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From: Secretary-General of the European Commission,
signed by Mr Jordi AYET PUIGARNAU, Director

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To: Mr Uwe CORSEPIUS, Secretary-General of the Council of the European
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Subject: ANNEXES to the Commission Delegated Regulation of XXX
supplementing and amending Regulation (EU) No 167/2013 of the
European Parliament and of the Council with regard to vehicle construction
and general requirements for the approval of agricultural and forestry
vehicles

Delegations will find attached document C(2014) 6494 final - Annexes 1 to 6.

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ANNEXES 1 to 6

ANNEXES

to the

Commission Delegated Regulation

of XXX

**supplementing and amending Regulation (EU) No 167/2013 of the European Parliament
and of the Council with regard to vehicle construction and general requirements for the
approval of agricultural and forestry vehicles**

ANNEXES

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ANNEX I
Application of UNECE regulations

| UNECE regulation No | Subject | Series of amendments | OJ Reference | Applicability |
|----------------------------|--|---|-----------------------------|----------------------|
| 14 | Safety-belt anchorages, ISOFIX anchorages systems and ISOFIX top tether anchorages | Supplement 1 to the 07 series of amendments | OJ L 109, 28.4.2011, p. 1 | T and C |
| 16 | Safety belts, restraint systems and child restraint systems | Supplement 1 to the 06 series of amendments | OJ L 233, 9.9.2011, p. 1 | T and C |
| 43 | Safety glazing | Supplement 12 to the 00 series of amendments | OJ L 230, 31.8.2010, p. 119 | T and C |
| 60 | Driver operated controls - identification of controls, tell-tales and indicators (moped/motorcycles) | | OJ L 95, 31.3.2004, p. 10 | T and C |
| 79 | Steering equipment | Supplement 3 to the 01 series of amendments and Corrigendum 20 January 2006 | OJ L 137, 27.5.2008, p. 25 | T and C |

Explanatory note: The fact that a component is included in this list does not make its installation mandatory. For certain components, however, mandatory installation requirements are laid down in other Annexes to this Regulation.

ANNEX II
Recognition of test reports issued on the basis of OECD Codes for the purposes of EU
type-approval

| Test report on the basis of OECD Code No | Subject | Edition | Applicability | Alternative to the EU test report on the basis of |
|---|--|-----------------------------|--------------------------------------|--|
| 3 | Official testing of protective structures on agricultural and forestry tractors (dynamic test) | Edition 2015 -July 2014- | T1, T4.2 and T4.3 | Annex VI and Annex XVIII (if the seat-belt anchorages have been tested) |
| 4 | Official testing of protective structures on agricultural and forestry tractors (static test) | Edition 2015 -July 2014- | T1/C1, T4.2/C4.2 and T4.3/C4.3 | Annex VIII and Annex XVIII (if the seat-belt anchorages have been tested) |
| 5 | Official measurement of noise at the driving position(s) on agricultural and forestry tractors | Edition 2015 -July 2014- | T and C | Annex XIII |
| 6 | Official testing of front mounted roll-over protective structures on narrow-track wheeled agricultural and forestry tractors | Edition 2015 -July 2014- | T2, T3 and T4.3 | Annex IX and Annex XVIII (if the seat-belt anchorages have been tested) |
| 7 | Official testing of rear mounted roll-over protective structure on narrow-track wheeled agricultural and forestry tractors | Edition 2015 -July 2014- | T2/C2, T3/C3 and T4.3/C4.3 | Annex X and Annex XVIII (if the seat-belt anchorages have been tested) |
| 8 | Official testing of protective structures on agricultural and forestry track-laying tractors | Edition 2015 -July 2014- | C1, C2, C4.2 and C4.3 | Annex VII and Annex XVIII (if the seat-belt anchorages have been tested) |
| 10 | Official testing of falling object protective structures on agricultural and forestry tractors | Edition 2015 -July 2014- | T and C | Annex XI Part C |

ANNEX III
Arrangements with regard to type-approval procedures, including the requirements relating to virtual testing

1. Type-approval process

When receiving an application for vehicle type-approval, the approval authority shall:

- 1.1. verify that all EU type-approval certificates issued and test reports granted pursuant to Regulation (EU) 167/2013 and the delegated and implementing acts adopted pursuant to that Regulation which are applicable for vehicle type-approval cover the vehicle type and correspond to the prescribed requirements;
- 1.2. by reference to the documentation make sure that the vehicle specifications and data contained in the vehicle information document are included in the data in the information packages and in the EU type-approval certificates issued in accordance with Regulation (EU) 167/2013 and the delegated and implementing acts adopted pursuant to that Regulation;
- 1.3. on a selected sample of vehicles from the type to be approved carry out or arrange to be carried out inspections of vehicle parts and systems to verify that the vehicle(s) is/are built in accordance with the relevant data contained in the authenticated information package in respect of Regulation (EU) 167/2013 and the delegated and implementing acts adopted pursuant to that Regulation;
- 1.4. carry out or arrange to be carried out relevant installation checks in respect of separate technical units where applicable;
- 1.5. carry out or arrange to be carried out necessary checks in respect of the presence of the subjects provided for in Annex I of Regulation (EU) No 167/2013;

2. Combination of technical specifications

The number of vehicles to be submitted shall be sufficient to permit the proper check of the various combinations to be type-approved according to the following criteria:

- 2.1. propulsion unit;
- 2.2. transmission;
- 2.3. powered axles (number, position and interconnection);
- 2.4. steered axles (number and position);
- 2.5. braking system and braked axles (number);
- 2.6. roll-over protection structure;
- 2.7. protection against hazardous substances.

3. Specific provisions

3. Where no approval certificates or test reports in respect of the subjects covered by Regulation (EU) 167/2013 or the delegated and implementing acts adopted pursuant to that Regulation are available, the approval authority shall:
 - 3.1. arrange for the necessary tests and checks as required by Regulation (EU) 167/2013 and the delegated and implementing acts adopted pursuant to that Regulation;
 - 3.2. verify that the vehicle conforms to the particulars in the vehicle information folder and that it meets the technical requirements of Regulation (EU) 167/2013 and the delegated and implementing acts adopted pursuant to that Regulation;
 - 3.3. carry out or arrange to be carried out relevant installation checks in respect of components and separate technical units where applicable.

4. Procedures to be followed during multi-stage EU type-approval

4.1. General

- 4.1.1. The satisfactory operation of the process of multi-stage EU type-approval requires joint action by all the manufacturers concerned. To this end type-approval authorities shall ensure, before granting first and subsequent stage approval, that suitable arrangements exist between the relevant manufacturers for the supply and interchange of documents and information such that the completed vehicle type meets the technical requirements of Regulation (EU) 167/2013 and the delegated and implementing acts adopted pursuant to that Regulation. Such information shall include details of relevant system, component and separate technical unit approvals and of vehicle parts which form part of the incomplete vehicle but are not yet approved.
- 4.1.2. EU Type-approvals in accordance with point 4. are granted on the basis of the current state of completion of the vehicle type and shall incorporate all approvals granted at earlier stages.
- 4.1.3. Each manufacturer in a multi-stage EU type-approval process is responsible for the approval and conformity of production of all systems, components or separate technical units manufactured by him or added by him to the previously built stage. He is not responsible for subjects which have been approved in an earlier stage except in those cases where he modifies relevant parts to an extent that the previously granted approval becomes invalid.

4.2. Procedures.

The approval authority shall:

- 4.2.1. verify that all EU type-approval certificates issued and test reports granted pursuant to Regulation (EU) 167/2013 and the delegated and implementing acts adopted pursuant to that Regulation which are applicable for vehicle type-approval cover the vehicle type at its state of completion and correspond to the prescribed requirements;
- 4.2.2. ensure that all the relevant data, taking account of the state of completion of the vehicle, is included in the information folder;
- 4.2.3. by reference to the documentation make sure that the vehicle specification(s) and data contained in the vehicle information folder are included in the data in the information packages and in the EU type-approval certificates, in accordance with Regulation (EU) 167/2013 or the delegated and implementing acts adopted pursuant to that Regulation;

and in the case of a completed vehicle, where an item number in the information folder is not included in any of the information packages, confirm that the relevant part of characteristic conforms to the particulars in the information folder;

- 4.2.4. on a selected sample of vehicles from the type to be approved carry out or arrange to be carried out inspections of vehicle parts and systems to verify that the vehicle(s) is/are built in accordance with the relevant data contained in the authenticated information package in respect of Regulation (EU) 167/2013 and the delegated and implementing acts adopted pursuant to that Regulation;
- 4.2.5. Carry out or arrange to be carried out relevant installation checks in respect of separate technical units where applicable.
- 4.3. The number of vehicles to be inspected for the purposes of point 4.2.4 shall be sufficient to permit the proper control of the various combinations to be EU type-approved according to the state of completion of the vehicle and the criteria set-out in point 2.

5. Conditions under which virtual testing has to be performed and requirements which can be subject to virtual testing

5.1. Objectives and scope

Point 5. lays down appropriate provisions concerning virtual testing in accordance with Article 27(6) of Regulation (EU) No 167/2013. It shall not apply to the second subparagraph of Article 27(3) of that Regulation.

5.2. List of requirements which may be subject to virtual testing

| Delegated act reference | Annex No | Requirement | Restrictions / Comments |
|-------------------------|----------|---|-------------------------|
| RVCR | IX | continuous or interrupted roll over behaviour in case of a laterally overturning narrow track tractor with a protective frame mounted in front of the driver's seat | Section B4 |

Table 1: List of requirements which may be subject to virtual testing.

6. Conditions under which virtual testing has to be performed

6.1. Virtual test pattern

The following scheme shall be used as a basic structure for describing and conducting virtual testing:

- 6.1.1. purpose;
- 6.1.2. structure model;
- 6.1.3. boundary conditions;
- 6.1.4. load assumptions;
- 6.1.5. calculation;

- 6.1.6. assessment;
- 6.1.7. Documentation.
- 6.2. Fundamentals of computer simulation and calculation
- 6.2.1. Mathematical model

The mathematical model shall be supplied by the manufacturer. It shall reflect the complexity of the structure of the vehicle, system and components to be tested in relation to the requirements. The same provisions shall apply *mutatis mutandis* for testing components or technical units independently from the vehicle.

- 6.2.2. Validation process of the mathematical model

The mathematical model shall be validated in comparison with the actual test conditions. A physical test shall be conducted for the purposes of comparing the results obtained when using the mathematical model with the results of a physical test. Comparability of the test results shall be proven. A validation report shall be drafted by the manufacturer or by the technical service and submitted to the approval authority. Any change made to the mathematical model or to the software likely to invalidate the validation report shall be brought to the attention of the approval authority, which may require that a new validation process is conducted. The flow chart of the validation process is shown in Figure 1 of point 7.

- 6.2.3. Documentation

The data and auxiliary tools used for the simulation and calculation shall be made available by the manufacturer and be documented in a suitable way.

- 6.2.4. Tools and support

At the request of the technical service, the manufacturer shall supply or provide access to the necessary tools, including appropriate software.

- 6.2.5. In addition, the manufacturer shall provide appropriate support to the technical service.

- 6.2.6. Providing access and support to a technical service does not detract from any obligation of the technical service regarding the skills of its personnel, the payment of licence rights and respect of confidentiality.

7. Validation process virtual testing

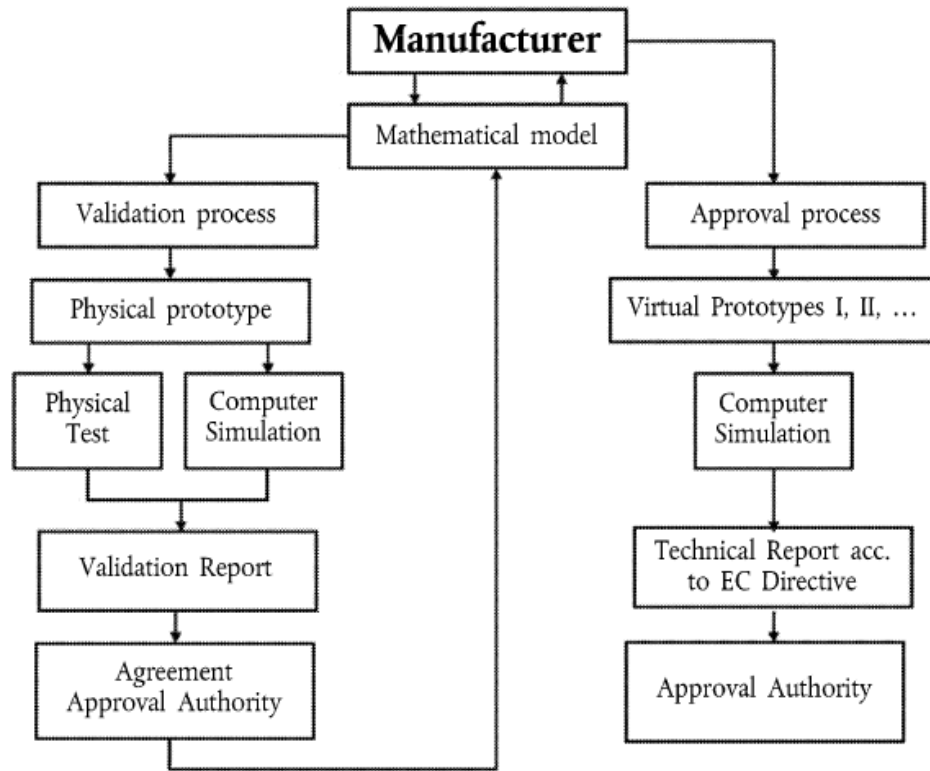


Figure 1: Virtual testing validation process flow chart.

