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OFFICE OF VEHICLE SAFETY COMPLIANCE

FMVSS No. 217
"BUS EMERGENCY EXITS AND WINDOW RETENTION AND RELEASE"

Compliance Test Report
for a
2004 Orion V, 29 Passenger Transit Bus
NHTSA No. C40805

U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF VEHICLE SAFETY COMPLIANCE
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Technical Report Documentation Page

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SECTION 1.0 – PURPOSE OF COMPLIANCE TEST

Tests were conducted on a model year 2004 Orion V, 29-passenger transit bus, NHTSA No. C40805, in accordance with the Office of Vehicle Safety Compliance (OVSC) Test Procedure TP-217TB-00 to determine compliance to the requirements of Federal Motor Vehicle Safety Standards (FMVSS) 217, "Bus Emergency Exits and Window Retention and Release".

SECTION 2.0 – TEST SUMMARY

TEST SUMMARY

A 29-passenger, 2004 Orion V bus (VIN: 1VHAC3A2846502288) was tested to the requirements of Federal Motor Vehicle Safety Standard No. 217, "Bus Emergency Exits and Window Retention and Release" on August 9, 2004. The testing was performed by OVSC engineers. The bus was tested in accordance with the OVSC test procedure TP-217TB-00, dated June 25, 2002. The bus is equipped with four (4) emergency exit windows on the curb side of the bus, 5 (5) emergency exit windows on the street side of the bus and one (1) emergency roof exit located at the rear of the bus. A summary of results is provided in the table below.

Table 1 – Test Summary

Section	Description	Pass/Fail	Reason
S5.2	Provision of Emergency Exits	Pass	
S5.3	Emergency Exit Release	Pass	
S5.4	Emergency Exit Opening	Pass	
S5.5	Emergency Exit Identification	Pass	
S5.1	Window Retention	Not Tested	

SECTION 3.0 – COMPLIANCE TEST DATA

DATA SHEET No. 1

PROVISION OF EMERGENCY EXITS

Table 2 - Provision of Emergency Exits

Exit Number	Emergency Exit Type and Location	Exit Dimensions	Exit Area	Maximum Credit Area Allowed (not to exceed 3,458 sq. cm)
1	Window, Right-Front	131 cm x 59 cm	7,729 sq. cm	3,458 sq. cm
2	Window, Right-Mid	131 cm x 83 cm	10,873 sq. cm	3,458 sq. cm
3	Window, Right-Mid	142 cm x 83 cm	11,786 sq. cm	3,458 sq. cm
4	Window, Right-Rear	142 cm x 83 cm	11,786 sq. cm	3,458 sq. cm
5	Window, Left-Rear	142 cm x 83 cm	11,786 sq. cm	3,458 sq. cm
6	Window, Left-Mid	142 cm x 83 cm	11,786 sq. cm	3,458 sq. cm
7	Window, Left-Mid	131 cm x 83 cm	10,873 sq. cm	3,458 sq. cm
8	Window, Left-Mid	131 cm x 83 cm	10,873 sq. cm	3,458 sq. cm
9	Window, Left-Front	84 cm x 84 cm	7,056 sq. cm	3,458 sq. cm
10	Roof Hatch, Rear	54 cm x 54 cm	2,916 sq. cm	2,916 sq. cm

Total Required Area = **29** Designated Seating Positions (DSPs) x 432 cm^2 = **12,528 cm^2**
Total Credit Area = **34,038 cm^2** (PASS)

Each side of the bus must contain 40% of the Total Required Area
(.40 x 12,528 cm^2) = 5,011 cm^2

Total Credit Area-Left Side (5 windows)= (5 x 3,458 cm^2) = 17,290 cm^2 (PASS)
Total Credit Area-Right Side (4 windows)= (4 x 3,458 cm^2) = 13,832 cm^2 (PASS)

The bus has a rear roof exit and the configuration of the bus appears to preclude the installation of an accessible rear exit.

