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Working Party on the Construction of Vehicles

Working Party on Brakes and Running Gear (GRRF)
(Forty-fifth session, 1-5 February 1999,
agenda item 5.4.)

PROPOSAL FOR A NEW DRAFT REGULATION:

UNIFORM PROVISIONS CONCERNING THE APPROVAL OF SUPPLEMENTARY GRIP DEVICES FOR TYRES TO BE FITTED ON ROAD VEHICLES

Transmitted by the Expert from Italy

Note: The text reproduced below was prepared by the expert from Italy in order to establish provisions for snow chains to be used in M1 vehicles.

Note: This document is distributed to the Experts on Brakes and Running Gear only.

GE.98-24439

1. SCOPE

This Regulation applies to supplementary adhesion devices intended for mounting on wheels of vehicles of category M1 1/equipped with tyres complying with Regulation No. 30.

2. DEFINITIONS

For the purpose of this Regulation:

2.1. "Supplementary grip device for tyre (snow chain)" means a device to improve power transmission, particularly on snow and ice, suitable to be used on long ways.

2.2. "Snow chain type" means a category of snow chains that does not present differences about the following essential items:

2.2.1. name of the manufacturer;

2.2.2. tread pattern (transverse elements, rhomboidal, etc.);

2.2.3. construction material.

3. APPLICATION FOR APPROVAL

3.1. The application for approval of a snow chain type shall be submitted by the manufacturer, or if necessary by his duly accredited representative, and shall indicate:

3.1.1. name of the manufacturer and/or commercial trade-mark;

3.1.2. tread pattern;

3.1.3. construction material;

3.1.4. commercial designation by the manufacturer.

3.2. The application for approval shall be provided with drawings, in triplicate, sufficiently detailed to permit identification of the type. They shall also show the position intended for the approval mark, that is on an element not submitted to road contact and, if possible, on the visible side when fitted on the tyre.

3.3. The application for approval shall also be provided with two samples of snow chain representative of the type, together with the list of tyre sizes which can be fitted with these samples.

1/ Category M1 as defined in annex 7 to the Consolidated Resolution on the Construction of Vehicles (R.E.3) (document TRANS/WP.29/78/Rev.1).

4. APPROVAL

4.1. If the snow chain, submitted for approval in accordance with paragraph 3. above, meets the requirements of this Regulation, approval for this type of snow chain shall be granted.

4.2. An approval number shall be assigned to each type approved. Its first two digits (at present 00 for the Regulation in its original form) shall indicate the series of amendments incorporating the most recent major technical amendments made to the regulation at the time of issue of the approval. The same Contracting Party may not assign the same number to another type of snow chain.

4.3. Notice of approval or refusal or extension of approval of a snow chain type under this Regulation shall be communicated to the Contracting Parties to the 1958 Agreement which apply this Regulation by means of a communication form conforming to the model in annex 1 to this Regulation.

4.4. Every snow chain conforming to a type approved under this Regulation shall bear a clearly legible and indelible international approval mark consisting of:

4.4.1. a circle surrounding the letter E followed by the distinguishing number of the country which has granted approval, 2/ and

4.4.2. the number of this Regulation, followed by the letter “R”, a dash and the approval number to the right of the circle prescribed in paragraph 4.2.