ANNEX IV
Arrangements with regard to conformity of production

1. Definitions

For the purposes of this Annex the following definitions shall apply:

- 1.1. 'quality management system' means a set of interrelated or interacting elements that organisations use to direct and control how quality policies are implemented and quality objectives are achieved;
- 1.2. 'audit' means an evidence-gathering process used to evaluate how well audit criteria are being applied; it should be objective, impartial and independent, and the audit process should be both systematic and documented;
- 1.3. 'corrective actions' means a problem-solving process with subsequent steps taken to remove the causes of a nonconformity or undesirable situation and designed to prevent their recurrence;

2. Purpose

- 2.1. The conformity of production procedure aims to ensure that each vehicle, system, component, separate technical unit, part or equipment produced is in conformity with the specification, performance and marking requirements of the approved type.
- 2.2. Procedures include inseparably the assessment of quality management systems, referred as 'initial assessment' and set out in section 3. and verification and production-related controls, referred to as 'product conformity arrangements' and set out in section 4.

3. Initial assessment

- 3.1. Before granting type-approval, the approval authority shall verify the existence of satisfactory arrangements and procedures established by the manufacturer for ensuring effective control so that vehicles, systems, components or separate technical units when in production conform to the approved type.
- 3.2. Guidelines for quality and/or environmental management systems auditing set out in the EN ISO 19011:2011 standard shall apply to the initial assessment.
- 3.3. The requirements referred to in point 3.1. shall be verified to the satisfaction of the approval authority granting type-approval. The approval authority shall be satisfied with the initial assessment and the product conformity arrangements in section 4. taking account as necessary of one of the arrangements described in points 3.3.1. to 3.3.3. or a combination of those arrangements in full or in part as appropriate.
 - 3.3.1. The initial assessment and/or verification of product conformity arrangements shall be carried out by the approval authority granting the approval or an appointed body acting on behalf of the approval authority.
 - 3.3.1.1. When considering the extent of the initial assessment to be carried out, the approval

authority may take account of available information relating to:

- 3.3.1.1.1. the manufacturer's certification described in point 3.3.3., which has not been qualified or recognised under that point;
- 3.3.1.1.2. in the case of components or separate technical units type-approvals, quality system assessments performed in the component or separate technical unit manufacturer's premises by vehicle manufacturer(s), according to one or more of the industry sector specifications satisfying the requirements in harmonised standard EN ISO 9001:2008.
- 3.3.2. The initial assessment and/or verification of product conformity arrangements may also be carried out by the approval authority of another Member State, or the appointed body designated for this purpose by the approval authority.
 - 3.3.2.1. In such a case, the approval authority of the other Member State shall prepare a statement of compliance outlining the areas and production facilities it has covered as relevant to the vehicles, systems, components or separate technical units to be type-approved.
 - 3.3.2.2. On receiving an application for a compliance statement from the approval authority of a Member State granting type-approval, the approval authority of another Member State shall send forthwith the statement of compliance or advise that it is not in a position to provide such a statement.
 - 3.3.2.3. The statement of compliance shall include at least the following:
 - 3.3.2.3.1. group or company (e.g. XYZ automotive);
 - 3.3.2.3.2. particular organisation (e.g. European division);
 - 3.3.2.3.3. plants/sites (e.g. Engine plant 1 (United Kingdom) — vehicle plant 2 (Germany));
 - 3.3.2.3.4. vehicle/component range (e.g. All category T1 models);
 - 3.3.2.3.5. areas assessed (e.g. Engine assembly, body pressing and assembly, vehicle assembly);
 - 3.3.2.3.6. documents examined (e.g. Company and site quality manual and procedures);
 - 3.3.2.3.7. date of the assessment (e.g. Audit conducted from 18 to 30.5.2013);
 - 3.3.2.3.8. planned monitoring visit (e.g. October 2014).
 - 3.3.3. The approval authority shall also accept the manufacturer's suitable certification to harmonised standard EN ISO 9001:2008 or an equivalent harmonised standard as satisfying the initial assessment requirements of point 3.3. The manufacturer shall provide details of the certification and undertake to inform the approval authority of any revisions to its validity or scope.
- 3.4. For the purpose of vehicle type-approval, the initial assessments carried out for granting approvals for systems, components and separate technical units of the vehicle need not be repeated but shall be complemented by an assessment covering the locations and activities relating to the assembly of the whole vehicle not covered by the former assessments.

4. Product conformity arrangements

- 4.1. Every vehicle, system, component or separate technical unit approved pursuant to Regulation (EU) No 167/2013 and the delegated and implementing acts adopted pursuant to that Regulation, pursuant to a UNECE regulation annexed to the Revised 1958 Agreement, or pursuant to a complete test report issued on the basis of OECD Codes listed in Annex II to this Regulation, shall be so manufactured as to conform to the approved type by meeting the requirements of this Annex, Regulation (EU) No 167/2013 and the delegated and implementing acts adopted pursuant to that Regulation, as well as the relevant UNECE regulation(s) and OECD Code(s).
- 4.2. Before granting a type-approval pursuant to Regulation (EU) No 167/2013 and the delegated and implementing acts adopted pursuant to that Regulation, a UNECE regulation annexed to the Revised 1958 Agreement or an OECD Code, the approval authority of a Member State shall verify the existence of adequate arrangements and documented control plans, to be agreed with the manufacturer for each approval, to carry out at specified intervals those tests or associated checks necessary to verify continued conformity with the approved type, including, where applicable, tests specified in Regulation (EU) No 167/2013, the UNECE regulation and the OECD Code.
- 4.3. The holder of the type-approval shall, in particular:
 - 4.3.1. ensure the existence and application of procedures for effective control of the conformity of products (vehicles, systems, components or separate technical units) to the approved type;
 - 4.3.2. have access to the testing or other appropriate equipment necessary for checking conformity to each approved type;
 - 4.3.3. ensure that test or check result data are recorded and that annexed documents remain available for a period of up to 10 years to be determined in agreement with the approval authority;
 - 4.3.4. analyse the results of each type of test or check, in order to verify and ensure the stability of the product characteristics, making allowance for variation in industrial production;
 - 4.3.5. ensure that for each type of product, at least the checks and the tests prescribed in Regulation (EU) No 167/2013 and the delegated and implementing acts adopted pursuant to that Regulation as well as those set out in the relevant UNECE Regulation or OECD Code are carried out;
 - 4.3.6. ensure that any set of samples or test pieces giving evidence of non-conformity in the type of test in question gives rise to a further sampling and test or check. All the necessary steps shall be taken to restore the production process to ensure conformity with the approved type;
 - 4.3.7. in the case of vehicle type-approval, the checks referred to in point 4.3.5 shall at least consist in verifying the correct built specifications in relation to the approval and the information required for certificates of conformity.
- 4.4. In the case of step-by-step, mixed or multi-stage type-approvals, the approval authority granting whole vehicle type-approval may request specific details regarding compliance with the conformity of production requirements set out in this Annex from any approval authority that granted type-approval of any relevant system, component or separate technical unit.

- 4.5. If the approval authority granting whole vehicle type-approval is not satisfied with the reported information referred to in point 4.4. and has communicated this in writing to the manufacturer in question and the approval authority granting type-approval for the system, component or separate technical unit, the approval authority granting whole vehicle type-approval shall demand additional conformity of production audits or checks to be performed at the site of the manufacturer(s) of those systems, components or separate technical units and the results shall immediately be made available to the approval authority concerned.
- 4.6. If points 4.4 and 4.5 apply and the further audit or check results are deemed not to be satisfactory in the opinion of the approval authority granting whole vehicle type-approval, the manufacturer shall ensure that conformity of production is restored as soon as possible by corrective actions to the satisfaction of the approval authority granting whole vehicle type-approval and to the satisfaction of the approval authority granting type-approval of the system, component or separate technical unit.

5. Continued verification arrangements

- 5.1 The authority which has granted type-approval may at any time verify the conformity of production control methods applied in each production facility by means of periodic audits. The manufacturer shall for that purpose allow access to the manufacture, inspection, testing, storage and distribution sites and shall provide all necessary information with regard to the quality management system documentation and records.
- 5.1.1. The normal approach for such periodic audits shall be to monitor the continued effectiveness of the procedures laid down in sections 3 and 4 (initial assessment and product conformity arrangements) of this Annex.
- 5.1.1.1. Surveillance activities carried out by the technical services (qualified or recognised as required in point 3.3.3) shall be accepted as satisfying the requirements of point 5.1.1 with regard to the procedures established at initial assessment.
- 5.1.1.2. The normal frequency of these verifications by the approval authority (other than those referred to in point 5.1.1.1.) shall be such as to ensure that the relevant conformity of production controls applied in accordance with sections 3 and 4 are reviewed over a period consistent with the climate of trust established by the approval authority.
- 5.2. At every review, the records of tests, checks and production records, and in particular the records of those tests or checks documented as required in point 4.2., shall be available to the inspector.
- 5.3. The inspector may select random samples to be tested in the manufacturer's laboratory or in the facilities of the technical service, in which case only physical tests shall be carried out. The minimum number of samples may be determined according to the results of the manufacturer's own verification.
- 5.4. Where the level of control appears unsatisfactory, or when it seems necessary to verify the validity of the tests carried out in application of point 5.2., the inspector shall select samples to be sent to the technical service to perform physical tests in accordance with the requirements set out in section 4 and in Regulation (EU) No 167/2013, the delegated and implementing acts adopted pursuant to that Regulation, the relevant UNECE Regulation or OECD Code.
- 5.5. Where unsatisfactory results are found during an inspection or a monitoring review, the approval authority shall ensure that all necessary steps are taken to restore conformity

of production as rapidly as possible.

- 5.6. Where Regulation (EU) No 167/2013 requires compliance with UNECE regulations or allows to use complete test reports issued on the basis of OECD standard Codes as an alternative to the requirements set out in the delegated acts adopted pursuant to that Regulation, the manufacturer may choose to apply the provisions of this Annex as an alternative to the conformity of production requirements in the respective UNECE regulations or OECD Codes. However, if points 4.5 or 4.6 apply, all separate conformity of production requirements in UNECE Regulations or OECD Codes have to be complied with to the satisfaction of the approval authority until it decides that conformity of production has been restored.

ANNEX V

Requirements with regard to access to repair and maintenance information

List of Appendices

| Appendix Number | Appendix title | Page |
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| 1 | Access to vehicle OBD and vehicle repair and maintenance information | |
| 2 | Information to enable the development of generic diagnostic tools | |

1. Definition

For the purposes of this Annex the following definition shall apply: ‘access to Vehicle OBD and Vehicle Repair and Maintenance Information’ means the availability of all OBD and repair and maintenance information required for the inspection, diagnosis, servicing or repair of the vehicle.

2. Compliance with access to vehicle OBD and vehicle repair and maintenance information requirements in the type-approval procedure

2.1. The manufacturer shall ensure compliance with the technical requirements in this Annex regarding access to vehicle OBD and vehicle repair and maintenance information.

2.2. Approval authorities shall grant type-approval only after receiving from the manufacturer a Certificate on Access to Vehicle OBD and Vehicle Repair and Maintenance Information.

2.3. The Certificate on Access to Vehicle OBD and Vehicle Repair and Maintenance Information shall serve as the proof of compliance with Chapter XV of Regulation (EU) No 167/2013.

2.4. The Certificate on Access to Vehicle OBD and Vehicle Repair and Maintenance Information shall be drawn up in accordance with the model referred to in Article 53(8)(3) to Regulation (EU) No 167/2013.

3. Fees for access

In addition to time-based access under Article 55 of Regulation (EU) No 167/2013, manufacturers may offer transaction-based access for which fees are charged per transaction and not based on the time for which access is granted. Where manufacturers offer both time-based and transaction-based access systems, independent repairers shall choose a preferred access system, either time-based or transaction based.