DATA SHEET No. 2

Table 3 - Access Regions and Forces to Release Exits

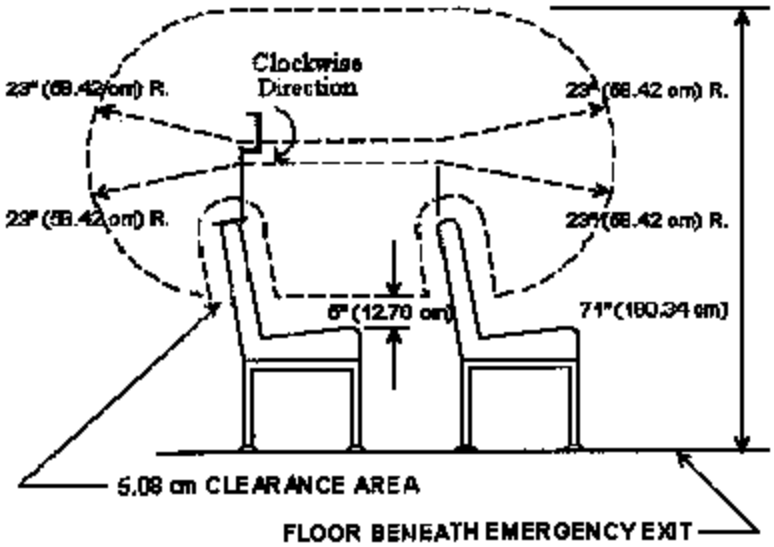
Emergency Exit Type and Location	No. of Release Mechanisms	Access Region	Motion to Release Exit	Measured Force to Release Exit			Max. Force Allowable	Pass	Fail
Window-Right-Front - Exit 1	1	High + Low	Rotary	1) 58.8 N	2) 58.8 N	3) 53.9 N	89 N	X	
Window-Right-Mid Exit 2	1	High + Low	Rotary	1) 39.2 N	2) 44.1 N	3) 39.2 N	89 N	X	
Window -Right-Rear - Exit 4	1	High + Low	Rotary	1) 73.5 N	2) 49 N	3) 53.9 N	89 N	X	
Window-Left-Rear - Exit 5	1	High + Low	Rotary	1) 24.5 N	2) 24.5 N	3) 24.5 N	89 N	X	
Window-Left-Mid - Exit 6	1	High + Low	Rotary	1) 29.4 N	2) 58.8 N	3) 29.4 N	89 N	X	
Window-Left-Mid - Exit 7	1	High + Low	Rotary	1) 29.4 N	2) 44.1 N	3) 34.3 N	89 N	X	
Window-Left-Mid - Exit 8	1	High + Low	Rotary	1) 24.5 N	2) 19.6 N	3) 19.6 N	89 N	X	
Window-Left-Front - Exit 9	1	High + Low	Rotary	1) 49 N	2) 49 N	3) 53.9 N	89 N	X	

Note:

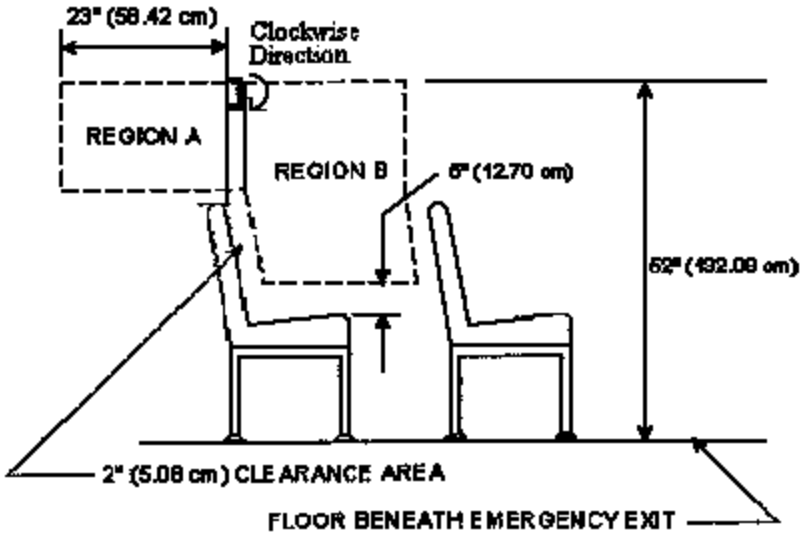
Each release mechanism tested was exercised three times prior to measuring the release force. The term exercised is used to describe the action whereby the release mechanism is released and the window opened and then returned to its original unreleased location.