4.5. The approval mark shall be clearly legible and be indelible.

2/ 1 for Germany, 2 for France, 3 for Italy, 4 for the Netherlands, 5 for Sweden, 6 for Belgium, 7 for Hungary, 8 for the Czech Republic, 9 for Spain, 10 for Yugoslavia, 11 for the United Kingdom, 12 for Austria, 13 for Luxembourg, 14 for Switzerland, 15 (vacant), 16 for Norway, 17 for Finland, 18 for Denmark, 19 for Romania, 20 for Poland, 21 for Portugal, 22 for the Russian Federation, 23 for Greece, 24 for Ireland, 25 for Croatia, 26 for Slovenia, 27 for Slovakia, 28 for Belarus, 29 for Estonia, 30 (vacant), 31 for Bosnia and Herzegovina, 32-36 (vacant), 37 for Turkey, 38-39 (vacant), 40 for The former Yugoslav Republic of Macedonia, 41 (vacant), 42 for the European Community (Approvals are granted by its Member States using their respective ECE symbol) and 43 for Japan. Subsequent numbers shall be assigned to other countries in the chronological order in which they ratify or accede to the Agreement Concerning the Adoption of Uniform Technical Prescriptions for Wheeled Vehicles, Equipment and Parts which can be Fitted and/or be Used on Wheeled Vehicles and the Conditions for Reciprocal Recognition of Approvals Granted on the Basis of these Prescriptions, and the numbers thus assigned shall be communicated by the Secretary-General of the United Nations to the Contracting Parties to the Agreement.

4.6. Annex 2 to this Regulation gives an example of the arrangement of the approval mark.

5. INDICATIONS ON THE PACKAGING

5.1. Packaging shall bear the following permanent and legible indications:

5.1.1. Name of the manufacturer or commercial trade-mark.

5.1.2. Designation of the snow chain type.

5.1.3. List of the tyre sizes which can be fitted with this snow chain.

5.1.4. An advice indicating the obligation to follow provisions of the passenger car manufacturer, when existing.

6. GENERAL REQUIREMENTS

6.1. Snow chain sizes are identified by the sizes of the tyres which can be fitted with the snow chain (with reference to paragraph 2.17. of Regulation No. 30). A snow chain may be fitted on tyres having different sizes, provided that these are included in the list of paragraph 5.1.3. of this Regulation.

6.2. The snow chains shall be suitable to be fitted to tyres having the same nominal dimensions independently from the tyre tread pattern without the use of any adaptor.

6.3. The elements of the snow chain which take part in improving adhesion shall be so designed to give good grip on snow and ice. They shall give a grip improvement both in longitudinal direction (breakaway on up grade, braking) and in transverse direction (road holding ability in a turn), in order to grant vehicle safety on snow-covered and frozen roads.

6.4. The overall dimensions of the snow chain when fitted on the tyre shall not exceed 13 mm on the internal sidewall of the tyre.

6.5. The snow chains shall be manufactured with such materials in order to resist mechanical stress and wear during use.

6.6. The different parts which make up the snow chain:

6.6.1. shall be so linked to each other to allow the snow chain to adapt to the tyre and its deformations during use, thus avoiding rapid wear;

6.6.2. shall not cause, due to their design, any damage to the tread and sidewalls of the tyre during the normal use;

6.6.3. shall be so designed to avoid blocking of compressed snow and ice among them;

6.6.4. shall be so welded not to present any burr.

6.7. For safety reasons, tightness while driving of the snow chain fixing system to the tyre shall be granted. This system shall also allow mounting and removal of the snow chain in a sufficiently easy way.

6.8. The snow chain, while driving at the maximum speed of 50 km/h, shall not damage any part of the vehicle by contact or shock of elements being unlocked or loose.

7. SPECIFIC REQUIREMENTS

7.1. Mechanical strength

7.1.1. The snow chain shall be submitted to a tensile strength test as described in annex 3 to this Regulation.

7.1.2. The different elements of the snow chain shall resist at least to the following forces:

7.1.2.1. 5000 N, for those elements which adhere to the tread of the tyre when fitted;

7.1.2.2. 4000 N, for the side chain which links the elements mentioned in paragraph 7.1.2.1. to each other;

7.1.2.3. 3000 N, for the connecting elements which are placed on the internal sidewall of the tyre when fitted;

7.1.2.4. 1200 N, for the coupling devices, pull-handle excluded.

7.2. Protection against corrosion

Metallic elements of the snow chain shall be chrome-zinc galvanized for a minimum thickness of 5 µm verified in compliance with ISO 2081, or any other as effective protection.

7.3. Wear strength

7.3.1. The snow chain shall be submitted to a wear test as described in annex 4 to this Regulation.

7.3.2. The different elements of the snow chain shall resist to the test without any failure and the tyre shall not present any damage.

