any damage caused by their inadequacy.

For all the testing activities mentioned above, Italcertifier Laboratories inform that:

The client is responsible for the conditions in which the sample to be tested reaches the Italcertifier Laboratories, and therefore subsequently tested.

Italcertifier is relieved of any responsibility in case the condition of the sample supplied does not correspond to that declared by the client.

Italcertifier reiterates that the test and the consequent Report concern only the samples tested under the conditions declared by the client.

Italcertifier declines all responsibility for the data supplied by the manufacturer which have an impact on the test results.

2.1 Storage time for conservation of the test sample

For the specific tests in question, there is no minimum storage time for the sample after the test.

The timing and methods of collecting the test vehicle are managed by RTP who, for this purpose, agrees the logistics with the Client's contact person.

Regarding the "braking tests at dynamometer test bench", the Laboratories inform that:

In the case of tests on gaskets or blocks, the storage time is 10 years for homologation tests in accordance with the UIC\EN Standard.

In the case of custom tests, however, the Laboratory does not keep the samples which are returned to the customer, if requested, or destroyed if not collected by the client.

In case the test object is wheel(set)s or disc brake(s), storage or return will be agreed with the Client.



2.2 Further information to the client

All documents and declarations must be provided in Italian or English language.