SAFETY COMPLIANCE TESTING FOR
FMVSS NO. 216
ROOF CRUSH RESISTANCE

NISSAN MOTOR CO., LTD.
2004 NISSAN QUEST, MPV
NHTSA NO. C45203

GENERAL TESTING LABORATORIES, INC.
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JUNE 3, 2004
FINAL REPORT
PREPARED FOR
U. S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
400 SEVENTH STREET, SW
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NHTSA No. C45203

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SECTION 1

PURPOSE OF COMPLIANCE TEST

1.0 PURPOSE OF COMPLIANCE TEST

A 2004 Nissan Quest MPV was subjected to Federal Motor Vehicle Safety Standard (FMVSS) No. 216 testing to determine if the vehicle was in compliance with the requirements of the standard. The purpose of this standard is to reduce deaths and injuries due to the crushing of the roof into the occupant compartment in rollover crashes.

1.1 The test vehicle was a 2004 Nissan Quest MPV. Nomenclature applicable to the test vehicle are:

A. Vehicle Identification Number: 5N1BV28U94N320161

B. NHTSA No.: C45203

C. Manufacturer: NISSAN MOTOR CO., LTD

D. Manufacture Date: 9/03

1.2 TEST DATE

The test vehicle was subjected to FMVSS No. 216 testing on May 24, 2004.
SECTION 2

COMPLIANCE TEST RESULTS SUMMARY

2.0 TEST RESULTS

All tests were conducted in accordance with NHTSA, Office of Vehicle Safety Compliance (OVSC) Laboratory Procedure, TP-216-05 and General Testing Laboratories Procedure, TP-216-05B with the following modifications requested by the COTR:

1) The vehicle was rigidly mounted in the test fixture by welding vertical supports to the vehicle jack points to prevent any vehicle movement. Chains were not used in an effort to reduce and/or eliminate "pre-stressing" of the vehicle due to the tightening of chains.

2) Dial gauges were placed at the vehicle corners and at the passenger door to track overall vehicle motion and the ability of the alternate tie-down procedure to restrict motion of the vehicle.

The data for this portion of the test can be found on Data Sheet 6.

Based on the test performed, the 2004 Nissan Quest appears to meet the requirements of FMVSS 216.
SECTION 3

COMPLIANCE TEST DATA

3.0 TEST RESULTS

The following data sheets document the results of testing on the 2004 Nissan Quest.
DATA SHEET 1
FMVSS 216
SUMMARY OF RESULTS

VEH. MOD YR/MAKE/MODEL/BODY: 2004 NISSAN QUEST MPV.
VEH. NHTSA NO: C45203; VIN: 5N1BV28U94N320161
VEH. BUILD DATE: 9/03 TEST DATE: MAY 24, 2004
TEST LABORATORY: GENERAL TESTING LABORATORIES
OBSERVERS: GRANT FARRAND, JIMMY LATANE, AMANDA PRESCOTT

A. VISUAL INSPECTION OF TEST VEHICLE

Upon receipt, inspect vehicle for completeness, function, and discrepancies or damage which might influence the testing.

RESULTS:

B. VEHICLE DATA

(1) Vehicle type as shown on certification label: MPV
(2) Vehicle UVW as recorded on Data Table 2: 2027 kg

C. STATIC LOAD TEST OF DRIVER SIDE OF ROOF

Minimum roof crush resistance required by FMVSS 216 for the vehicle tested:

MCCR as recorded on Data Table 2: 29.797 N

Maximum roof crush resistance measured during test was 55,275 N at 76.9 mm

PASS FAIL

D. POST TEST VISUAL INSPECTION

Driver side roof rail pushed down from "C" pillar forward. Roof metal around sun roof came up approximately 4" in center of roof. Driver door glass shattered and driver side of windshield cracked. Roof rail above driver's door pushed down/in approximately 4".