7.4. Hardness test

7.4.1. The snow chain shall be submitted to the hardness test as described in ISO 6507-1.

7.4.2. The elements which adhere to the tread of the tyre when fitted shall satisfy the following requirements:

7.4.2.1. core hardness: 400 HV1 ± 100 HV1;

7.4.2.2. surface hardness: 750 HV1 minimum;

7.4.2.3. minimum depth of casehardening for which the hardness is not less than 550 HV1/15, verified in conformity with ISO 2639: 5% of the wire diameter.

7.5. Dynamic lifting

7.5.1. The snow chain shall be submitted to a dynamic lifting test as described in annex 5 to this Regulation.

7.5.2. The elements which adhere to the tread of the tyre when fitted shall not lift from the tread surface more than 25 mm.

7.6. Effectiveness tests

Noted the high variability of conditions which can be found in performing the tests (power of the engine, traction scheme, weight distribution and wheel dimensions of the test car; environmental and road surface conditions), these tests are performed through comparative results obtained with the snow chain submitted for approval and a sample snow chain which characteristics are listed in annex 8 to this Regulation.

7.6.1. Comparative tests on frozen road

The snow chain shall be submitted to the tests on iced road surface as described in annex 6 to this Regulation.

7.6.2. Comparative test on snow-covered road

The snow chain shall be submitted to the test on a snow-covered road surface as described in annex 7 to this Regulation.

7.6.3. Tests validation

7.6.3.1. For each test mentioned in paragraphs 7.6.1. and 7.6.2., the difference of a single measurement from the mean value obtained in the whole test shall be contained in a range of ± 10%, both with the snow chain submitted for approval and with the sample snow chain.

7.6.3.2. To repeat once any measurement which is outside the above-mentioned range is permitted.

7.6.3.3. Should the maximum allowed deviation be exceeded even after the above-mentioned repetition, the test shall be performed from the beginning.

7.6.4. Results evaluation

7.6.4.1. For each test mentioned in paragraphs 7.6.1. and 7.6.2., the effectiveness ratio between the mean value obtained with the snow chain submitted for approval and the mean value obtained with the sample snow chain shall not be less than 0.7.

7.6.4.2. Furthermore, the mean of all the effectiveness ratio mentioned in paragraph 7.6.4.1, shall not be less than 0.8.

8. USE AND MAINTENANCE MANUAL

8.1. Every snow chain packaging shall contain the manual for use and maintenance which shall report at least the following information:

8.1.1. Advice of the prohibition to exceed the maximum speed of 50 km/h when using snow chains;

8.1.2. Detailed instructions for mounting (and stretching) and for removal, illustrated by photographs or pictures;

8.1.3. Information on handling, maintenance, recover and on the limits of use;

8.1.4. General rules of behaviour for safety while driving with snow chains;

8.1.5. Advice of the obligation to follow possible provisions of the passenger car manufacturer;

8.1.6. name and address of the manufacturer of the snow chain.

9. MODIFICATION OF SNOW CHAIN TYPE AND EXTENSION OF APPROVAL

9.1. Every modification of the snow chain type shall be notified to the administrative department which approved the snow chain type. The department may then either:

9.1.1. Consider that the modifications made are unlikely to have appreciable adverse effects and that in any case the type of snow chain still complies with the requirements, or

9.1.2. Require a further test report from the Technical Service responsible for conducting the tests.

9.2. Confirmation or refusal of approval, specifying the alterations, shall be communicated by the procedure specified in paragraph 4.3. above to the Parties to the Agreement applying this Regulation.

9.3. The competent authority issuing an extension of approval shall assign a series number to each communication form drawn up for such an extension and inform thereof the other Contracting Parties to the Agreement by means of a communication form conforming to the model in annex 2 to this Regulation.

10. CONFORMITY OF PRODUCTION

10.1. The conformity of production procedures shall comply with those set out in the Agreement, appendix 2 (E/ECE/324-E/ECE/TRANS/505/Rev.2).