The forces were measured using a Shimpo MF handheld force gauge. The force gauge has a hook at one end that allows for the attachment of the gauge onto the release mechanism. After the gauge is attached an engineer applies a force to the gauge which is transferred to the release mechanism. The engineer applies increasingly greater force until the release mechanism is released. The force measured is recorded and the gauge is zeroed for the next test.

Access Regions for Low Force



Access Regions for High Force



DATA SHEET No. 3

Table 4 - Access Regions and Forces to Open Exits

Emergency Exit Type and Location	Access Region	Motion to Extend Exit	Measured Force to Open Exit			Max. Force Allowable	Pass	Fail
Window-Right-Front - Exit 1	High + Low	Straight and Perpendicular	1) 58.8 N	2) 60.8 N	3) 58.8 N	267 N	X	
Window-Right-Mid Exit 2	High + Low	Straight and Perpendicular	1) 73.5 N	2) 73.5 N	3) 63.7 N	267 N	X	
Window -Right-Rear - Exit 4	High + Low	Straight and Perpendicular	1) 166.6 N	2) 166.2 N	3) 161.7 N	267 N	X	
Window-Left-Rear - Exit 5	High + Low	Straight and Perpendicular	1) 166.6 N	2) 176.4 N	3) 191.1 N	267 N	X	
Window-Left-Mid - Exit 6	High + Low	Straight and Perpendicular	1) 156.8 N	2) 191.1 N	3) 98 N	267 N	X	
Window-Left-Mid - Exit 7	High + Low	Straight and Perpendicular	1) 112.7 N	2) 117.6 N	3) 107.8 N	267 N	X	
Window-Left-Mid - Exit 8	High + Low	Straight and Perpendicular	1) 254.8 N	2) 171.5 N	3) 181.3 N	267 N	X	
Window-Left-Front - Exit 9	High + Low	Straight and Perpendicular	1) 53.9 N	2) 73.5 N	3) 63.7 N	267 N	X	

A Shimpo MF handheld force gauge is used to measure the force to open the exit. The force gauge has a flat attachment on one end that provides a surface to place against the exit. The exit is released prior to measuring the force to open the exit. An engineer then applies an increasing force to the force gauge until the exit is opened allowing passage of the 33cm by 50cm ellipsoid. The force is recorded and the gauge is zeroed for the next test.

Emergency Exit Identification

1. Each emergency exit has a permanently affixed, legible label or placard with the designation "Emergency Door" or "Emergency Exit." **PASS**

2. Each emergency exit has a permanently affixed, legible label or placard describing the motion necessary to release (unlatch) and open the exit. **PASS**

3. The label is within 16 cm of the nearest release mechanism. **PASS**

SECTION 4.0 – INSTRUMENTATION AND EQUIPMENT LIST

INSTRUMENTATION AND EQUIPMENT LIST

EQUIPMENT	DESCRIPTION	SERIAL NO.
Ellipsoid	Minor Axis = 33 cm Major Axis = 50 cm	N/A
Force gauge	Shimpo MF	505110
Craftsman 8m Tape Measure	Tape Measure	N/A