RESULTS:

REMARKS:

RECORDED BY: ________________________________ DATE: __05/24/04__

APPROVED BY: ________________________________
DATA SHEET 2
FMVSS 216
RECEIVING INSPECTION

VEH. MOD YR/MAKE/MODEL/BODY: 2004 NISSAN QUEST MPV
VEH. NHTSA NO: C45203; VIN: 5N1BV28U94N320161
VEH. BUILD DATE: 9/03; TEST DATE: MAY 24, 2004
TEST LABORATORY: GENERAL TESTING LABORATORIES
OBSERVERS: GRANT FARRAND, JIMMY LATANE, AMANDA PRESCOTT

Upon receipt, the vehicle will be examined visually for completeness, function, and damage. The roof and supporting structures such as the doors and windows should be checked for proper operation and any discrepancies which may influence the testing. The vehicle will be weighed and the minimum roof crush resistance determined.

RESULTS:

(1) Unloaded Vehicle Weight (UVW)

<table>
<thead>
<tr>
<th>Part</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left Front</td>
<td>574</td>
</tr>
<tr>
<td>Right Front</td>
<td>597</td>
</tr>
<tr>
<td>Front Axle</td>
<td>1171</td>
</tr>
<tr>
<td>Left Rear</td>
<td>438</td>
</tr>
<tr>
<td>Right Rear</td>
<td>418</td>
</tr>
<tr>
<td>Rear Axle</td>
<td>856</td>
</tr>
</tbody>
</table>

TOTAL UVW 2027 kg

(2) Vehicle type as shown on vehicle certification label: MPV

(3) Minimum Roof Crush Resistance (MCRR):

Passenger Car:

UVW x 1.5 x 9.8 = N/A N
MCRR = N/A N (UVW x 1.5 x 9.8 or 22,241 N whichever is less)

MPV, Truck or Bus:

MCRR = UVW x 1.5 x 9.8 = 29,797 N

(4) Other Comments: 

REMARKS:

RECORDED BY: _______________________ DATE: 05/24/04
APPROVED BY: _______________________

[Signatures]
DATA SHEET 3
FMVSS 216
PRE-TEST PREPARATION

VEH. MOD YR/MAKE/MODEL/BODY: 2004 NISSAN QUEST MPV
VEH. NHTSA NO: C45203; VIN: 5N1BV28U94N320161
VEH. BUILD DATE: 9/03; TEST DATE: MAY 24, 2004
TEST LABORATORY: GENERAL TESTING LABORATORIES
OBSERVERS: GRANT FARRAND, JIMMY LATANE, AMANDA PRESCOTT

Prior to testing, the following will be accomplished:

A. Secure any convertible top, movable or removable roof structure in their weather tight positions __ Removed driver side roof rack

B. Close all windows _______ OK

C. Close and lock all doors _______ OK

D. State Side of Roof Tested _______ Driver

E. Measure the lateral angle of the test device at sufficient points to determine that it has a 25 degree (plus zero degree, minus one degree) angle __ 25°

F. Measure the longitudinal angle of the loading device at sufficient points to determine that is has a 5 degree (plus zero minutes, minus 20 minutes) __ 5°

G. The test device will initially contact the roof at 584 mm aft from top center of windshield

H. If the test device was relocated based on the requirements of Chapter 12.3 paragraph F, describe where the test device will initially contact the roof as relocated ______ N/A

I. Ambient temperature 51 mm from the vehicle roof in the immediate area of the test device: ____ 26.7 _______ degrees C.

REMARKS:

RECORDED BY: ___________________________ DATE: __05/24/04__________

APPROVED BY: ___________________________
DATA SHEET 4
FMVSS 216

VEH. MOD YR/MAKE/MODEL/BODY: 2004 NISSAN QUEST MPV
VEH. NHTSA NO: C45203; VIN: 5N1BV28U94N320101
VEH. BUILD DATE: 9/03; TEST DATE: MAY 24, 2004
TEST LABORATORY: GENERAL TESTING LABORATORIES
OBSERVERS: Grant Farrand, Jimmy Latane, Amanda Prescott

RESULTS: Plots of load versus displacement and time versus displacement showed that:

(1) The maximum roof crush resistance was 55,275 N at 76.9 mm
(2) The rate of loading was 5.08 mm/sec (2 in/sec)
(3) The required roof crush resistance of 29,797 N was at 33.8 mm