4. Service parts, diagnostic tools and test equipment

4.1. In the context of Article 53 (6) of Regulation (EU) No 167/2013, the manufacturer shall make the following information available to interested parties on the basis of individual arrangements to which the principle of Article 55 of Regulation (EU) No 167/2013 apply and to provide contact details on its website:

4.1.1. relevant information to enable the development of replacement components which are critical to the correct functioning of the OBD system;

4.1.2. information to enable the development of generic diagnostic tools as listed in Appendix 2.

4.2. For the purposes of point 4.1.1., the development of replacement components shall not be restricted by any of the following:

4.2.1. the unavailability of pertinent information;

4.2.2. the technical requirements relating to malfunction indication strategies if the OBD thresholds are exceeded or if the OBD system is unable to fulfil the basic OBD monitoring requirements of this Regulation;

- 4.2.3. specific modifications to the handling of OBD information to deal independently with vehicle operation on liquid or gaseous fuels;
- 4.2.4. the type-approval of gaseous-fuelled vehicles that contain a limited number of minor deficiencies.
- 4.3. For the purposes of point 4.1.2., where manufacturers use diagnostic and test tools in accordance with ISO 22900-2:2009 regarding Modular Vehicle Communication Interface (MVCI) and ISO 22901-2:2011 on Open Diagnostic Data Exchange (ODX) in their franchised networks, the ODX files shall be accessible to independent operators via the manufacturer's website.

5. Multi-stage type-approval

- 5.1. In the case of multi-stage type-approval, as defined in Article 20 of Regulation (EU) No 167/2013, the final manufacturer shall be responsible for providing access to vehicle OBD and vehicle repair and maintenance information regarding its own manufacturing stage(s) and the link to the previous stage(s).
- 5.2. In addition, the final manufacturer shall on its website provide independent operators with the following information:
 - 5.2.1. website address of the manufacturer(s) responsible for the previous stage(s);
 - 5.2.2. name and address of all the manufacturers responsible for the previous stage(s);
 - 5.2.3. type-approval number(s) of the previous stage(s);
 - 5.2.4. the engine number.
- 5.3. Manufacturers responsible for a particular stage or stages of type-approval shall be responsible for providing through their website access to vehicle OBD and vehicle repair and maintenance information regarding the stage(s) of type-approval for which they are responsible and the link to the previous stage(s).
- 5.4. The manufacturer responsible for a particular stage or stages of type-approval shall provide the following information to the manufacturer responsible for the next stage:
 - 5.4.1. the Certificate of Conformity relating to the stage(s) for which it is responsible;
 - 5.4.2. the Certificate on Access to Vehicle OBD and Vehicle Repair and Maintenance Information, including its appendices;
 - 5.4.3. the type-approval number corresponding to the stage(s) for which it is responsible;
 - 5.4.4. the documents referred to in points 5.4.1., 5.4.2. and 5.4.3. as provided by the manufacturer(s) involved in the previous stage(s).
- 5.5. Each manufacturer shall authorise the manufacturer responsible for the next stage to pass the documents to the manufacturers responsible for subsequent and final stages.
- 5.6. In addition, on a contractual basis, the manufacturer responsible for a particular stage or stages of type-approval shall:
 - 5.6.1. provide the manufacturer responsible for the next stage with access to OBD and repair and maintenance information and interface information corresponding to the particular

stage(s) for which it is responsible;

- 5.6.2. provide, at the request of a manufacturer responsible for a subsequent stage of type-approval, with access to vehicle OBD and vehicle repair and maintenance information and interface information corresponding to the particular stage(s) for which he is responsible.
- 5.7. A manufacturer, including a final manufacturer, may charge fees in accordance with Article 55 of Regulation (EU) No 167/2013 only in respect of the particular stage(s) for which he is responsible.
- 5.8. A manufacturer, including a final manufacturer, shall not charge fees for providing information relating to the website address or contact details of any other manufacturer.

6. Small volume manufacturers

- 6.1. Manufacturers shall provide access to repair and maintenance information in a readily accessible and prompt manner, and in a manner which is non-discriminatory as compared with the provisions given or access granted to authorised dealers and repairers in accordance with Article 53(13) of Regulation (EU) No 167/2013, if their annual worldwide production of a type of vehicle covered by that regulation is less than:
- a) for T-category: 200 vehicles;
 - b) for C-category: 80 vehicles;
 - c) for R-category: 400 vehicles;
 - d) for S-category: 200 vehicles.

For a type of system, component or separate technical unit covered by that Regulation, the relevant figure in the meaning of this provision is 250 units.

- 6.2. Vehicles, systems, components and separate technical units covered by paragraph 1 shall be listed on the manufacturer's repair and maintenance information website.
- 6.3. The approval authority shall inform the Commission of all type-approvals granted to small-volume manufacturers.

7. Compliance with the obligations regarding access to vehicle OBD and vehicle repair and maintenance information

- 7.1. An approval authority may, at any time, on their own initiative, or on the basis of a complaint or of an assessment by a technical service, check a manufacturer's compliance with its obligations under Regulation (EU) No 167/2013, this Regulation and the terms of the Certificate on Access to Vehicle OBD and Vehicle Repair and Maintenance Information.
- 7.2. Where an approval authority finds that a manufacturer has failed to comply with its obligations regarding access to vehicle OBD and vehicle repair and maintenance information, the approval authority which granted the relevant type-approval shall take appropriate measures to remedy the situation.
- 7.3. Such measures may include withdrawal or suspension of type-approval, fines or other measures adopted in accordance with Regulation (EU) No 167/2013.
- 7.4. If an independent operator or a trade association representing independent operators files a

complaint to the approval authority, the authority shall carry out an audit to verify the manufacturer's compliance with obligations concerning access to vehicle OBD and vehicle repair and maintenance information.

- 7.5. When carrying out the audit, the approval authority may ask a technical service or any other independent expert to carry out an assessment to verify whether these obligations are met.
- 7.6. If the vehicle OBD and vehicle repair and maintenance information is not available when the application for type-approval is made, the manufacturer shall provide that information within six months of the date of type-approval.
- 7.7. Where the vehicle is placed on the market more than six months after type-approval, the information shall be provided on the date on which the vehicle is placed on the market.
- 7.8. The approval authority may presume on the basis of a completed Certificate on Access to Vehicle OBD and Vehicle Repair and Maintenance Information that the manufacturer has put in place satisfactory arrangements and procedures with regard to access to vehicle OBD and vehicle repair and maintenance information, provided that no complaint was made and that the manufacturer provides the certificate within the periods referred to in paragraph 7.7.
- 7.9. If the certificate of compliance is not provided within that period, the approval authority shall take appropriate measures to ensure compliance.

8. Information requirements for granting access to independent operators to non-secure areas

- 8.1. For access to any OBD and repair and maintenance information other than that relating to secure areas of the vehicle, registration requirements for use of the manufacturer's website by an independent operator shall require only such information as is necessary to confirm how payment for the information is to be made.

9. Information requirements for granting access to independent operators to secure areas

- 9.1. For access to any OBD and repair and maintenance information concerning access to secure areas of the vehicle, the independent operator shall be approved and authorised for this purpose on the basis of documents demonstrating that it pursues a legitimate business activity and has not been convicted of relevant criminal activity.
- 9.2. Independent operators shall be given access to vehicle security features used by authorised dealers and repair shops under protection of security technology concerning the exchange of data to ensure confidentiality, integrity and protection against replay.
- 9.3. The Forum on Access to Vehicle Information provided for by Article 56 of Regulation (EU) No 167/2013 will specify state-of-the-art parameters for fulfilling these requirements.
- 9.4. For information concerning access to secure areas of the vehicle, the independent operator shall present a certificate in accordance with ISO 20828:2006 to identify itself and the organisation to which it belongs. The manufacturer shall respond with its own certificate in accordance with ISO 20828:2006 to confirm to the independent operator that it is accessing a legitimate site of the manufacturer in question. Both parties shall keep a log of any such transactions indicating the vehicles and changes made to them

under this provision.

Appendix 1
Access to vehicle OBD and vehicle repair and maintenance information

1. Introduction

- 1.1. This Appendix lays down technical requirements for the accessibility of vehicle OBD and vehicle repair and maintenance information.

2. Requirements

- 2.1. The manufacturer shall provide vehicle repair and maintenance information using only open text and graphic formats or formats which can be viewed and printed using only standard software plug-ins that are freely available, easy to install, and which run with computer operating systems commonly in use.
- 2.1.1. Vehicle OBD and vehicle repair and maintenance information available through websites shall follow the common standard referred to in Article 53(2) of Regulation (EU) No 167/2013.
- 2.1.2. Where possible, keywords in the metadata shall conform to ISO 15031-2:2010. Such information shall be always available, except as required for website maintenance purposes.
- 2.1.3. Those requiring the right to duplicate or re-publish the information should negotiate directly with the manufacturer concerned.
- 2.1.4. Information for training material shall also be available, but may be presented through media other than websites.
- 2.2. Information on all parts of the vehicle, with which the vehicle, as identified by the model and serial number, or by VIN number of the vehicle and any additional criteria such as wheelbase, engine output, trim level or options, is equipped by the vehicle manufacturer and which can be replaced by spare parts offered by the vehicle manufacturer to its authorised repairers or dealers or third parties by means of reference to original equipment (OE) parts numbers, shall be made available in a database easily accessible to independent operators.
- 2.3. This database or alternative accessible format shall comprise the VIN, OE parts numbers, OE naming of the parts, validity attributes (valid-from and valid-to dates), fitting attributes and, where applicable, structuring characteristics.
- 2.4. The information on the database or available in another accessible format shall be regularly updated. In particular, the updates shall include all modifications to individual vehicles after their production if this information is available to authorised dealers.
- 2.5. Reprogramming of control units for the purposes of, e.g. recalibration after a repair or loading software to a replacement ECU or recoding or reinitialising replacement parts or components, must allow the use of non-proprietary hardware.
- 2.5.1. Reprogramming shall be conducted in accordance with either ISO 22900-2, SAE J2534 or TMC RP1210 at the latest as from 1.1.2018;

this date is set to 1.1.2020

- for manufacturers of vehicles of R- and S-category,
- for manufacturers of vehicles of T- and C-category whose production is below the limits set out in point 6.1. of this Annex,
- for manufacturers of systems, components or separate technical units whose production is below the limits set out in point 6.1. of this Annex.

- 2.5.2. Ethernet, serial cable or Local Area Network (LAN) interface and alternative media like Compact Disc (CD), Digital Versatile Disc (DVD) or solid state memory device for infotainment systems (e.g. navigation systems, telephone) may also be used, but on the condition that no proprietary communication software (e.g. drivers or plug-ins) and hardware is required. For the validation of the compatibility of the manufacturer-specific application and the vehicle communication interfaces (VCI) complying to ISO 22900-2, SAE J2534 or TMC RP1210, the manufacturer shall offer either a validation of independently developed VCIs or the information, and loan of any special hardware, required for a VCI manufacturer to conduct such validation himself. The conditions of Article 55 of Regulation (EU) No 167/2013 shall apply to fees for such validation or information and hardware.
- 2.5.3. Until a vehicle manufacturer has implemented these standards, he shall make available proprietary information (e.g. protocol information, process method, identity coding) on how to reprogram a control unit.
- 2.5.4. To ensure in-vehicle communication and communication between ECUs and diagnostic service tools, the following standards shall apply: SAE J1939, ISO 11783, ISO 14229 or ISO 27145. ISO 27145 shall be applied in combination with either ISO 15765-4 or ISO 13400.
- 2.5.5. When a manufacturer recommends a combination of a type of tractor with a type of R or S category vehicle or vice versa, he shall provide the vehicle OBD and vehicle repair and maintenance information related to the interconnectivity of both vehicles to independent operators. This information may also be provided through a website set up jointly by several manufacturers or a consortium of manufacturers if this website is compliant with the provisions of this Regulation, as indicated by recital 23 to Regulation (EU) No 167/2013.
- 2.6. Manufacturers' repair information websites shall indicate type-approval numbers by model.
- 2.7. Manufacturers shall establish reasonable and proportionate fees for hourly, daily, monthly, annual and if applicable per-transaction access to their repair and maintenance information websites.

Appendix 2
Information to enable the development of generic diagnostic tools

1. Information required for the manufacture of diagnostic tools

In order to facilitate the provision of generic diagnostic tools for multi-make repairers, vehicle manufacturers shall make available the information referred to in points 1.1, 1.2 and 1.3 through their repair information websites. That information shall include all diagnostic tool functions and all the links to repair information and troubleshooting instructions. The access to the information may be subject to the payment of a reasonable fee.

