

CIRCULAR 11/00-9-1

TEST PROCEDURES ADR 11/00 - INTERNAL SUN VISORS “A Guide for Inspectors”

**This Circular is relevant to the Third Edition of the
Australian Design Rules gazetted as
National Standards under the Motor Vehicle Standards Act 1989.**

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1 SCOPE

This procedure, when read in conjunction with other circulars issued by the Administrator provides sufficient information, without reference to other standards, for the conducting and auditing of tests on Internal Sun Visors to demonstrate compliance with Australian Design Rule 11/00. For convenience, reference to the ADR clause number is quoted in brackets against each appropriate section of this procedure.

The equipment, orders of accuracy and step by step actions described in this procedure are drawn from the standards and recommended practices quoted in the ADR and from accepted laboratory and testing practices. While conformance with this procedure is sufficient to demonstrate compliance with the ADR, other equipment, orders of accuracy and procedures may be used provided it can be shown that they demonstrate compliance with the ADR.

This ADR covers four aspects: -

- (i) determination of contactable areas of the sun visor assembly,
- (ii) the physical design features of the sun visor assembly,
- (iii) the energy absorption requirements of the material or assembly demonstrated by test results, and
- (iv) fracture characteristics of any mirrors included in the sun visor assembly.

This procedure is intended primarily as a guide for officers of the Australian Department of Transport and Communications or Agents acting on behalf of the Administrator when they carry out audit inspections of Test Facilities or witness tests for compliance with the ADR. This and other Circulars dealing with Test Procedures for ADRs may also be useful to vehicle manufacturers and testing organisations.

Nothing in these Circulars, however, absolves the manufacturers from complying with the requirements as specified in the ADR which always remains the primary reference.

2 SELECTION OF TEST COMPONENTS

This procedure applies to vehicles which are of the type specified in the Applicability Section of the ADR. If testing is to be conducted to Clause 11.3 of the ADR sun visors are regarded as contactable and therefore

subject to the Design Rule requirements where they can be contacted by a 165 mm diameter sphere when in the installed position and in any adjustment position provided. If the sunvisor is to be tested as part of an ECE approval to Regulation 21/01 'Interior Fittings' then it shall be tested if it has any 'point of contact' as defined in that Regulation including when the length of the arm is increased to 1000 mm as allowed by Clause 1.4.1.1 of Annex 4 of the Regulation.

3 IDENTIFICATION OF TEST COMPONENTS

The components and/or materials submitted for test shall be representative of the design conditions as reflected in the production drawings.

If production parts are being tested they should be drawn from a batch which has passed normal quality control procedures. They then should be identified against the production drawings. If prototype parts are being tested they should be individually inspected on a component by component basis for both dimensional and material compliance with the drawing.

In both cases the revision or issue status of the drawing to which the assemblies have been checked must be stated on all test records.

Compliance with the energy absorption requirements may be obtained by conducting tests on the sun visor assembly or on test samples. Such samples shall be right square prisms with plane dimensions at least 100 mm by 100 mm, consisting of the energy absorbing materials used in the sun visor assembly in the same manner as in the sun visor with a thickness equal to their minimum thickness measured at any point 25 mm or more from the edge of the visor. (Clause 11.3.4.1.) Such test samples shall be clearly identified to enable the samples to be traced back to a component or assembly drawing including the revision or issue status and this information must be stated on all test records.

4 NUMBER OF TEST ASSEMBLIES

One sun visor assembly would be required in order to carry out the contactable area and design requirement tests. Several sun visor assemblies may be required in order to demonstrate that the energy absorption requirements have been met for impact at any point more than 40 mm from the edge of the visor. Therefore any point within that defined area which may be regarded as being of different construction,

thickness or composition shall be impacted, (Clause 11.3.4.1.) (e.g. near a structural member), this is covered

in more detail in Section 6.3.1.1.

Each visor assembly may be impacted more than once provided that:-

- successive impact centre points are positioned at least twice the diameter of the impact depression away from each other and
- impacts are conducted on one side only of each assembly.

A minimum of five tests would normally be conducted within these constraints and sufficient assemblies provided to enable this to be achieved. When complete sun visor assemblies are tested two or three samples are usually sufficient.

Where the sun visors are not of symmetrical construction on either side and both sides are contactable then tests shall be conducted from both sides and sufficient samples provided.