10.2. The authority which has granted type approval may at any time verify the conformity control methods applied in each production facility. The normal frequency of these verifications shall be once every two years.

11. PENALTIES FOR NON-CONFORMITY OF PRODUCTION

11.1. The approval granted in respect of a type of snow chain pursuant to this Regulation may be withdrawn if the requirements laid down in paragraph 10.1. above are not complied with or if a snow chain selected has failed to pass the checks prescribed in paragraph 10.2. above.

11.2. If a Contracting Party to the Agreement applying this Regulation withdraws an approval it has previously granted, it shall forthwith so notify the other Contracting Parties applying this Regulation, by means of a communication form conforming to the model in annex 1 to this Regulation.

12. PRODUCTION DEFINITIVELY DISCONTINUED

If the holder of an approval completely ceases to manufacture a type of snow chain approved in accordance with this Regulation, he shall so inform the authority which granted the approval. Upon receiving the relevant communication, that authority shall inform the other Parties to the 1958 Agreement applying this Regulation by means of a communication form conforming to the model in annex 1 to this Regulation.

13. NAMES AND ADDRESSES OF TECHNICAL SERVICES RESPONSIBLE FOR CONDUCTING APPROVAL TESTS AND OF ADMINISTRATIVE DEPARTMENTS

The Contracting Parties to the Agreement applying this Regulation shall communicate to the United Nations secretariat the names and addresses of the technical services responsible for conducting approval tests and of the administrative departments which grant approval and to which forms certifying approval or extension or refusal or withdrawal of approval, or production definitively discontinued issued in other countries, are to be sent.

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Annex 1

COMMUNICATION

(maximum format: A4 (210 x 297 mm))

issued by: Name of administration:
.....
.....
.....

concerning: 2/ APPROVAL GRANTED
APPROVAL EXTENDED
APPROVAL REFUSED
APPROVAL WITHDRAWN
PRODUCTION DEFINITELY DISCONTINUED

of a snow chain type pursuant to Regulation No. ....

Approval No.: ..... Extension No.:.....

1. Trade name or mark of the snow chain . . . . . .

2. Trade name designation, by the manufacturer, of the snow chain type. . . . . .

3. Name and address of the manufacturer . . . . . .

4. If applicable, name and address of the manufacturer's representative . . . . . .

5. Date on which the snow chain was submitted for approval tests. . . . . .

6. Technical service responsible for carrying out the approval tests. . . . . .

7. Date of test report issued by the technical service. . . . . .

8. Approval granted/refused/extended/withdrawn 2/

9. Reason(s) for the extension (if applicable) . . . . . .

10. Remarks . . . . . .

11. Place . . . . . .

12. Date . . . . . .

13. Name and signature . . . . . .

14. Annexed is a list of documents making up the approval file, deposited with the competent authority which granted approval, a copy of which can be obtained on request.

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1/ Name of the administration.

2/ Strike out what does not apply.

Annex 2

ARRANGEMENT OF THE APPROVAL MARK

a = 4 mm min

The snow chain bearing the above approval mark has been approved in Italy (E3) under approval number 002643.

The first two digits of the approval number indicate that the approval was granted in accordance with the requirements of Regulation No. XX in its original form.