1.1. Communication protocol information

The following information shall be required indexed against vehicle make, model and variant, or other workable definition such as VIN or vehicle and systems identification:

(a) Any additional protocol information system necessary to enable complete diagnostics in addition to the standards prescribed in point 4.7.3 of Annex 9B to UNECE Regulation No 49, including any additional hardware or software protocol information, parameter identification, transfer functions, 'keep alive' requirements, or error conditions;

(b) Details of how to obtain and interpret all fault codes which are not in accordance with the standards prescribed in point 4.7.3 of Annex 9B to UNECE Regulation No 49;

(c) A list of all available live data parameters, including scaling and access information;

(d) A list of all available functional tests, including device activation or control and the means to implement them;

(e) Details of how to obtain all component and status information, time stamps, pending DTC and freeze frames,

(f) Resetting adaptive learning parameters, variant coding and replacement component setup, and customer preferences,

(g) ECU identification and variant coding,

(h) Details of how to reset service lights;

(i) Location of diagnostic connector and connector details;

(j) Engine code identification.

1.2. Test and diagnosis of OBD monitored components

The following information shall be required:

- (a) A description of tests to confirm its functionality, at the component or in the harness;
- (b) Test procedure including test parameters and component information;
- (c) Connection details including minimum and maximum input and output and driving and loading values;
- (d) Values expected under certain driving conditions including idling;
- (e) Electrical values for the component in its static and dynamic states;
- (f) Failure mode values for each of the above scenarios;
- (g) Failure mode diagnostic sequences including fault trees and guided diagnostics elimination;

1.3. Data required to perform the repair

The following information shall be required:

- (a) ECU and component initialisation (in the event of replacements being fitted);
- (b) Initialisation of new or replacement ECU's where relevant using pass- through (re-) programming techniques.

ANNEX VI
Requirements applying to roll-over protection structures (dynamic testing)

A. General provision

1. The Union requirements applying to roll-over protection structures (dynamic testing) are set out in point B.

B. Requirements applying to roll-over protection structures (dynamic testing)⁽¹⁾

1. DEFINITIONS

- 1.1. [Not applicable]

1.2. Rolling Over Protective Structure (ROPS)

Roll-over protective structure (protective cab or frame), hereinafter called “protective structure”, means the structure on a tractor the essential purpose of which is to avoid or limit risks to the driver resulting from roll-over of the tractor during normal use.

The roll-over protective structure is characterized by the provision of space for a clearance zone large enough to protect the driver when seated either inside the envelope of the structure or within a space bounded by a series of straight lines from the outer edges of the structure to any part of the tractor that might come into contact with flat ground and that is capable of supporting the tractor in that position if the tractor overturns.

1.3. Track

- 1.3.1. Preliminary definition: median plane of the wheel

The median plane of the wheel is equidistant from the two planes containing the periphery of the rims at their outer edges.

- 1.3.2. Definition of track

The vertical plane through the wheel axis intersects its median plane along a straight line which meets the supporting surface at one point. If A and B are the two points thus defined for the wheels on the same axle of the tractor, then the track width is the distance between points A and B. The track may be thus defined for both front and rear wheels. Where there are twin wheels, the track is the distance between two planes each being the median plane of the pairs of wheels.

For track-laying tractors, the track is the distance between the median planes of the tracks.

- 1.3.3. Additional definition: median plane of the tractor

Take the extreme positions of points **A** and **B** for the tractor rear axle, which gives the maximum possible value for the track. The vertical plane at right angles to the

line **AB** at its centre point is the median plane of the tractor.

1.4. Wheelbase

The distance between the vertical planes passing through the two lines **AB** as defined above, one for the front wheels and one for the rear-wheels.

1.5. Determination of seat index point; Seat location and adjustment for test

1.5.1. Seat Index Point (SIP)⁽²⁾

The seat index point shall be determined in accordance with ISO 5353:1995.

1.5.2. Seat location and adjustment for test

1.5.2.1. Where the inclination of the backrest and seat pan is adjustable, these must be adjusted so that the Seat Index Point is in its rear uppermost position;

1.5.2.2. Where the seat is equipped with suspension, the latter must be blocked at mid-travel, unless this is contrary to the instructions clearly laid down by the seat manufacturer;

1.5.2.3. Where the position of the seat is adjustable only lengthwise and vertically, the longitudinal axis passing through the Seat Index Point shall be parallel with the vertical longitudinal plane of the tractor passing through the centre of the steering wheel and not more than 100 mm from that plane.

1.6. Clearance zone

1.6.1. Reference plane

The clearance zone is illustrated in Figures 3.8 to 3.10 and Table 3.3. The zone is defined in relation to the reference plane and the Seat Index Point. The reference plane is a vertical plane, generally longitudinal to the tractor and passing through the Seat Index Point and the centre of the steering wheel. Normally the reference plane coincides with the longitudinal median plane of the tractor. This reference plane shall be assumed to move horizontally with the seat and steering wheel during loading but to remain perpendicular to the tractor or the floor of the roll-over protective structure. The clearance zone shall be defined on the basis of sub clauses 1.6.2 and 1.6.3.

1.6.2. Determination of clearance zone for tractors with a non-reversible seat

The clearance zone for tractors with a non-reversible seat is defined in 1.6.2.1 to 1.6.2.10 below and is bounded by the following planes, the tractor being on a horizontal surface, the seat, where adjustable, adjusted to its rear uppermost position⁽²⁾, and the steering wheel, where adjustable, adjusted to the mid position for seated driving:

1.6.2.1. a horizontal plane A1 B1 B2 A2, $(810 + av)$ mm above the seat index point (SIP) with line B1B2 located $(ah - 10)$ mm behind the SIP;

1.6.2.2. an inclined plane G1 G2 I2 I1, perpendicular to the reference plane, including both a point 150 mm behind line B1B2 and the rearmost point of the seat backrest;

1.6.2.3. a cylindrical surface A1 A2 I2 I1 perpendicular to the reference plane, having a radius of 120 mm, tangential to the planes defined in 1.6.2.1 and 1.6.2.2 above;

- 1.6.2.4. a cylindrical surface B1 C1 C2 B2, perpendicular to the reference plane, having a radius of 900 mm extending forward for 400 mm and tangential to the plane defined in 1.6.2.1 above along line B1B2;
- 1.6.2.5. an inclined plane C1 D1 D2 C2, perpendicular to the reference plane, joining the surface defined in 1.6.2.4 above and passing 40 mm from the forward external edge of the steering wheel. In the case of a high steering wheel position, this plane extends forward from line B1B2 tangentially to the surface defined in 1.6.2.4 above;
- 1.6.2.6. a vertical plane D1 E1 E2 D2 perpendicular to the reference plane 40 mm forward of the external edge of the steering wheel;
- 1.6.2.7. a horizontal plane E1 F1 F2 E2 passing through a point (90 - av) mm below the seat index point (SIP);
- 1.6.2.8. a surface G1 F1 F2 G2, if necessary curved from the bottom limit of the plane defined in 1.6.2.2 above to the horizontal plane defined in 1.6.2.7 above, perpendicular to the reference plane, and in contact with the seat backrest throughout its length;
- 1.6.2.9. vertical planes J1 E1 F1 G1 H1 and J2 E2 F2 G2 H2. These vertical planes shall extend upwards from plane E1 F1 F2 E2 for 300 mm; the distances E1 E0 and E2 E0 shall be 250 mm;
- 1.6.2.10. parallel planes A1 B1 C1 D1 J1 H1 I1 and A2 B2 C2 D2 J2 H2 I2 inclined so that the upper edge of the plane on the side on which the force is applied is at least 100 mm from the vertical reference plane.

1.6.3. Determination of clearance zone for tractors with a reversible driver's position

For tractors with a reversible driver's position (reversible seat and steering wheel), the clearance zone is the envelope of the two clearance zones defined by the two different positions of the steering wheel and the seat.

1.6.4. Optional seats

1.6.4.1. In case of tractors that could be fitted with optional seats, the envelope comprising the seat index points of all options offered shall be used during the tests. The protective structure shall not enter the larger clearance zone which takes account of these different seat index points.

1.6.4.2. In the case where a new seat option is offered after the test has been performed, a determination shall be made to see whether the clearance zone around the new SIP falls within the envelope previously established. If it does not, a new test must be performed.

1.6.4.3. Optional seat does not include a seat for a person in addition to the driver and from where the tractor cannot be controlled. The SIP shall not be determined because the definition of the clearance zone is in relation to the driver seat.

1.7. *Unballasted mass*

The mass of the tractor without ballasting devices and, in the case of tractors with pneumatic tyres, without liquid ballast in the tyres. The tractor shall be in running order with tanks, circuits and radiator full, protective structure with cladding and any

track equipment or additional front wheel drive components required for normal use. The operator is not included.

1.8. Permissible measurement tolerances

| | |
|---------------|--|
| Distance | ± 0.5 mm |
| Force | ± 0.1 % (of the sensor full scale) |
| Mass | ± 0.2 % (of the sensor full scale) |
| Tyre pressure | ± 5.0 % |
| Angle | $\pm 0.1^\circ$ |

1.9. Symbols

| | | |
|----------------------|----------------------|---|
| a_h | (mm) | Half of the horizontal seat adjustment |
| a_v | (mm) | Half of the vertical seat adjustment |
| E | (J) | Energy input during test |
| F | (N) | Static load force |
| H | (mm) | Height of lift of the centre of gravity of the pendulum block |
| I | (kg.m ²) | Moment of inertia about rear axle, excluding wheels used for calculating rear impact energy |
| L | (mm) | Wheelbase used for calculating rear impact energy |
| M | (kg) | Mass used for calculating energy and crushing forces |

2. FIELD OF APPLICATION

2.1. This Annex is applicable to tractors having at least two axles for pneumatic tyred wheels with or without track attachments and with an unballasted tractor mass greater than 600 kg but generally less than 6000 kg.

2.2. The minimum track width of the rear-wheels should generally be greater than 1 150 mm. It is recognised that there may be designs of tractors, for example, lawn mowers, narrow vineyard tractors, low profile tractors used in buildings with limited overhead clearance or in orchards, high-clearance tractors and special forestry machines, such as forwarders and skidders, for which this Annex is not applicable.

3. RULES AND DIRECTIONS

3.1. General regulations

3.1.1. The protective structure may be manufactured either by the tractor manufacturer or by an independent firm. In either case a test is only valid for the model of tractor on which it is carried out. The protective structure must be retested for each model of tractor to which it is to be fitted. However, testing stations may certify that the strength tests are also valid for tractor models derived from the original model by modifications to the engine, transmission and steering and front suspension (*see below 3.6: Extension to other tractor models*). On the other hand, more than one protective structure may be tested for any one model of tractor.

3.1.2. The protective structure submitted for dynamic test must be supplied attached in the

normal manner to the tractor model in connection with which it is being tested. The tractor submitted shall be complete and in running order.

3.1.3. Where a "tandem" tractor is concerned, the mass of the standard version of that part to which the protective structure is fitted is to be used.

3.1.4. A protective structure may be designed solely to protect the driver in the event of the tractor overturning. Onto this structure it may be possible to fit weather protection for the driver, of a more or less temporary nature. The driver will usually remove this in warm weather. There are protective structures however, in which the cladding is permanent and warm weather ventilation provided by windows or flaps. As the cladding may add to the strength of the structure and if removable may well be absent when an accident occurs, all parts that can be so taken away by the driver will be removed for the purpose of the test. Doors, roof hatch and windows that can be opened shall be either removed or fixed in the open position for the test, so that they do not add to the strength of the protective structure. It shall be noted whether, in this position, they would create a hazard for the driver in the event of overturning.

Throughout the remainder of these rules, reference will only be made to testing the protective structure. It must be understood that this includes cladding not of a temporary nature.

A description of any temporary cladding supplied is to be included in the specifications. All glass or similar brittle material shall be removed prior to the test. Tractor and protective structure components which might sustain needless damage during the test and which do not affect the strength of the protective structure or its dimensions may be removed prior to the test if the manufacturer wishes. No repairs or adjustment may be carried out during the test.

3.1.5. Any component of the tractor contributing to the strength of the protective structure such as mud-guards, which has been reinforced by the manufacturer, should be described and its measurements given in the test report.

3.2. *Apparatus and test conditions*

3.2.1. The structure shall be struck by a block acting as a pendulum and submit to a front and a rear crushing test.

3.2.2. The mass of the pendulum bloc (Figure 3.1) shall be 2000 kg. Its impact face shall have dimensions $680 \times 680 \text{ mm} \pm 20$. It shall be made in such a way that the position of its centre of gravity is constant (for example with iron bars bound in concrete). It shall be suspended from a pivot point about 6 m above the floor in such a way that the height of the pendulum may be conveniently and safely adjusted.