REMARKS:

RECORDED BY: [Signature]  DATE: 05/24/04
APPROVED BY: [Signature]
DATA SHEET 5
FMVSS 216
POST TEST VISUAL INSPECTION

VEH. MOD YR/MAKE/MODEL/BODY: 2004 NISSAN QUEST MPV
VEH. NHTSA NO: C45203; VIN: 5N1BV28U94N320161
VEH. BUILD DATE: 9/03; TEST DATE: MAY 24, 2004
TEST LABORATORY: GENERAL TESTING LABORATORIES
OBSERVERS: GRANT FARRAND, JIMMY LATANE, AMANDA PRESCOTT

Upon completion of testing, a detailed visual inspection of the vehicle shall be made. Describe all damage and deformation that occurred during the test.

RESULTS: Driver side roof rail pushed down from "C" pillar forward. Roof metal around came up approximately 4" in center of roof. Driver door glass shattered and driver side of windshield cracked. Roof rail above driver's door pushed down/in approximately 4".

RECORDED BY: [Signature] DATE: 05/24/04
APPROVED BY: [Signature]
VEH. MOD YR/MAKE/MODEL/BODY: 2004 NISSAN QUEST MPV
VEH: NHTSA NO: C45203; VIN: 5N1BV2BU94N320161
VEH. BUILD DATE: 9/03; TEST DATE: MAY 24, 2004
TEST LABORATORY: GENERAL TESTING LABORATORIES
OBSERVERS: GRANT FARRAND, JIMMY LATANE, AMANDA PRESCOTT

Maximum Load Applied = 55,276 N @ 76.9 mm
Maximum Displacement = 132 mm @ 49,850 N

Left Front Dial Indicator Displacement = 1.14 mm
Right Front Dial Indicator Displacement = indicator did not record
Left Rear Dial Indicator Displacement = 9.25 mm
Right Rear Dial Indicator Displacement = 11.79 mm
Right Door Sill Dial Indicator Displacement = 6.22 mm

NOTES:

RECORDED BY: [Signature]  DATE: 05/24/04
APPROVED BY: [Signature]
## TABLE 1 - INSTRUMENTATION & EQUIPMENT LIST

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<tr>
<th>EQUIPMENT</th>
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<td>AT&amp;T</td>
<td>486D86</td>
<td>BEFORE USE</td>
<td>BEFORE USE</td>
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<tr>
<td>TEST FIXTURE</td>
<td>GTL</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>A/D INTERFACE</td>
<td>METRABYTE</td>
<td>DAS-16(F)</td>
<td>BEFORE USE</td>
<td>BEFORE USE</td>
</tr>
<tr>
<td>SIGNAL CONDITIONER</td>
<td>METRABYTE</td>
<td>EXP-RES</td>
<td>BEFORE USE</td>
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<tr>
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<td>REVERE</td>
<td>544351</td>
<td>11/03</td>
<td>11/04</td>
</tr>
<tr>
<td>DIAL INDICATOR</td>
<td>MITUTOYO</td>
<td>2424-10</td>
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<td>BEFORE USE</td>
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<td>ELECTRIC ASSOC. INC.</td>
<td>11A4A8</td>
<td>BEFORE USE</td>
<td>BEFORE USE</td>
</tr>
</tbody>
</table>
SECTION 5

PHOTOGRAPHS
2004 NISSAN QUEST
NHTSA NO. C45203
FMVSS NO. 216

FIGURE 5.2
\( \frac{3}{4} \) REARWARD VIEW OF VEHICLE ONE TESTED
SIDE BEFORE TESTING
2004 NISSAN QUEST
NHTSA NO. C45203
FMVSS NO. 216

FIGURE 5.4
RIGHT SIDE VIEW OF VEHICLE BEFORE TESTING
2004 NISSAN QUEST
NHTSA NO. C45203
FMVSS NO. 216

FIGURE 5.25
RIGHT REAR DISPLACEMENT AT FULL LOAD (INCHES)
GTL 5200

216, Roof Crush, Driver Side.

Force in Newtons (Thousands) vs. Time in Seconds