Where test samples are supplied for the energy absorption tests a minimum of five test samples shall be provided. Where the sun visors are not of symmetrical construction on either side and both sides are contactable then ten test samples shall be provided.

Where the sun visor is fitted with a mirror and the mirror is of a glazing material required to meet the fragmentation requirements of Australian Standard R1-1968, 2080-1982 or the other Standards nominated in ADR 8/00. It should be confirmed that the mirror has been tested to demonstrate compliance with that Standard.

Where the sun visor is fitted with a mirror and so constructed as to prevent the particles formed on fracture from becoming detached from the sun visor one sample sun visor assembly containing the mirror shall be provided.

5 EQUIPMENT

5.1 Contactable Area Test

5.1.1 Basic Equipment. A 165 mm diameter spherical head form.

5.1.1.1 Measurement. The areas of the sun visor assembly which can be contacted by the 165 mm diameter sphere when the sun visor is in any adjustment position provided shall be determined.

5.1.1.2 Recording. The contactable areas shall be marked on the sun visor assembly so that the relevant design criteria can be applied.

5.2 Sun Visor Design

5.2.1 Basic Equipment. Standard inspection tools such as are required to establish conformity of component to drawing. Inspection tools to determine depth of energy absorbing material around perimeter of any mirror (if fitted), and radius of curvature of any metal components of visor or mounting frame if components are defined as contactable.

5.3 Energy Absorption Test

5.3.1 Basic Equipment. The energy absorption test equipment shall consist of a rigid moving head form of 165 mm diameter having an

effective mass of 6.8 (0.1 kg and a rigid anvil having a mass of at least 300 kg. (Clause 11.3.4.2.) The moving head and anvil should have sufficient rigidity to obviate undesirable vibrations in the equipment.

The face of the anvil to which the sun visor is mounted is perpendicular to the direction of travel of the moving head just prior to impact. Where a sun visor of tapered thickness is being tested the anvil may be tilted or a rigid support provided to ensure that the surface of the visor at the impact point is perpendicular to the direction of travel of the moving head.

The moving head shall be mounted on a suitable fixture to enable impact with the test sample at a velocity of not less than 3.5 m/sec. Various means are employed to provide the required velocity; some form of mechanical stored energy such as bungee cords or compression springs being generally used together with some form of release mechanism. (Clause 11.3.4.3.)

A transducer mounted on the moving head such that a complete deceleration/time curve is obtained using an oscillograph or other recording device. (Clause 11.3.4.4.)

Test equipment which may be used for this test is that shown in Annex A.

5.3.2 Instrumentation

5.3.2.1 Measurement. Two items are required to be determined; velocity of the moving head just prior to impact and the deceleration/time curve of the moving head during impact.

Velocity measurement is typically achieved by measuring the time taken for the head to pass through a 'gate' using photo-electronic cells or similar devices with corresponding electronic circuits. Readout may be direct via a device on the electronic package or indirect via a light beam recorder.

Deceleration/time measurement is generally achieved by the use of accelerometers, a system of amplifiers and a light beam oscillograph. The accelerometer output may be recorded in some other way and then fed into an analyser to provide the required deceleration time trace remote from the test site.

5.3.2.2 Recording. Typical recording systems employ a light beam chart recorder with built in facility for producing accurate timing lines together with the necessary signal conditioners and pre-amplifiers.

5.3.2.3 Order of Accuracy. Except where specified in the ADR or referred documents, the following order of accuracy is considered to be commercially achievable and should be taken as a guide. Instrumentation of lesser accuracy is acceptable provided it is taken into account in determining the certainty of results.

The velocity readout should be within (5% of the actual velocity. The deceleration channel must have a frequency response flat to within (5% from 1 to 1000 Hz.

To achieve these accuracies a chart recorder with a paper speed approaching 2 m/sec. is required and timing line generation with 0.1% accuracy is usually used. The accelerometer should have a frequency response from 1 to 1000 Hz flat to within (5% and the use of a class 1000 instrument in accordance with the recommendations of SAEJ211 Instrumentation for Impact Tests is satisfactory. Refer Annex I for Table. (Clause 11.3.4.4.).

5.3.2.4 Calibration. Routine calibration of the velocity measuring system, the accelerometer and measurement recorder must be conducted in accordance with Circular 0-12-3.