SECTION 5.0

PHOTOGRAPHS LIST

Photo 1 - Exterior Front View

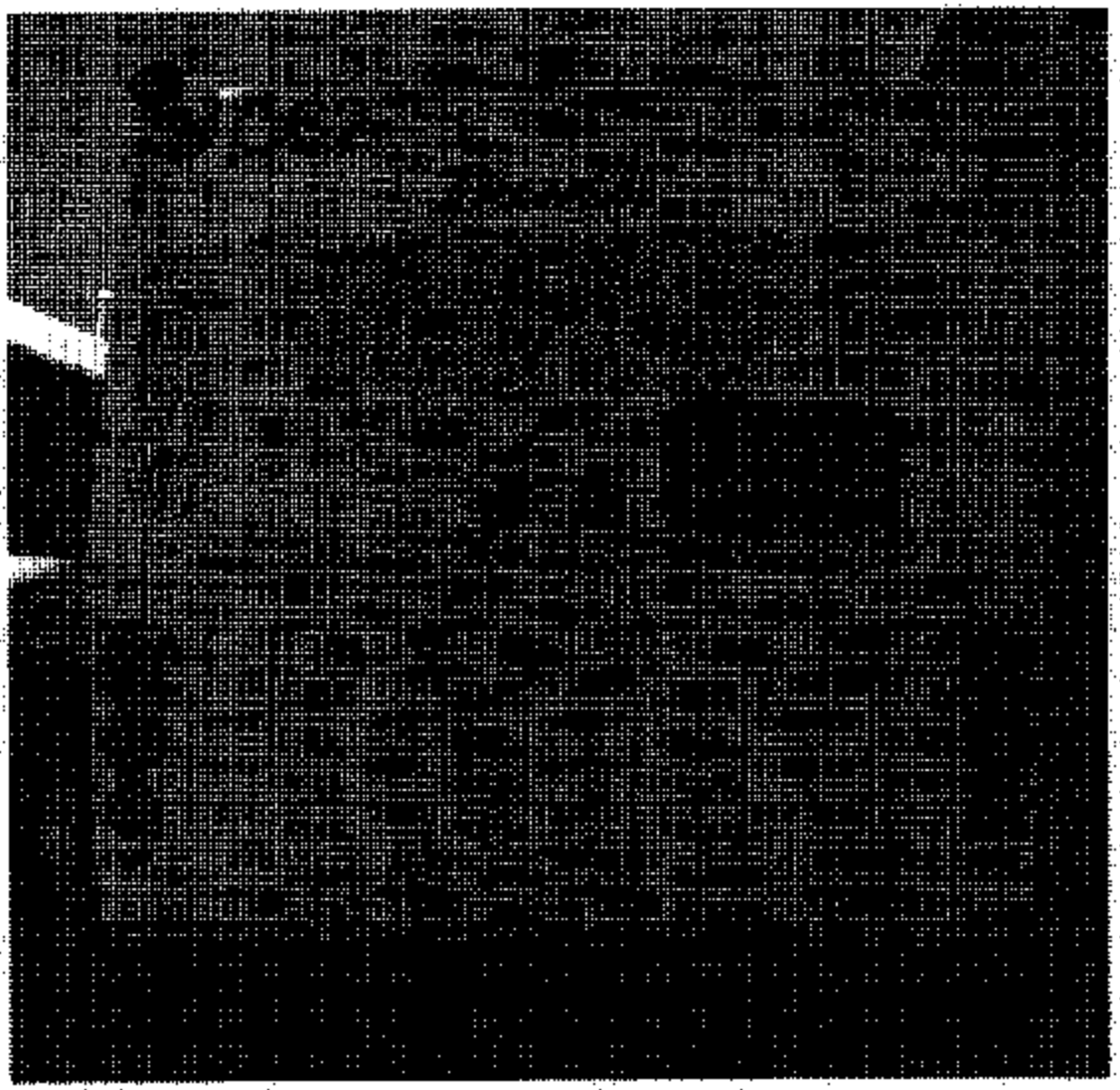