3.2.3. For tractors with less than 50 % of their mass on the front wheels, the first blow shall be at the rear of the structure. This shall be followed by a crushing test also at the rear of the structure. The second blow shall be at the front and the third at the side. Finally, there shall be a second crushing test at the front.

For tractors with 50 % or more of their mass on the front wheels, the first blow shall be at the front and the second blow at the side. This shall be followed by the two crushing tests, firstly at the rear and secondly at the front.

- 3.2.4. For tractors with a reversible driver's position (reversible seat and steering wheel), the first blow shall be longitudinal at the heavier end (with more than 50 % of the mass of the tractor). This shall be followed by a crushing test on the same end. The second blow shall be at the other end, and the third at the side. Finally, there shall be a second crushing test at the lighter end.
- 3.2.5. A track width setting for the rear-wheels shall be chosen such that the structure is in no way supported by the tyres during the test. This provision may be disregarded if such support is given when the wheels are in their widest alternative track setting.
- 3.2.6. The side of the tractor from which the side blow is struck shall be that which, in the opinion of the testing station, is likely to give the greatest distortion. The rear blow shall be on the corner opposite the side blow and the front blow on the corner nearer the side blow. The rear blow shall be administered at two-thirds the distance from the median plane of the tractor to the vertical plane touching the outside extremity of the structure. However, if a curve in the back of the structure starts at less than two-thirds of the distance from the centre, the blow shall be struck at the beginning of the curve, i.e. at the point where this curve is tangential to a line at right angles to the median plane of the tractor.
- 3.2.7. If, during the test, any lashings, props or blocks move or break, the test must be repeated.

3.3. *Impact tests*

3.3.1. Impact at the rear (Figures 3.2.a and 3.2.b)

3.3.1.1. The rear impact is not required on tractors having 50 % or more of their mass (as defined above) on the front wheels.

3.3.1.2. The tractor shall be placed in relation to the pendulum so that this will strike the structure when the striking face and the supporting chains are at an angle of 20° to the vertical unless the structure at the point of contact has, during deflection, a greater angle with the vertical. In this case the striking face shall be adjusted parallel to the side of the structure at the point of contact at the moment of maximum deflection by an additional support, the supporting chains remaining at an angle of 20° to the vertical. The point of impact shall be that part of the structure likely to hit the ground first in a rearward overturning accident, normally the upper edge. The height of the pendulum will be so adjusted that it has no tendency to turn about the point of contact.

3.3.1.3. The tractor will be lashed down. The points of attachment of the lashings shall be approximately 2 m behind the rear axle and 1.5 m in front of the front axle. There shall be two lashings on each axle, one on each side of the median plane of the tractor. The lashings shall be steel cable of 12.5 to 15 mm diameter, tensile strength 1100 – 1260 MPa. The tyres of the tractor shall be inflated, and the lashings tightened to give tyre pressures and deflections, as shown in the Table 3.1, below.

After the lashings have been tightened a wood beam 150 x 150 mm shall be clamped in front of the rear-wheels, driven tight against them.

- 3.3.1.4. The pendulum shall be pulled back so that the height H of its centre of gravity above that at the point of impact is given by one of the following formulae at the option of the manufacturer:

$$H = 2.165 \times 10^{-8} ML^2 \text{ or } H = 5.73 \times 10^{-2} I$$

- 3.3.1.5. The pendulum shall be released and allowed to crash against the structure. The quick release mechanism must be so positioned that it does not tilt the weight in relation to the chains supporting it at the moment of release.

| | Tyre pressures kPa (*) | Deflection mm |
|--|---------------------------|------------------|
| Four-wheel drive tractors with front and rear wheels of the same size: | | |
| Front | 100 | 25 |
| Rear | 100 | 25 |
| Four-wheel drive tractors with front wheels smaller than rear wheels: | | |
| Front | 150 | 20 |
| Rear | 100 | 25 |
| Two-wheel drive tractors: | | |
| Front | 200 | 15 |
| Rear | 100 | 25 |
| (*) No water ballast is to be used | | |

Table 3.1
Tyre Pressures

- 3.3.2. Impact at the front (Figures 3.3.a and 3.3.b)

- 3.3.2.1. This shall be carried out in the same way as the impact at the rear. The lashings shall be the same but the wooden beam shall be behind the rear-wheels. The height of fall of the centre of gravity of the pendulum shall be given by the following formula:

$$H = 125 + 0.02 M.$$

- 3.3.2.2. The point of impact shall be that part of the structure that would hit the ground first when turning over sideways while travelling forward, normally the top of the front corner.

- 3.3.3. Impact at the side (Figure 3.4)

- 3.3.3.1. The tractor shall be placed in relation to the pendulum so that this will strike the

structure when the striking face and the supporting chains are vertical unless the structure at the point of contact is, during deflection, other than vertical. In this case the striking face shall be adjusted so that it is approximately parallel to the structure at the point of contact at the moment of maximum deflection. This adjustment shall be made by an additional support, the supporting chains remaining vertical at the moment of impact. The point of impact shall be that part of the structure likely to hit the ground first in a sideways overturning accident, normally the upper edge.

3.3.3.2. Unless it is certain that any other part of this edge would hit the ground first, the point of impact shall be in the plane at right angles to the median plane of the tractor and passing 60 mm in front of the seat index point, the seat being at its mid-point of longitudinal adjustment. The height of the pendulum will be so adjusted that it has no tendency to turn about the point of contact.

3.3.3.3. For tractors with a reversible driver's position, the point of impact shall be in the plane at right angles to the median plane of the tractor and at the mid-point between the two seat index points.

3.3.3.4. The rear-wheel of the tractor on the side to be struck shall be lashed down. The tension in the lashings shall be determined as for the impact at the rear. After lashing, a beam 150 x 150 mm shall be clamped against the side of the rear-wheel opposite the blow, and driven hard against the tyre. A beam shall be placed as a prop against this wheel and secured on the floor so that it is held tight against the wheel during impact. The length of this beam shall be chosen so that when in position against the wheel it makes an angle of 25 to 40° with the horizontal. Furthermore its length shall be 20 to 25 times its thickness and its width 2 to 3 times its thickness.

3.3.3.5. The pendulum shall be pulled back as in the previous tests so that the height **H** of its centre of gravity above that at the moment of impact is determined by the following formula:

$$H = 125 + 0.15 M.$$

3.3.3.6. During the side impact test the difference between the maximum momentary deflection and the permanent deflection at a height of (810 + a_v) mm above the seat index point shall be recorded. This may be done with a device on which a moving friction collar shall be fitted on a horizontal rod. One end of the rod shall be attached to the top member of the structure and the other will pass through a hole in a vertical bar attached to tractor chassis. The collar will be positioned against the vertical bar attached to tractor chassis before the blow and its distance from it after the blow will give the difference between the maximum momentary deflection and the permanent deflection.

3.4. *Crushing tests*

It may be necessary to hold down the front of the tractor when carrying out the test at the rear. Blocks will be placed under the axles so that the tyres do not bear crushing force. The cross beam used shall have a width of approximately 250 mm and shall be connected to the load applying mechanism by universal joints (Figure 3.5).

3.4.1. Crushing at the rear (Figures 3.6.a and 3.6.b)

3.4.1.1. The crushing beam shall be positioned across the rear uppermost structural members so that the resultant of the crushing forces is located in the vertical reference plane of the tractor. The crushing force (**F**) shall be applied where:

$$F = 20 M.$$

This force shall be maintained for 5 seconds after cessation of any visually detectable movement of the protective structure.

3.4.1.2. Where the rear part of the protective structure roof will not sustain the full crushing force (Figures 3.7.a and 3.7.b), the force shall be applied until the roof is deflected to coincide with the plane joining the upper part of the protective structure with that part of the rear of the tractor capable of supporting the tractor when overturned.

The force shall then be removed and the crushing beam repositioned over that part of the protective structure that would support the tractor when completely overturned. The crushing force **F** shall be applied.

3.4.2. Crushing at the front (Figures 3.6.a and 3.6.b)

3.4.2.1. The crushing beam shall be positioned across the front uppermost structural members so that the resultant of the crushing forces is located in the vertical reference plane of the tractor. The crushing force (**F**) shall be applied where:

$$F = 20 M.$$

This force shall be maintained for 5 seconds after cessation of any visually detectable movement of the protective structure.

3.4.2.2. When the front part of the roof of the protective structure will not sustain the full crushing force (Figures 3.7.a and 3.7.b), the force shall be applied until the roof is deflected to coincide with the plane joining the upper part of the protective structure with that part of the front of the tractor capable of supporting the tractor when overturned.

The force shall then be removed and the crushing beam repositioned over that part of the protective structure that would support the tractor when completely overturned. The crushing force **F** shall then be applied.

3.5. *Conditions for acceptance*

3.5.1. The structure and tractor shall be visually examined for cracks and tears after each part of the test. For the structure to pass the test the following conditions shall be complied with:

- 3.5.1.1. there shall be no cracks in structural members, mounting components or tractor parts contributing to the strength of the protective structure (except as covered by 3.5.1.3 below);
- 3.5.1.2. there shall be no cracks in welds contributing to the strength of the protective structure or its mounting components. Spot or tack welding used for the attachment of cladding panels shall normally be excluded from this condition;
- 3.5.1.3. energy-absorbing tears in sheet metal structures are acceptable, providing that they are judged by the testing station to have not significantly reduced the resistance to deflection of the protective structure. Tears in sheet metal components caused by edges of the pendulum weight shall be ignored;
- 3.5.1.4. the required force must be sustained in both crushing tests;
- 3.5.1.5. the difference between the maximum momentary deflection and the permanent deflection in the side impact test must not exceed 250 mm (Figure 3.11);
- 3.5.1.6. no part shall enter the clearance zone during any part of the tests. No part may strike the seat during the tests. Furthermore, the clearance zone shall not be outside the protection of the protective structure. For this purpose, it shall be considered to be outside the protection of the structure if any part of it would come in contact with flat ground if the tractor overturned towards the direction from which the test load is applied. For estimating this, the tyres and track width setting shall be the smallest standard fitting specified by the manufacturer.
- 3.5.1.7. for the articulated tractors, the median planes of the two parts shall be assumed to be in line.
- 3.5.2. After the final crushing test, the permanent deformation of the protective structure shall be recorded. For this purpose, before the start of the test, the position of the main members in relation to the seat index point must be recorded. Then any movement of the members struck in the tests and any change of the height of the front and back members of the roof shall be recorded.

3.6. *Extension to other tractor models*

3.6.1. [Not applicable]

3.6.2. Technical extension

When technical modifications occur on the tractor, the protective structure or the method of attachment of the protective structure to the tractor, the testing station that has carried out the original test can issue a “technical extension report” in the following cases:

3.6.2.1. Extension of the structural test results to other models of tractors

The impact and crushing tests need not be carried out on each model of tractor, provided that the protective structure and tractor comply with the conditions referred to hereunder 3.6.2.1.1 to 3.6.2.1.5.

- 3.6.2.1.1. The structure shall be identical to the one tested;
- 3.6.2.1.2. The required energy shall not exceed the energy calculated for the original test by more than 5 %. The 5 % limit shall also apply to extensions in the case of substituting tracks for wheels on the same tractor;
- 3.6.2.1.3. The method of attachment and the tractor components to which the attachment is made shall be identical;
- 3.6.2.1.4. Any components such as mud-guards and bonnet that may provide support for the protective structure shall be identical;
- 3.6.2.1.5. The position and critical dimensions of the seat in the protective structure and the relative position of the protective structure on the tractor shall be such that the clearance zone would have remained within the protection of the deflected structure throughout all tests (this shall be checked by using the same reference of clearance zone as in the original test report, respectively Seat Reference Point [SRP] or Seat Index Point [SIP]).

3.6.2.2. Extension of the structural test results to modified models of the protective structure

This procedure has to be followed when the provisions of paragraph 3.6.2.1 are not fulfilled, it may not be used when the method of attachment of the protective structure to the tractor does not remain of the same principle (e.g. rubber supports replaced by a suspension device):

- 3.6.2.2.1. Modifications having no impact on the results of the initial test (e.g. weld attachment of the mounting plate of an accessory in a non-critical location on the structure), addition of seats with different SIP location in the protective structure (subject to checking that the new clearance zone(s) remain(s) within the protection of the deflected structure throughout all tests);
- 3.6.2.2.2. Modifications having a possible impact on the results of the original test without calling into question the acceptability of the protective structure (e.g. modification of a structural component, modification of the method of attachment of the protective structure to the tractor). A validation test can be carried out and the test results will be drafted in the extension report.