5.3.3 Fixtures. The fixture used to mount the test sample or assembly to the anvil must be such that the test sample is securely against the anvil face, i.e. no air gap, and securing devices must not be affixed within 40 mm of the impact point for any test, ensuring that the method of attachment has no influence on the test results. Typically the component is attached directly to the anvil with adhesive tape.

5.4 Mirror Fracture Tests

5.4.1 Glass Mirrors. The inspector should ensure that any glass mirror meets the requirements of the ADR for Safety Glazing Materials. In most cases, the glass will have been independently tested by the glass manufacturer, in which case the Test Facility or Vehicle Manufacturer should hold documentary evidence that this requirement has been met. Where the glass is tested within the ADR 11/00 Test Facility the test Standard specified in ADR 8/00 should be consulted for details of the fracture test.

5.4.2 Retained Fragment Tests. The energy absorption test equipment described in Section 5.3.1. is utilised for this test.

6 PROCEDURE

6.1 Contactable Area Tests

6.1.1 Preparation for Test

6.1.1.1 Prepare vehicle for contactable area tests by fitment of sample sun visor assemblies. Confirm that the worst case criteria in Section 2.2. have been met.

6.1.1.2 Review Instrumentation. Ensure that the sphere is of the correct diameter and that some form of marking pen or alternative is available.

6.1.2 Tests

6.1.2.1 Offer the sphere up to the sun visor assembly and mark the area of the sun visor contactable by the sphere. Ensure that the tests are conducted with the sun visor assembly at all

points of adjustment provided. This may include location of the sun visor to the side of the vehicle in which case the mounting sockets on the header panel, if fitted, may become contactable.

Clearly mark all contactable areas on the sun visor assembly to enable the design criteria requirements to be evaluated.

The tests carried out on one hand assembly can be regarded as being applicable to the other hand provided:

- the components and their mounting are symmetrical about the longitudinal centre line of the vehicle and
- the least constricted side is evaluated if there is any difference in the mounting environment.

6.1.2.2 Alternative test methods may be employed provided they can be shown to provide an accurate assessment of the contactable areas.

6.1.3 Determination of Results. From the data recorded the contactable areas of the sun visor assembly can be determined. This information should be retained as original data either in the form of a drawing, photograph or retention of the test sample.

6.2 Sun Visor Design

6.2.1 Preparation for Test. Taking the results from 6.1.3 mark on the drawing the contactable areas defined. If the drawing is not explicit the component must be measured for compliance with the requirements of section 6.2.2.1. Any significant omissions from the drawing should be referred to the Design Section for inclusion on the drawing.

6.2.2 Tests

6.2.2.1 The sun visor components or assembly shall be dimensionally checked in the contactable areas to determine:

- that all mounting components present no rigid material edge with a radius of curvature less than 3 mm. (Clause 11.2.1)
- that each edge of a contactable mirror, if fitted, is covered with a minimum of 3 mm of the energy absorbing material used in the construction of the visor (Clause 11.2.2)

6.2.3 Determination of Results. The conformance of the sun visor components and assembly to the design requirements specified can be established from the results obtained. All original data used for determining results is to be retained either as part of the Testing Facility's original test report or in a separate original data file.

6.3 Energy Absorption Tests

6.3.1 Preparation for Test

6.3.1.1 Review Programme. Review the proposed test programme and confirm that the correct number of test samples or sun visor assemblies have been selected and appropriately

marked. This marking shall include identification of the test components. In the case of the test samples the centre of the sample shall be marked. In the case of sun visor assemblies mark the 40 mm dimension line from the edge of the visor on the assembly. The components shall be examined and the positions considered relevant to meet the impact requirements shall be identified and marked. Such points shall be those within the 40 mm dimension line from the edge of the visor and shall comprise a minimum of five impact points.

An impact point shall be specified for each different material thickness or composition area and for each position where a supporting frame or other component comes within the 40 mm dimension line or the point on the visor where the supporting frame or other component is closest to this dimension line.

Where the visor is fitted with a mirror which is positioned in a contactable area as determined in Section 6.1 one impact point shall be the centre of the mirror and one impact point shall be at the junction of the mirror and the energy absorbing covering material. Visors fitted with mirrors shall also be impacted at a point on the reverse side of the visor from the mirror and corresponding to the centre of the mirror provided the area concerned is defined as a contactable area.