Photo 2 - Exterior Rear View

Photo 3 – Interior Rear View

Photo 4 – Interior Front View

Photo 5 – Emergency Exit Label

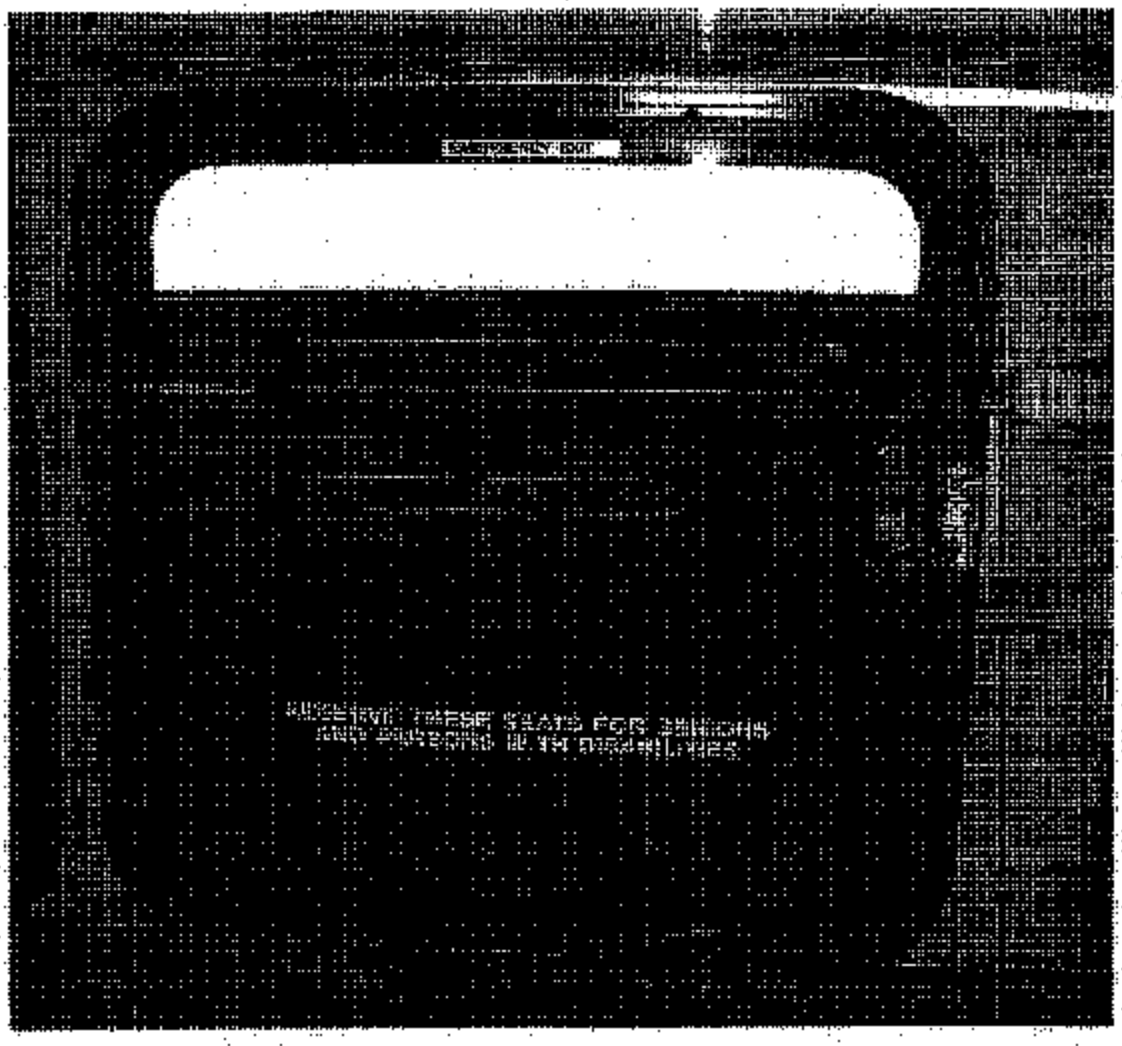


Photo 6 – Emergency Exit

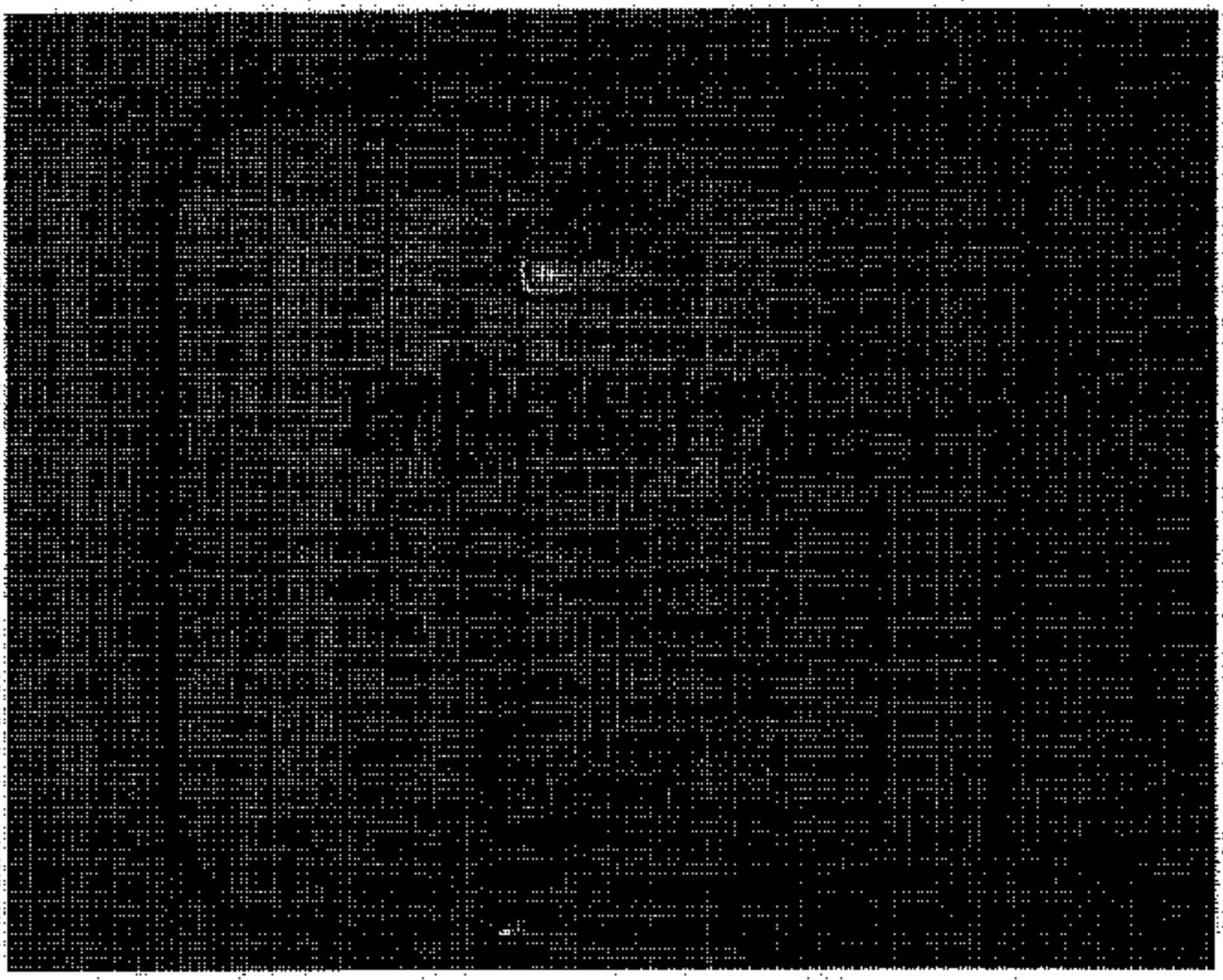