The following limits for this type extension are fixed:

- 3.6.2.2.2.1. No more than 5 extensions may be accepted without a validation test;

3.6.2.2.2. The results of the validation test will be accepted for extension if all the acceptance conditions of this Annex are fulfilled and if the deflection measured after each impact test does not deviate from the deflection measured after each impact test in the original test report by more than $\pm 7\%$;

3.6.2.2.3. More than one protective structure modifications may be included in a single extension report if they represent different options of the same protective structure, but only one validation test can be accepted in a single extension report. The options not tested shall be described in a specific section of the extension report.

3.6.2.2.3. Increase of the reference mass declared by the manufacturer for a protective structure already tested. If the manufacturer wants to keep the same approval number it is possible to issue an extension report after having carried out a validation test (the limits of $\pm 7\%$ specified in 3.6.2.2.2 are not applicable in such a case).

3.7. [Not applicable]

3.8. *Cold weather performance of protective structures*

3.8.1. If the protective structure is claimed to have properties resistant to cold weather embrittlement, the manufacturer shall give details that shall be included in the report.

3.8.2. The following requirements and procedures are intended to provide strength and resistance to brittle fracture at reduced temperatures. It is suggested that the following minimum material requirements shall be met in judging the protective structure's suitability at reduced operating temperatures in those countries requiring this additional operating protection.

| Specimen size | Energy at | |
|------------------------|-----------|-----------------|
| | -30 °C | -20 °C |
| mm | J | J ^{b)} |
| 10 x 10 ^{a)} | 11 | 27.5 |
| 10 x 9 | 10 | 25 |
| 10 x 8 | 9.5 | 24 |
| 10 x 7,5 ^{a)} | 9.5 | 24 |
| 10 x 7 | 9 | 22.5 |
| 10 x 6.7 | 8.5 | 21 |
| 10 x 6 | 8 | 20 |
| 10 x 5 ^{a)} | 7.5 | 19 |
| 10 x 4 | 7 | 17.5 |
| 10 x 3.5 | 6 | 15 |
| 10 x 3 | 6 | 15 |

| | | |
|------------------------|-----|----|
| 10 x 2.5 ^{a)} | 5.5 | 14 |
|------------------------|-----|----|

Table 3.2
Minimum Charpy V-notch impact energies

^{a)} Indicates preferred size. Specimen size shall be no less than largest preferred size that the material permits.

^{b)} The energy requirement at – 20 °C is 2.5 times the value specified for –30 °C. Other factors affect impact energy strength, i.e. direction of rolling, yield strength, grain orientation and welding. These factors shall be considered when selecting and using steel.

3.8.2.1. Bolts and nuts used to attach the protective structure to the tractor and used to connect structural parts of the protective structure shall exhibit suitable controlled reduced temperature toughness properties.

3.8.2.2. All welding electrodes used in the fabrication of structural members and mounts shall be compatible with the protective structure material as given in 3.8.2.3 below.

3.8.2.3. Steel materials for structural members of the protective structure shall be of controlled toughness material exhibiting minimum Charpy V-Notch impact energy requirements as shown in Table 3.2. Steel grade and quality shall be specified in accordance with ISO 630:1995; Amd1:2003.

Steel with an as-rolled thickness less than 2.5 mm and with a carbon content less than 0.2 % is considered to meet this requirement. Structural members of the protective structure made from materials other than steel shall have equivalent low temperature impact resistance.

3.8.2.4. When testing the Charpy V-Notch impact energy requirements, the specimen size shall be no less than the largest of the sizes stated in Table 3.2 that the material will permit.

3.8.2.5. The Charpy V-Notch tests shall be made in accordance with the procedure in ASTM A 370-1979, except for specimen sizes that shall be in accordance with the dimensions given in Table 3.2.

3.8.2.6. Alternatives to this procedure are the use of killed or semi-killed steel for which an adequate specification shall be provided. Steel grade and quality shall be specified in accordance with ISO 630:1995; Amd1:2003.

3.8.2.7. Specimens are to be longitudinal and taken from flat stock, tubular or structural sections before forming or welding for use in the protective structure. Specimens from tubular or structural sections are to be taken from the middle of the side of greatest dimension and shall not include welds.

3.9. [Not applicable]