Check that the samples have been subject to temperature conditioning at 25 degrees C (5 degrees C for a period of at least six hours prior to the test and tested at that temperature. (Clause 11.3.4.1.)

6.3.1.2 Review Test Fixture. Ensure that the test fixture meets the requirements specified in Section 5.3.1.1 in regard to head form, anvil and mounting arrangements.

6.3.1.3 Setting Up

6.3.1.3.1 Where test samples are to be tested in accordance with Section 3 requirements one sample shall be secured to the anvil so that the head form impacts the centre of the test sample.

6.3.1.3.2 Where actual sun visor assemblies are being tested the sample shall be secured to the anvil so that the head form impacts one of the points designated in Section 6.3.1.1.

6.3.1.4 Review Instrumentation. Ensure that all instrumentation is on the correct scale, that all zeroes are correctly set and that any feasible in situ calibration has been performed.

6.3.2 Tests

6.3.2.1 Operate the test rig and determine the results as in Section 6.3.3.

6.3.2.2 Replace the test sample or reposition the sun visor assembly so as to impact another of the points designated by Section 6.3.1.1. Repeat 6.3.2.1.

6.3.2.3 Repeat 6.3.2.2 and 6.2.3.1 until all samples required by Section 4 are tested and all points designated by 6.3.1.1 have been impacted.

6.3.3 Determination of Results. From the data recorded the impact speed and deceleration/time trace are determined either by direct read out or analysis of result records.

Confirm that the head form impacted the component at a velocity of at least 3.5 m/sec after allowing for instrumentation uncertainty. (Clause 11.3.4.3)

Using the deceleration/time trace determine the time during which the deceleration exceeded 80'g' and the maximum deceleration reading.

If the maximum deceleration reading exceeded 200'g' analyse trace to determine if result was a true reading or a 'spike' due to instrument 'ringing' within the head form. (Clause 11.3.3)

All original data used for determining results is to be retained either as part of the Testing Facility's Internal Report or in a separate original data file. In any case the deceleration/time traces are to be contained in the internal report.

6.4 Retained Fragment Tests

6.4.1 Preparation for Test. A sun visor assembly containing the mirror to be tested is to be appropriately identified and the centre of the mirror marked.

6.4.2 Review Test Fixture. Ensure that the test fixture meets the requirements specified in Section 5.3.1.1 in regard to head form, anvil and mounting arrangements.

6.4.3 Setting Up. Mount the sun visor to the anvil so that the head form will impact the centre of the mirror.

6.4.4 Review Instrumentation. Ensure that all instrumentation is on the correct scale, that all zeroes are correctly set and that any in situ calibration has been performed.

6.4.5 Tests. Operate the test rig and determine the results as in Section 6.4.6.

6.4.6 Determination of Results. If the mirror was not fractured by the head form impact then the requirements would be considered to have been met.

If the mirror was fractured by the head form impact observe whether any mirror particles were separated from the sun visor during impact.

Carefully remove the sun visor assembly from the anvil and turn it over so that the mirror faces downward. Observe whether any mirror particles fall from the sun visor. (Clause 11.2.2)

6.5 Reporting Results

For each test series a complete internal report giving a full description of material tested, equipment used, results and the order of accuracy is to be prepared. For submission to the Administrator, the determined results for the sun visor design in contactable areas, maximum

acceleration and length of time the acceleration was greater than 80'g' and compliance of any mirrors to the fracture requirements are to be recorded together with the Internal Report number in the appropriate section of the Summary of Evidence Report - see Section 8.

7 ANALYSIS OF RESULTS

The sun visor assembly will be considered to have conformed with ADR 11/00 if the following results have been achieved after making the appropriate allowance for instrument uncertainty.

CLAUSE	RESULT
11.2.1	No rigid material edge radius of less than 3 mm exists that is statically contactable by a sphere of 165 mm diameter.
11.2.2	Each edge of a contactable mirror attached to a sun visor is covered with more than 1.5 mm thickness of energy absorbing material used in the construction of the visor.
11.3.3	The test sample or sun visor shall arrest the moving head in such a way that the deceleration does not exceed 80 'g'. except during a period of 3 milliseconds when no peak shall exceed 200 'g'. Deceleration peaks exceeding 200 'g' must be of very short duration and be due to test equipment 'ringing'.
11.3.4.3	The moving head impacted the test sample at a velocity of not less than 3.5 m/sec.
11.2.2	No fracture of mirror occurred during the impact by the head form, or No fragments of mirror became detached from the visor as a result of impact by the head form.

