SURVIVAL FACTORS GROUP

IC/NAVISTAR LOADING DOOR TEST

ATTACHMENT 1

Chesterfield Township N.J.

HWY-12-MH-007
(06 Pages)

Loading Door Testing Protocol

Measure the Door Open Efforts at a height of 4 ft from the ground in the following conditions:

- Safety Off
- Electric Motor Disconnected
- Ignition Off
- Ignition On (We expect that this will result in the failure of the mechanism)

IC/Navistarl plan on doing the first three ahead of time and getting a reading.

Two questions that testing needs to get addressed:

1. What is considered an “Open” condition on the doors? Fully open or enough distance to pass an object of predetermined size?

2. Is it acceptable to push from the inside for any area where more force is required than what a person can input?

INTERNATIONAL TRUCK DEVELOPMENT & TECHNOLOGY CENTER

AREA:	Body-Exteriors		
MODEL:	Bus CE - PB105		
CABS:			
TRACKING#:	12-37541	**GROUP:**	
ACCOUNT#:	817	**FILE INDEX:**	TDTC Vehicle Lot Suggest using P3044
REPORTED BY:	Praneel Bhangaonkar	**COMPANY:**	Navistar - TDTC
VOCATION:			
KEYWORDS:	Bus CE, Door		
REF. REPORTS:			
DATE:	08-20-2012		

TO: Roy Zeitlow

CC: Rick VanLaar, Gregory Cameron, Alan Osterkil, James Stanick, Jaideep Bhat, James Rauwerdink, Joseph LaBonte

FINAL REPORT

SUBJECT:

Bus Electronic Entry Door Force Measurement

OBJECT:

Measure the amount of force required to open the entry door from the outside by pulling on the doors

CONCLUSIONS:

The target was set to open the door for a length of 12 inches. However due to constraints of the air cylinder used for test the maximum opening length achieved was 9 ¼ inches. With the door locked using air cylinder the door bracket was bent when force was applied but it did not break or developed any cracks.

As there are no standards specified for this test the test result is indeterminate.

RECOMMENDATIONS:

None.

REMARKS/BACKGROUND:

NTSB is investigating a bus accident and requested the amount of force required to open the electronic entry door from the outside.

MATERIALS/PART#'s:

Bus CE – PB105

METHOD:

Test 1:
The door was closed using the in-cab switch. The "emergency use" handle was push forward. The force was measured at height 36 inches from the floor lift. As the test was complete, the emergency handle was pulled rearward.

Test 2:
After completing Test 1 the door was closed using the in-cab switch. The "emergency use" handle was in disengaged position. Again force was applied to open the door at a height of 36 inches from the floor lift.

Test 3: The door was then locked using the air cylinder mechanism. Force was applied to open the door from inside at a height of 36 inches above the floor lift level. Care was taken to limit the force so as not to damage any components. The length of door opening was measured at different amount of forces.

TEST/ANALYSIS RESULTS:

Test 1:

Emergency use: Engaged/ON

Trial	Force measured (lbf)
1	6.4
2	7.0
3	6.6

Test 2:

Emergency use: Disengaged/OFF

Trial	Force measured (lbf)
1	2.6
2	2.6
3	3.4

Test 3:

Door locked with air cylinder.

Trial	Force (lbf)	Δ (in)
1	200	5 ¼
2	351.5	9 ¼

The target door opening length of 12 inches could not be achieved due to air cylinder constraints. However during test the door bracket connected to the air cylinder, used in locking mechanism, was bent when force was applied to open the door. No cracks or fracture of the bracket were detected.

MATERIAL STORAGE:

DATA STORAGE:

Data was recorded manually and presented in this report.

Reported by: _____
Praneel Bhangaonkar ---------- - -----

Approved by: _____
Joe Murglin ---------- - ----

Figure 1: Force applied to open door at a height 36 in from floor lift