Figure 3.1

Pendulum block and its suspending chains or wire ropes

Dimensions in mm

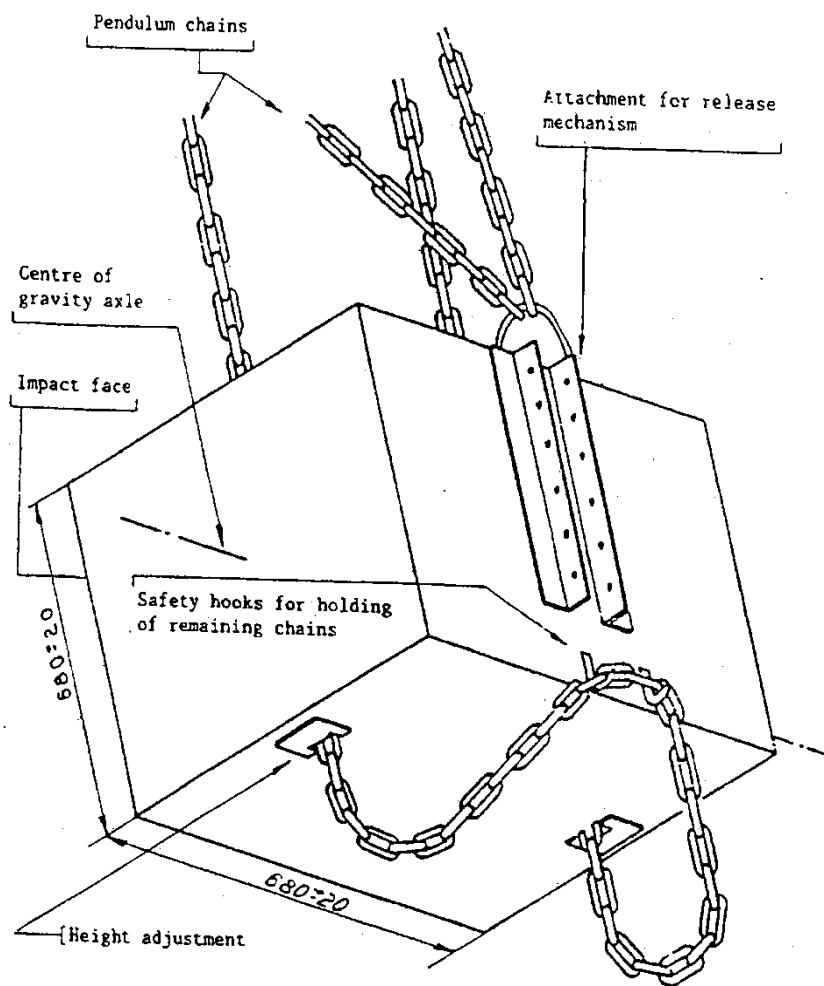


Figure 3.2

Method of impact from rear

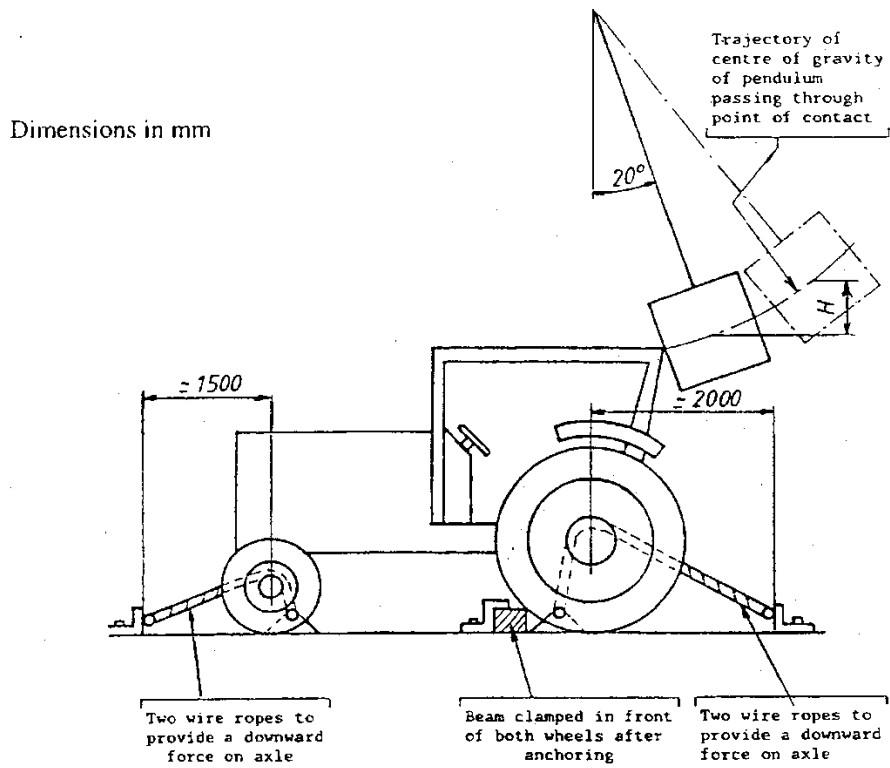


Figure 3.2.a Protective cab

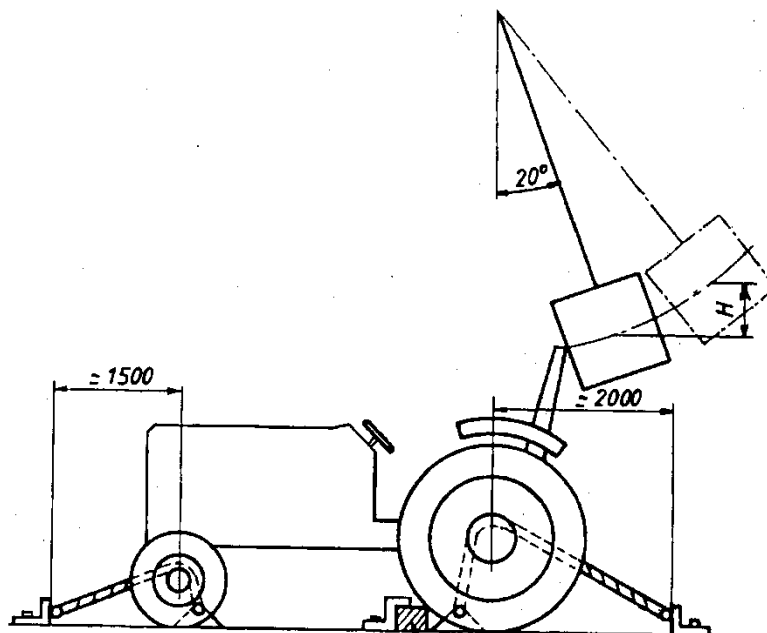


Figure 3.2.b **Rear roll bar frame**

Figure 3.3

Method of impact from front

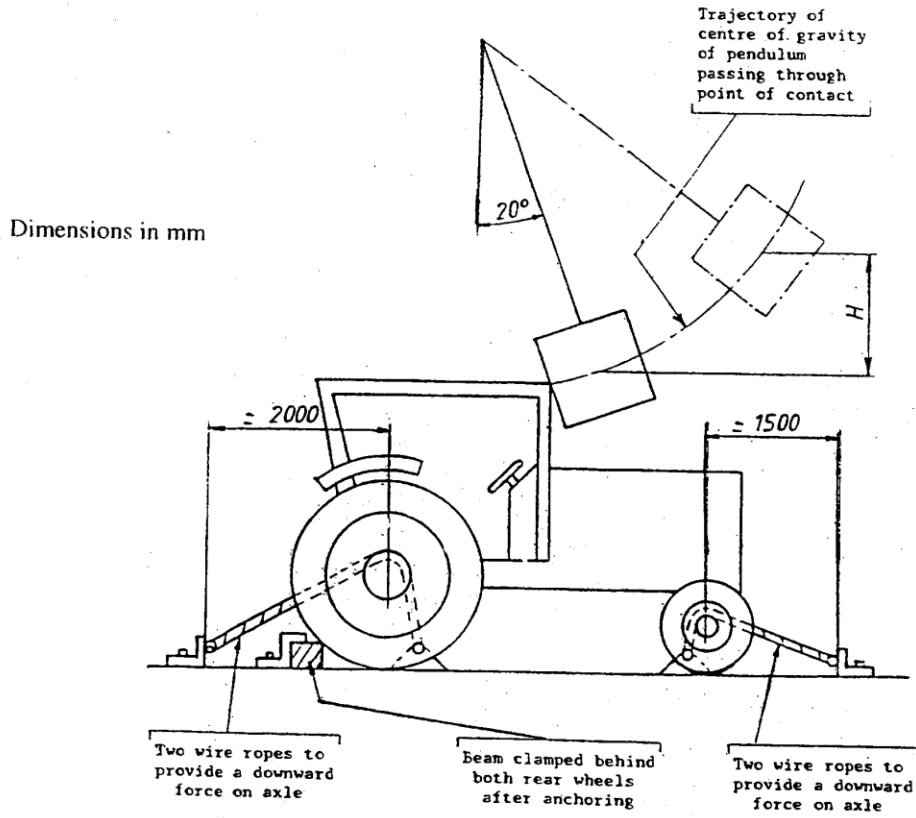


Figure 3.3.a Protective cab

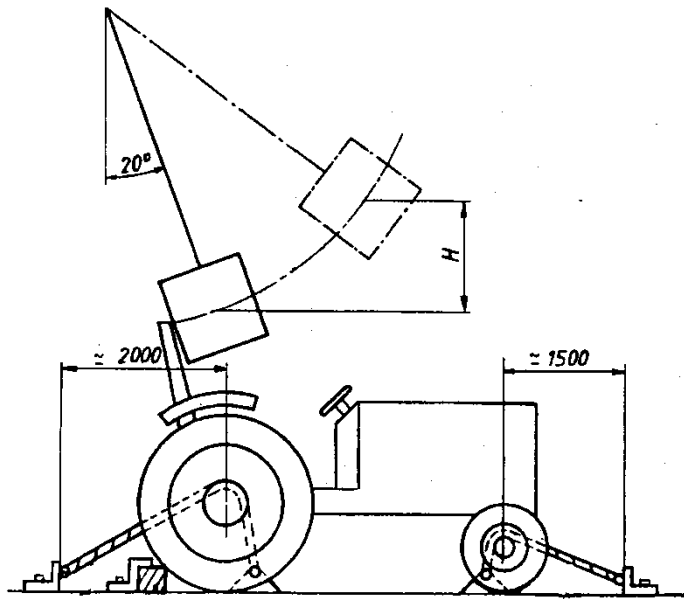


Figure 3.3.b Rear roll bar frame

Figure 3.4

Method of impact from side

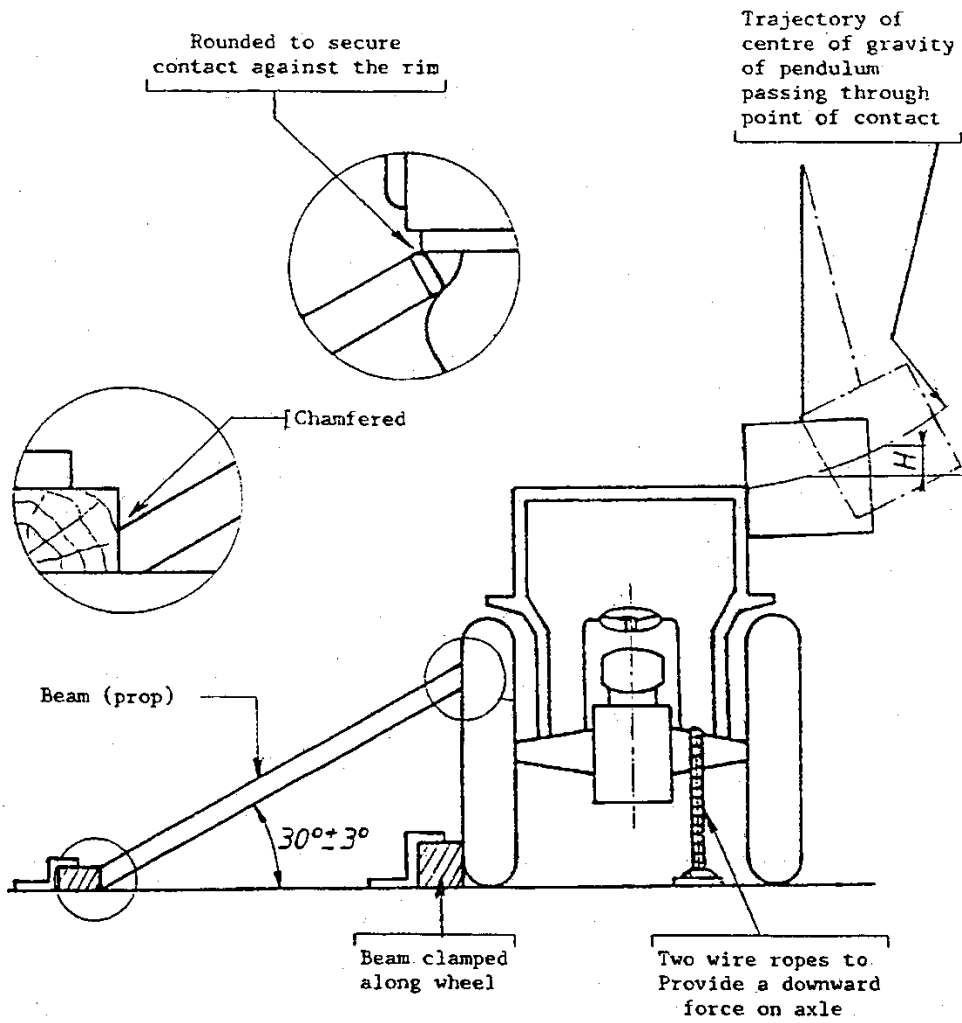


Figure 3.5

Example of an arrangement for crushing tests

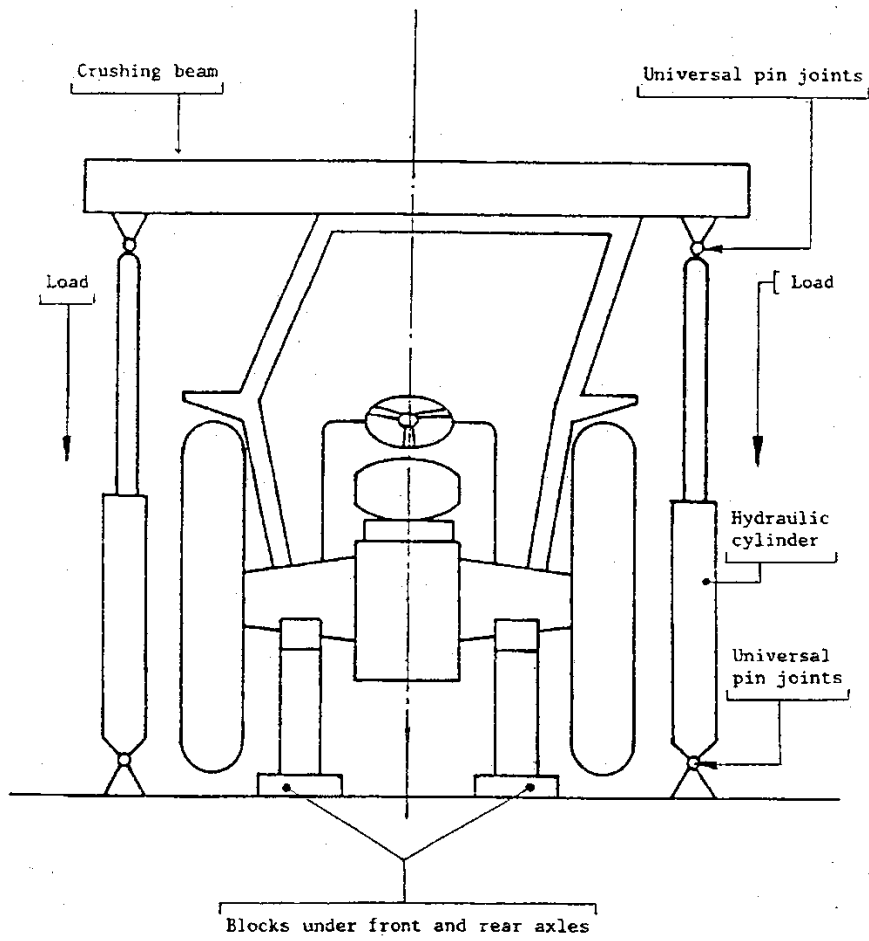


Figure 3.6

Position of beam for front and rear crushing tests

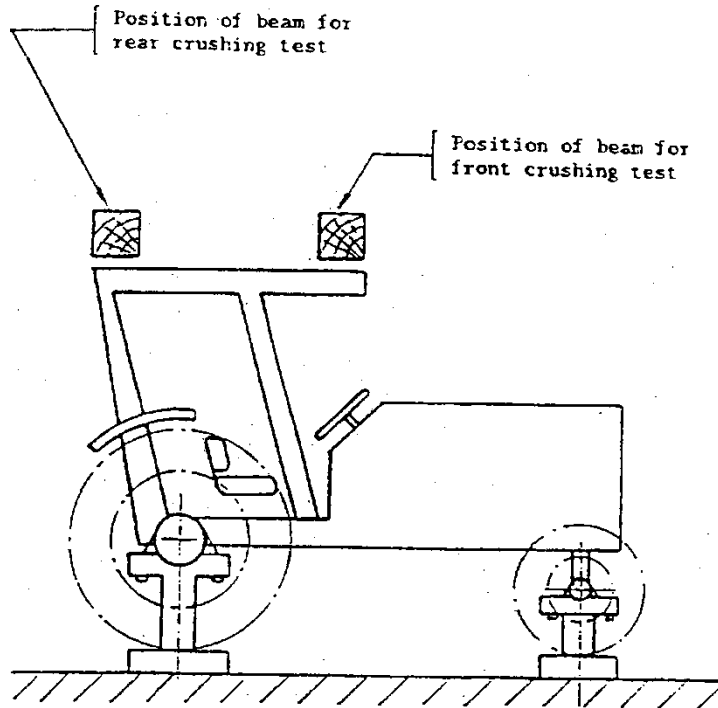


Figure 3.6.a **Protective cab**

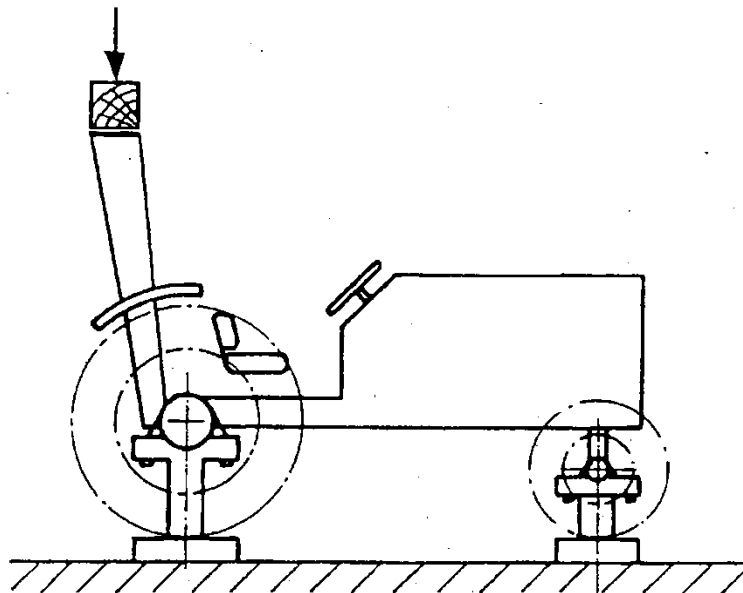


Figure 3.6.b **Rear roll bar frame**

Figure 3.7

**Position of beam for front crushing test
when full crushing force not sustained in front**

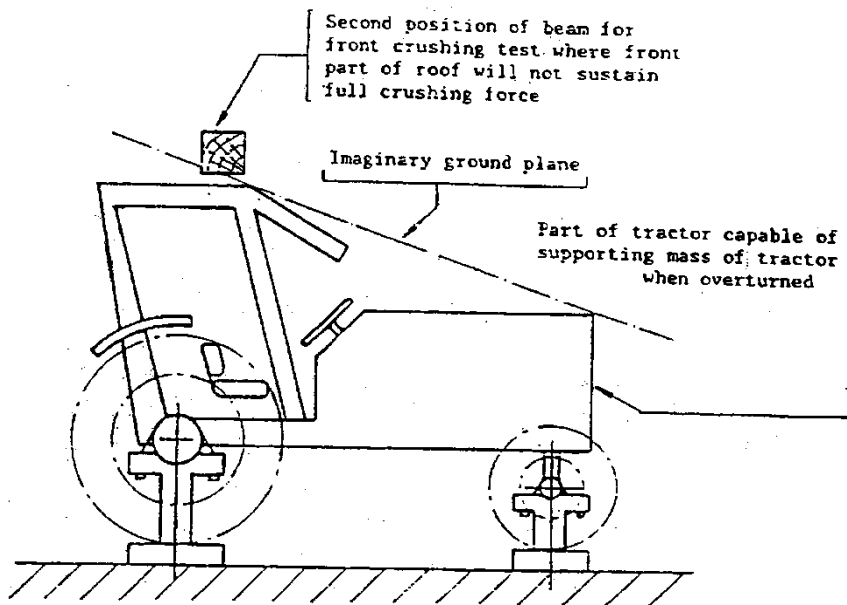


Figure 3.7.a Protective cab

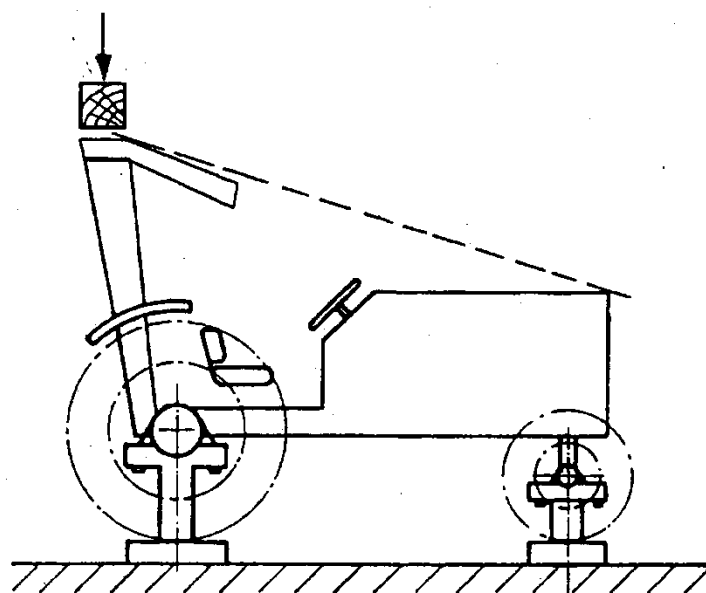


Figure 3.7.b **Rear roll bar frame**

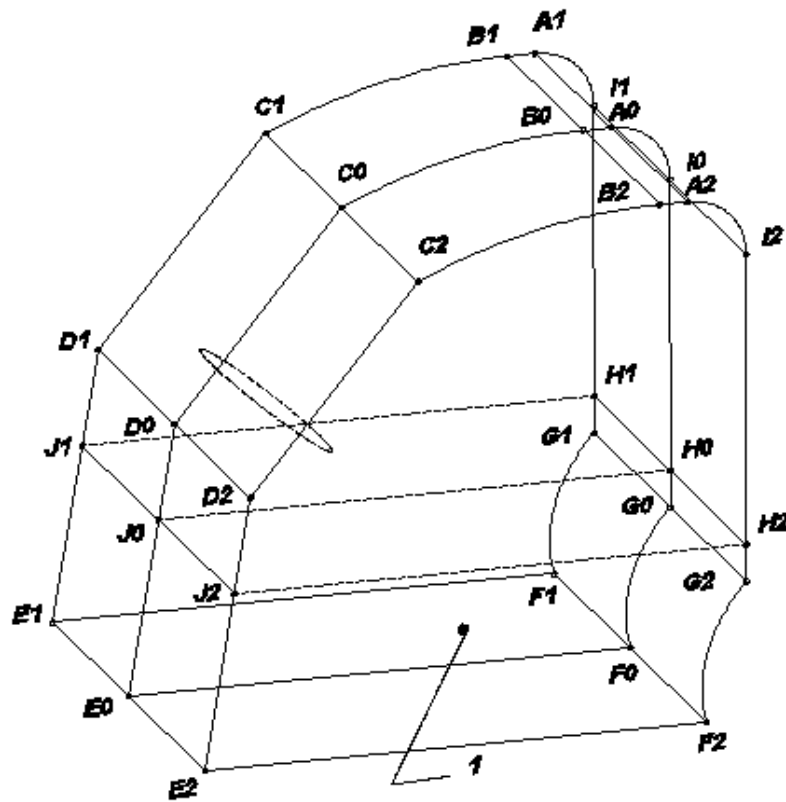
Table 3.3

Dimensions of the clearance zone

| Dimensions | mm | Remarks |
|-------------------------------|-----------|-----------------------------|
| A ₁ A ₀ | 100 | minimum |
| B ₁ B ₀ | 100 | minimum |
| F ₁ F ₀ | 250 | minimum |
| F ₂ F ₀ | 250 | minimum |
| G ₁ G ₀ | 250 | minimum |
| G ₂ G ₀ | 250 | minimum |
| H ₁ H ₀ | 250 | minimum |
| H ₂ H ₀ | 250 | minimum |
| J ₁ J ₀ | 250 | minimum |
| J ₂ J ₀ | 250 | minimum |
| E ₁ E ₀ | 250 | minimum |
| E ₂ E ₀ | 250 | minimum |
| D ₀ E ₀ | 300 | minimum |