A fragment of mirror is defined as a portion of the mirror material which extends the full depth of the mirror cross section in a plane through the mirror at right angles to the face.

8 SUMMARY OF EVIDENCE REPORT

The Summary of Evidence Report SE 11/00 is the only document to be sent to the Administrator for demonstration of compliance to ADR 11/00. The

original test report identification number, the location of the test report, the test facility identification number and the determined results are to be recorded in the appropriate place in the SE 11/00 form for each clause of the ADR.

9 PROCEDURE FOR DESIGNS WITH CERTIFICATION TO ALTERNATIVE STANDARDS

The energy absorption requirements of this Rule shall be deemed to be satisfied if the 'Sun Visor(s)' have satisfied the requirements of the "Energy Dissipation Test" in Annex 4 of the ECE Regulation 21/01, "Interior Fittings", provided that the testing is conducted with the 'Sun Visor ' mounted on the structural supporting member on which the 'Sun Visor' is to be installed and for the installed geometry of the 'Sun Visor' with respect to the 'H-point'.

In this case the appropriate parts of Evidence Summary of form SE 11/00 shall be completed.

10 REFERENCES

ADR References

ADR Definitions

ADR 11/00 - Internal Sun Visors

ADR 8/00 - Safety Glass

ECE Regulation 21.01 "Uniform Provisions Concerning the Approval of Vehicles with Regard to their Interior Fittings"

AS R1 - 1968 - Safety Glass for Land Transport

Circulars

Circular 0-12-2 - General Requirements for Test Facilities'.

Circular 0-12-3 - General Requirements for Calibration of Test Equipment and Instrumentation