Photo 7 – Roof Emergency Exit

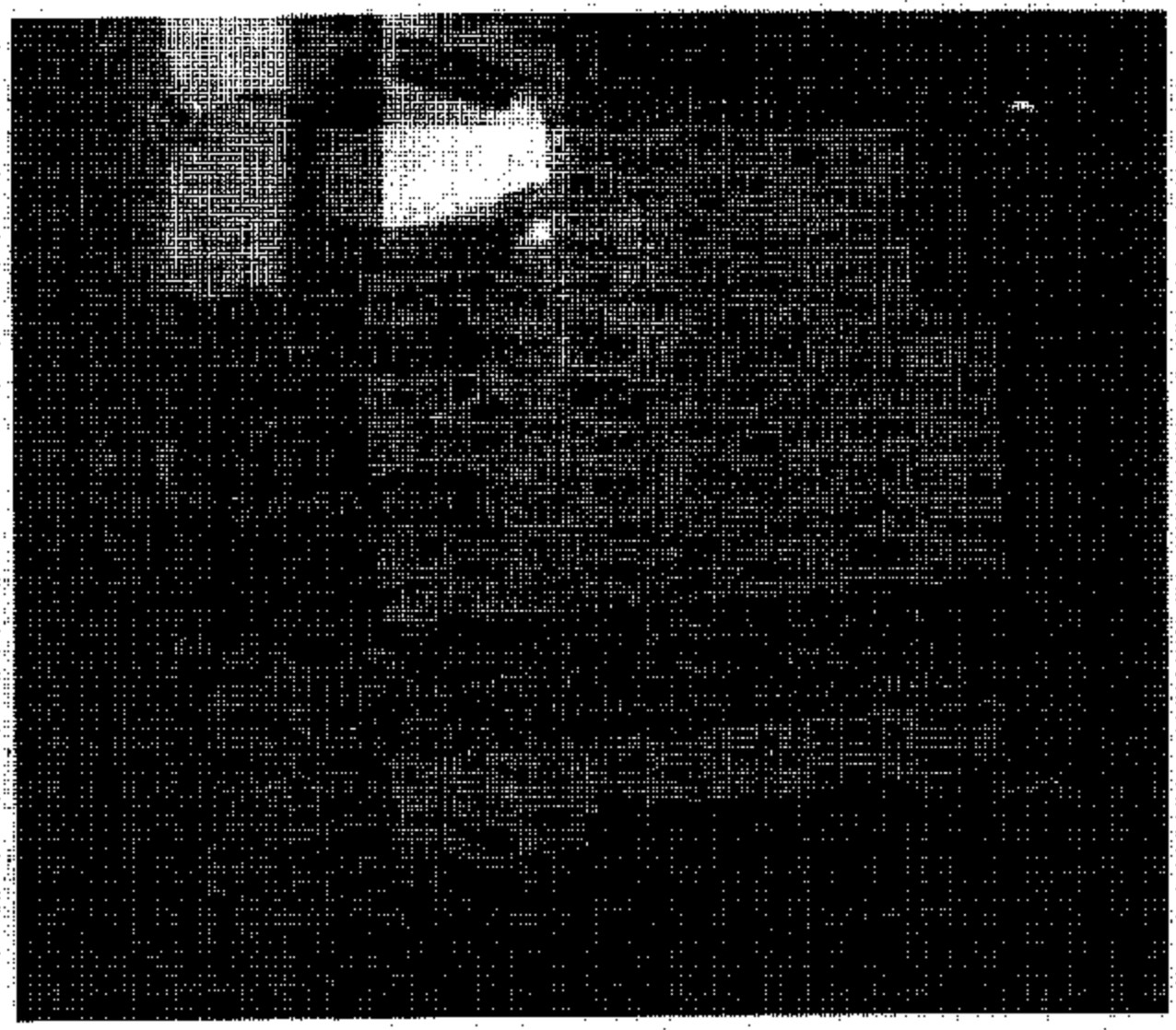


Photo 8 – Certification Label