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Annex 3

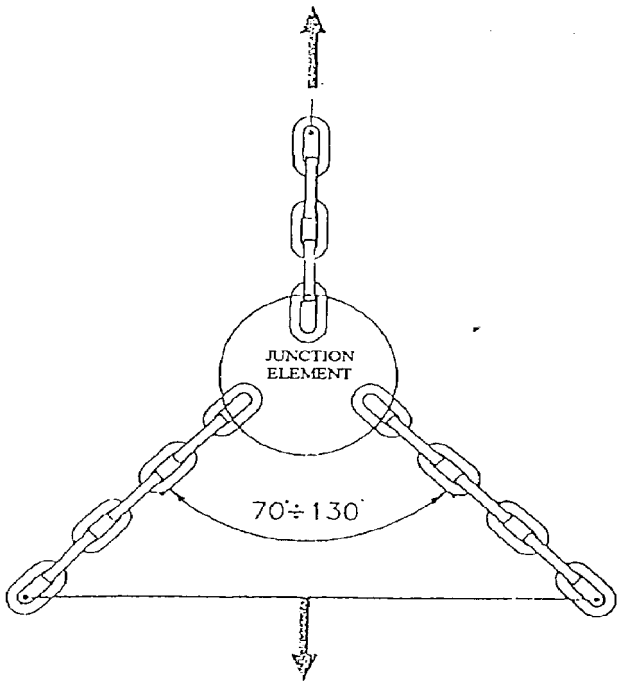
TENSILE STRENGTH TEST

1. Those elements which adhere to the tread of the tyre when fitted, the side chain which links these elements to each other and the connecting elements placed on the internal sidewall of the chain when fitted shall be subject to tensile strength test till breaking. The coupling devices, pull-handle excluded, shall be subject to tensile strength test till their releasing.

2. In case of rhomboidal tread pattern (or similar), the elements which adhere to tyre tread shall be tested reproducing its geometrical disposition when fitted to the tyre. It shall be tested by means of a special equipment having three fixing points and with the angle shown in Figure 1 between 70E and 130E.

3. All the other elements of the snow chain shall be tested being in a coaxial position with respect to the axis of the tensile test machine.

Figure 1 - Tensile strength test for rhomboidal elements



Annex 4

WEAR STRENGTH TEST

1. Conditions of the vehicle

1.1. To conduct the wear strength test a passenger car shall be used having a complete vehicle kerb mass of:
- 900 ÷ 1400 kg, if front-wheel drive;
- 1100 ÷ 1600 kg, if rear-wheel drive.

1.2. Maximum power of the car used for the test shall not be less than 50 kW.

1.3. The test shall be performed with the car in its kerb mass configuration with the driver and a passenger of 70 kg of weight seated in the front seat.

1.4. Tyres fitted on the car shall have a tread depth conforming to legislative provisions. Tyres shall be inflated at the pressure requested by the car manufacturer.

1.5. Snow chains shall be correctly fitted to the tyres of the driving wheels following the instructions shown on the manual for use and maintenance described under paragraph 8 of this Regulation.

2. Test procedure

2.1. The car fitted with the snow chains is driven on a dry asphalted road surface for at least 2 hours, at a speed of around but not more than 50 km/h, covering a minimum distance of 100 km.

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Annex 5

DYNAMIC LIFTING TEST

1. Conditions of the vehicle

1.1. The vehicle used for dynamic lifting test shall conform to provisions given in paragraph 1 of annex 4.

2. Test procedure

2.1. The car fitted with snow chains is driven on a dry asphalted road surface at a constant speed of 50 km/h.

2.2. Dynamic lifting of the snow chain from the tyre tread is measured by means of appropriate measuring devices (video recording, stroboscope, etc.).

2.3. It is allowed to perform the dynamic lifting test within a laboratory using the appropriate equipment. In this case it shall be assured that peripheral velocity of the tyre tread fitted with the snow chain be equal to the speed of 50 km/h on road.

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Annex 6

COMPARATIVE TESTS ON FROZEN ROAD

1. Conditions of the vehicle

1.1. The vehicle used for comparative tests on a frozen road shall conform to provisions given in paragraph 1 of annex 4.

2. Conditions of the road surface

2.1. Tests shall be performed on a frozen road which is straight, regular and which has a longitudinal slope of not more than ± 2%, with the ice being at a temperature between -10 EC and -3 EC.

3. Tests procedure

3.1. Each test is performed carrying out ten measurements with the sample snow chain and ten with the snow chain submitted for approval in the following order: 5 measurements with the sample snow chain,
10 measurements with the snow chain submitted for approval,
5 measurements with the sample snow chain.

4. Braking test

4.1. The car is driven at a constant speed of 50 km/h, then it is braked, by acting a progressive but firm pressure on the brake pedal, until stopping.