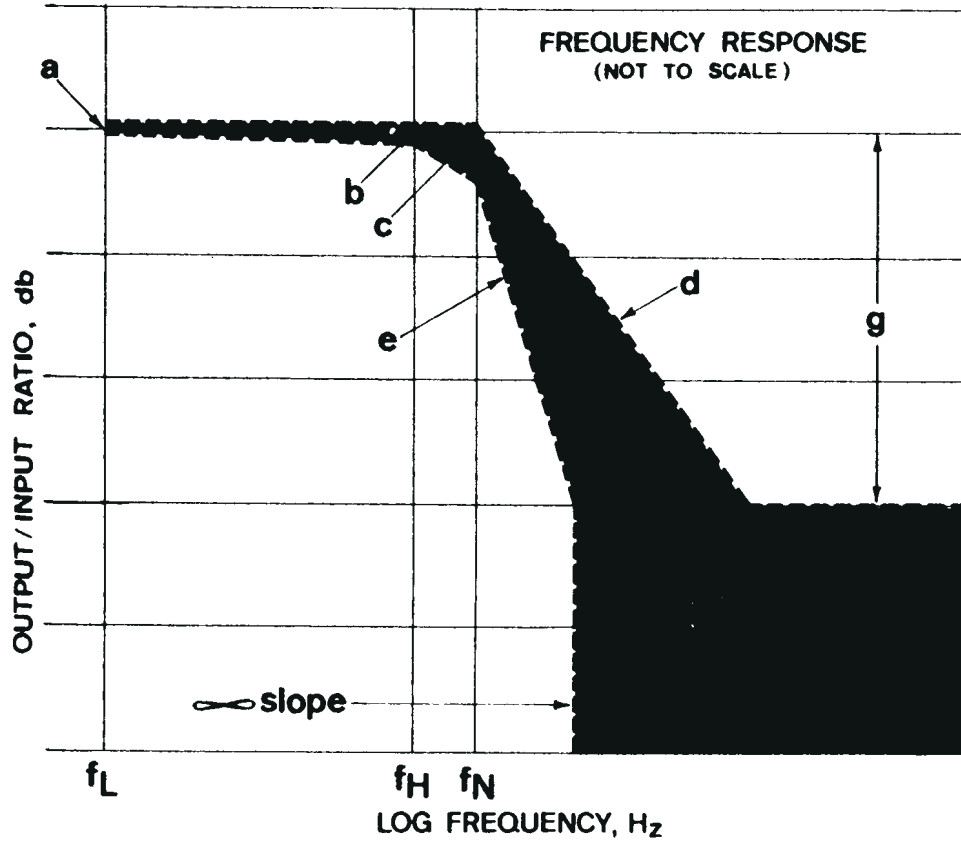
Other References

SAE Test Procedures

J211 (FS 201) Instrument Panel Laboratory Test Procedure

J211 Recommended Data Channel Dynamic Accuracy Diagram and Charts

ANNEX A

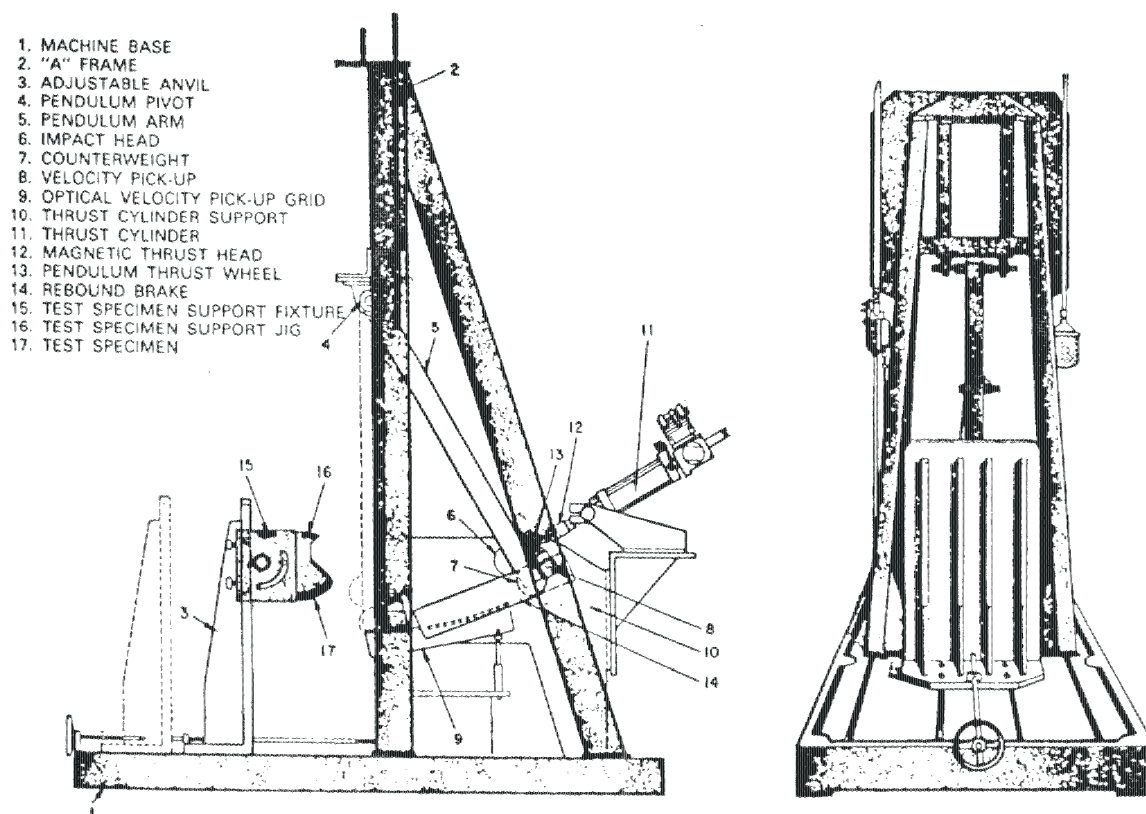


FREQUENCY RESPONSE VALUES

Channel Class	$f_{L'}$ Hz	a, dB	$f_{H'}$ Hz	b, dB	$f_{N'}$ Hz	c, dB	d, dB/ octave	e, dB/ octave	g, dB
1000	0.1	+1/2, -1/2	1000	+1/2, -1	1650	+1/2, -4	-9	-24	-30
600	0.1	+1/2, -1/2	600	+1/2, -1	1000	+1/2, -4	-9	-24	-30
180	0.1	+1/2, -1/2	180	+1/2, -1	300	+1/2, -4	-9	-24	-30
60	0.1	+1/2, -1/2	60	+1/2, -1	100	+1/2, -4	-9	-24	-30