| J ₀ E ₀ | 300 | minimum |
| A ₁ A ₂ | 500 | minimum |
| B ₁ B ₂ | 500 | minimum |
| C ₁ C ₂ | 500 | minimum |
| D ₁ D ₂ | 500 | minimum |
| I ₁ I ₂ | 500 | minimum |
| F ₀ G ₀ | - | depending on the tractor |
| I ₀ G ₀ | - | |
| C ₀ D ₀ | - | |
| E ₀ F ₀ | - | |

Figure 3.8 Clearance zone

Note: for dimensions, see Table 3.3 above



1 – Seat index point

Figure 3.9

Clearance zone

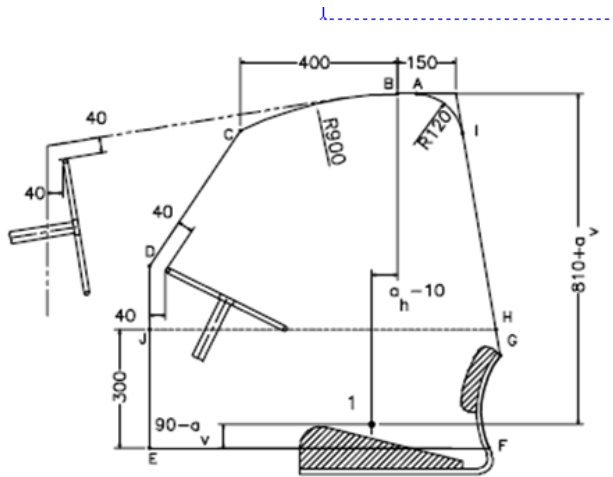


Figure 3.9.a

side view

section in reference plane

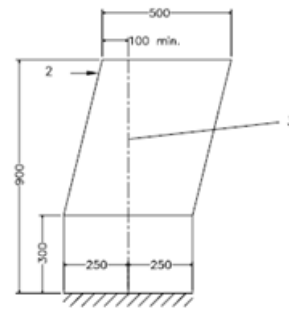


Figure 3.9.b

rear or front view

1 – Seat index point

2 – Force

3 – Vertical reference plane

Figure 3.10

Clearance zone for tractor with reversible seat and steering wheel

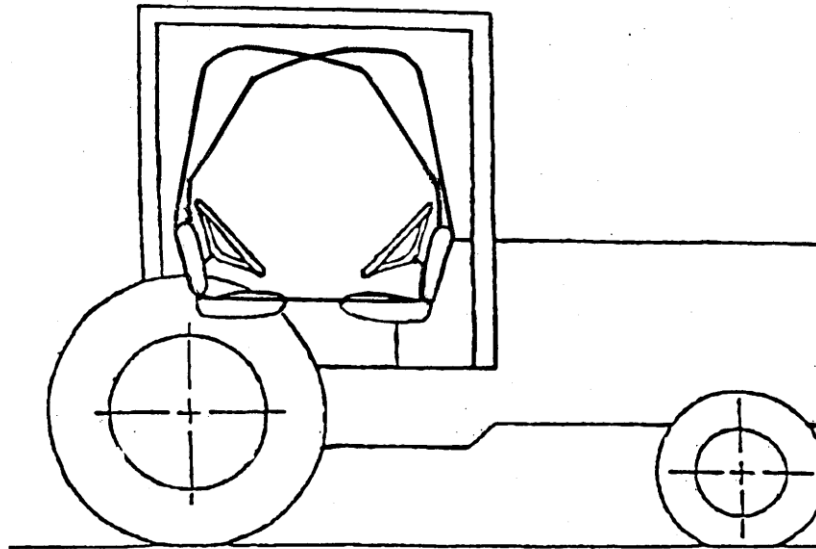


Figure 3.10.a **Protective cab**

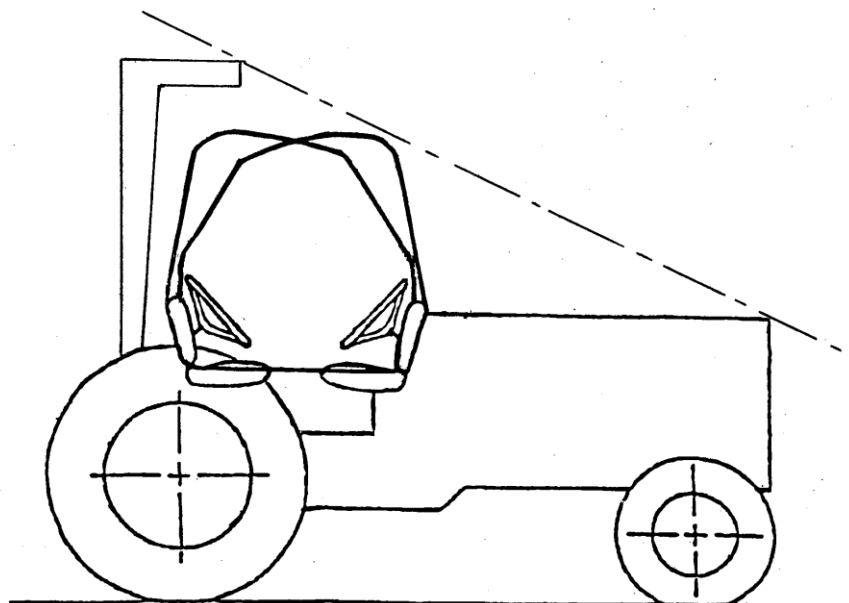
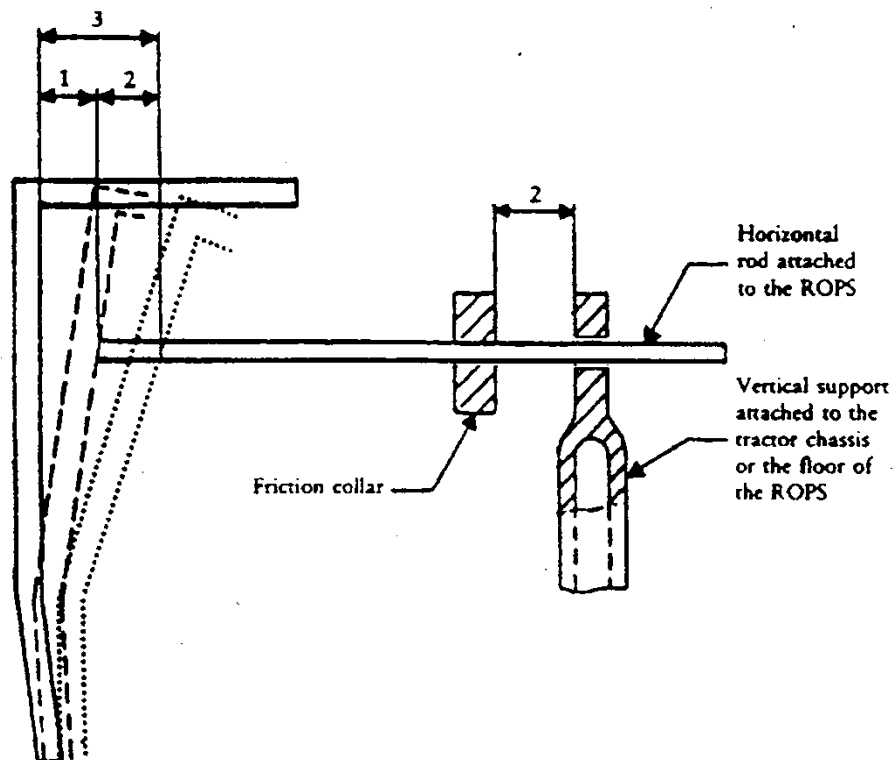


Figure 3.10.b **Rear roll bar frame**

Figure 3.11

Example of apparatus for measuring elastic deflection



- 1 – Permanent deflection
- 2 – Elastic deflection
- 3 – Total deflection (permanent plus elastic)

Explanatory notes to Annex VI

- (1) Unless otherwise stated, the text of the requirements and the numbering set out in point B are identical with the text and numbering of the OECD standard code for the official testing of protective structures on agricultural and forestry tractors (dynamic test), OECD Code 3, Edition 2015 of July 2014.

- (2) Users are reminded that the seat index point is determined according to ISO 5353 and is a fixed point with respect to the tractor that does not move as the seat is adjusted away from the mid-position. For purposes of determining the clearance zone, the seat shall be placed in the rear and uppermost position.