4.2. The stopping distance is measured by means of appropriate instruments.

5. Acceleration test

5.1. The car is accelerated from standstill until it covers a distance of 50 m.

5.2. The action on the accelerator pedal is the one that leads to the maximum acceleration of the car. The test is performed in first gear. Should the maximum power r.p.m. of the engine be reached before covering 50 m, second gear shall be engaged.

5.3. The time necessary to cover 50 m is measured by means of appropriate instruments.

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Annex 7

COMPARATIVE TEST ON SNOW-COVERED ROAD

1. Conditions of the vehicle

1.1. The vehicle used for the comparative test on a snow-covered road shall conform to provisions given in paragraph 1 of annex 4.

2. Conditions of the road surface

2.1. The test shall be performed on a straight road which has a longitudinal slope of not more than ± 2%, covered with a compact layer of snow, being this at a temperature between -8EC and -1 EC.

3. Test procedure

3.1. The test is performed carrying out three measurements with the sample snow chain followed by three measurement with the snow chain submitted for approval.

4. Traction test

4.1. The test car is coupled to a towed vehicle by means of a drawbar being parallel to the longitudinal axis of the car. An appropriate dynamometer is placed between the car mechanical coupling and the drawbar.

4.2. The towed vehicle shall have a complete kerb mass not less than 3 times the mass of the test car.

4.3. Being in first gear, the clutch pedal is released together with a progressive action on the accelerator pedal, until driving wheels reach their complete skidding.

4.4. The value of the maximum traction force daN is measured by means of the dynamometer.

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Annex 8

SAMPLE SNOW CHAIN

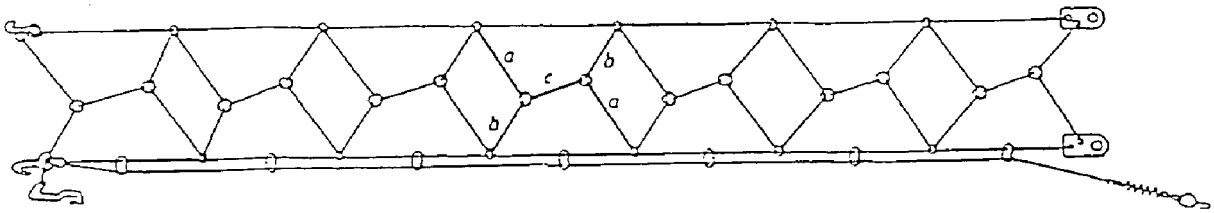
1. Dimensional requirements

1.1. The rings of the sample snow chain, i.e. those almost elliptical elements which form the links of the snow chain, shall have square section with the side measuring 3.7 mm.

1.2. The major axis of the rings, measured on the inner edge of the square section, shall measure 12.5 mm.

1.3. The links structure of the sample snow chain shall be as shown in Figure 2. The total number of rhombus, i.e. those geometrical figures described by two sides of length a and two sides of length b, when the sample snow chain is fitted to the tyres shall be of 7.

Figure 2 - Links structure of the sample snow chain



1.4. With reference to Figure 2, Table 1 gives an example on how to dimension the sample snow chain in function to some reference sizes of tyres which could be used to perform comparative tests listed in annexes 6 and 7 of this Regulation. If the test car is fitted with tyres having sizes other than those listed in Table 1 a sample snow chain having appropriate dimensions, even different from those listed in Table 1, shall be chosen.

Table 1 - Example of dimensions of the sample snow chain

Reference sizes	Number of rings for sides a/b/c
155 - 13	13 / 7 / 7
165 - 13	15 / 7 / 7
165 - 14	15 / 9 / 7
175 - 14	15 / 9 / 7
185 - 14	15 / 9 / 7

2. Strength requirements

2.1. The sample snow chain shall be subject to the tensile strength test described in annex 3 to this Regulation.

2.2. All elements of the sample snow chain shall satisfy provisions listed under paragraph 7.1.2. of this Regulation.

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