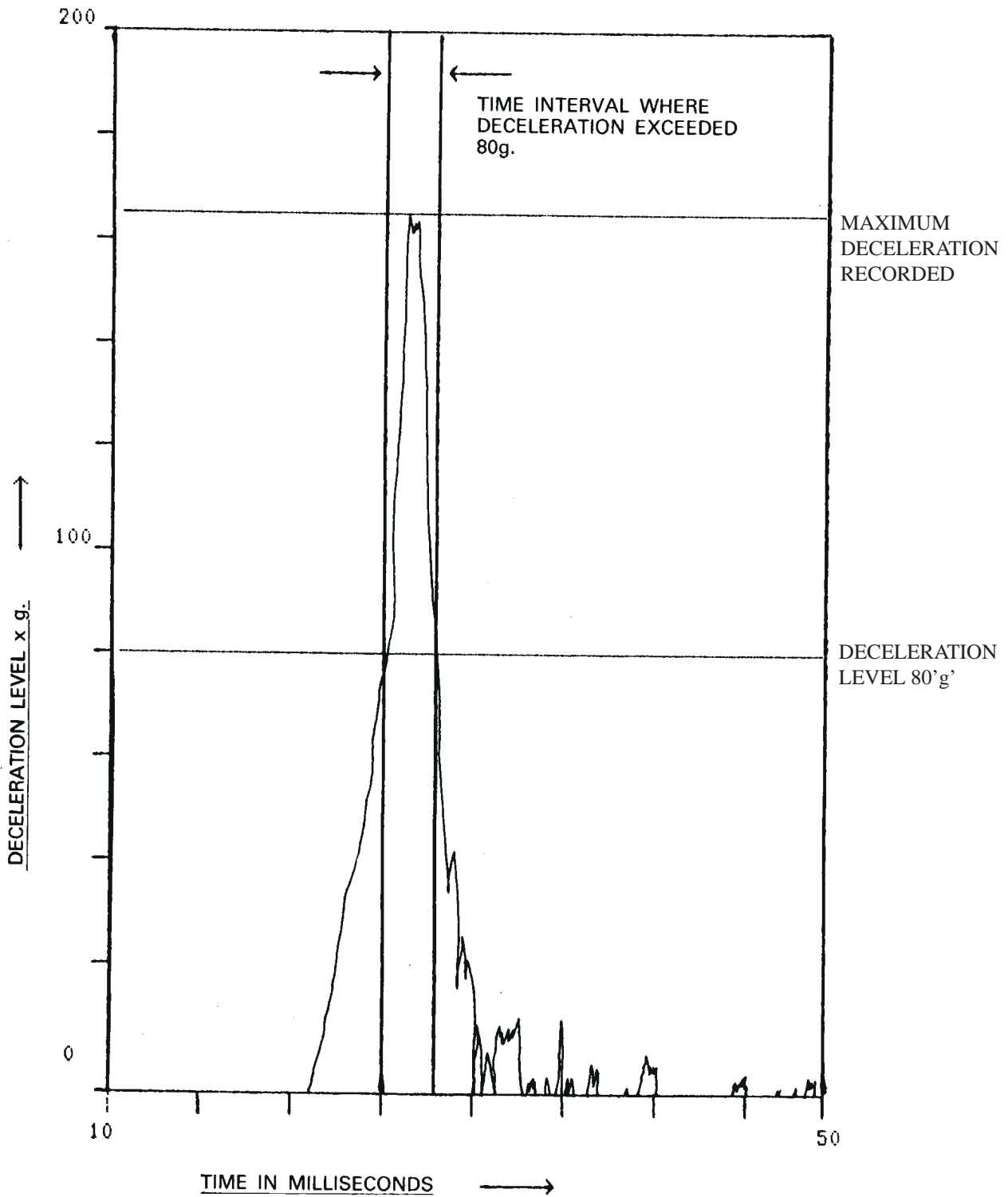
(a) SAE J211 RECOMMENDED DATA CHANNEL DYNAMIC ACCURACY DIAGRAM AND CHART

ANNEX A



(b) SAE PASSENGER COMPARTMENT IMPACT TEST RIG DIAGRAM

ANNEX B



SAMPLE ENERGY ABSORPTION TRACE ANALYSIS