



element™

Element Materials Technology
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Report Number: ESP014366P
Element Certification #: 12-0514.11
DC Not. #: 13020

Report Date: December 16, 2013
Test Dates: November 11, 2013
Through: November 13, 2013

STRUCTURAL PERFORMANCE TEST REPORT

Test Requested By: Deceuninck North America, LLC
351 North Garver Road
Monroe, Ohio 45050

Product Type and Series: Series 145.095 SS Vinyl (NC) Fin & (Rep) Equal Leg Frame Impact Glass Horizontal Sliding Window

Tests Conducted: TAS 201 (Large Missile), TAS 202, and TAS 203

TEST SPECIMEN

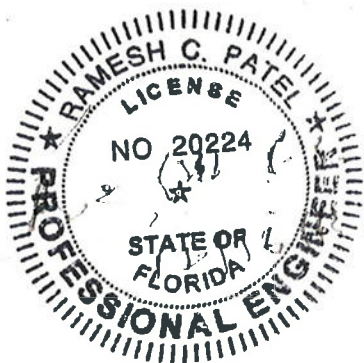
Design Pressure: Specimen 1- TAS-202 NC (Fin) + 50.0 psf. - 50.0 psf
Specimen 2- TAS-202 (Struct. Only) Rep (Equal Leg) + 50.0 psf. - 50.0 psf
Specimens 3, 4 & 5- TAS-201/203 (LMI) NC (Fin) + 50.0 psf. - 50.0 psf
*Specimen 6- TAS-201/203(LMI) Rep (Equal Leg) + 50.0 psf. - 50.0 psf
*(With deviations only one specimen impacted and cycled (Equal Leg).

Overall Size: All Specimens- 1880 mm wide x 1600 mm high (73" wide x 62" high)

Configuration: All Specimens- X/O One (1) operable sash and one (1) fixed sash.

Frame and Sash Material: Extruded vinyl
All Specimens

Frame Construction: The extruded vinyl fin/NC & equal leg/Rep. frame measured (74" wide x 63" high) buck opening overall. The vinyl fin/NC frame included a 1.125" integral fin. Frame corners utilized mitered and welded construction. Head, Sill and Jamb's measured (3.652" wide x 2.500" high) (refer to drawing #10008684-SH). Fixed meeting stile was coped and butted, secured thru frame head/sill with two (2) #8 x 3.000" PPH Truss head screws (drawing#143095SS-007Elevation meeting rail). Two (2) vinyl slider track inserts were located in the frame sill and head (refer to drawing # 10008469-SH) and inserted on an aluminum slider track reinforcement in the frame sill and head and secured at each head, sill & jamb corner & c/l at fixed meeting rail with two (2) #8 x .750" PPH SMS (refer to drawing # 10300189-SH).



Sash Construction:
 All Specimens

Sash constructed from extruded vinyl and utilized mitered and welded corner construction. One (1) fixed sash measured (36.5" wide x 60.75" high) overall. One (1) active sash measured (36.5" wide x 60.5" high) overall. The sash top and bottom rail measured (1.300" wide x 1.510" high) (refer to drawing #10008857-SII). The sash lock stile measured (1.551" wide x 1.250" high) (refer to drawing #10008845-SII). The sash pull stile measured (1.551" wide x 1.250" high) (refer to drawing #10008882-SII). The sash fixed meeting rail measured (1.524" wide x 2.118" high) (refer to drawing #10008511-SII).

Day lite opening:
 All Specimens

Day lite opening for fixed lite measured 864 mm x 1518 mm (34.0" wide x 59.75" high) overall Day lite opening for operable sash measured 1819 mm x 1448 mm (32.250" wide x 57.0" high) overall.

Glazing:
 All Specimens

¾" overall laminated (Impact) glass consisting of the following: As viewed from the exterior, operable sash was exterior glazed as follows: one(1) piece of .125" annealed glass / one (1) .300" Quanex Duraseal spacer system (as stated by manufacturer) One (1) piece of .125" annealed glass / .090" PVB laminate by Solutia Saflex / One (1) piece of .125" annealed glass. As viewed from the exterior, fixed lite was interior glazed as follows: one (1) piece of .125" annealed glass / .090" PVB laminate by Solutia Saflex / one (1) piece of .125" annealed glass / one (1) .300" Quanex Duraseal spacer system (as stated by manufacturer) / one (1) piece of annealed glass (reference drawing #3/4" I.G, ANN .090" PVB LAMI). The operable sash was exterior glazed, fixed sash was interior glazed with an adhesive back bedding compound Sikaflex-552® as stated by the manufacturer. The glazing utilized an extruded vinyl slide-in glazing bead around the exterior perimeter measuring .195" wide x .570" high overall with a .625" glass bite. (refer to drawing #10005470-SH).

Weather-stripping: All Specimens

<u>Quantity</u>	<u>Description</u>	<u>Location</u>
One (1) strip	Center fin wool pile .187 x .290" high	Sash stile
One (1) strip	Center fin wool pile .187 x .290" high	Sash top rail
One (1) strip	Center fin wool pile .187 x .290 high	Sash bottom rail
One (1) strip	Center fin wool pile .187 x .290 high	Sill riser for D/P 70 water



Hardware & Location: All Specimens

<u>Quantity</u>	<u>Description</u>	<u>Location</u>
Two (2)	Keepers	Fixed Meeting Stile. Each located 8" c/l from head/sill. Each secured with two (2) #6 x .750" PFH fasteners.
Two (2)	Locks	Sash Lock Stile. Each located 8" c/l from sash corners. Each secured with two (2) #6 x 1.0" PFH self tapping fasteners.
Two (2)	Roller Housings	Sash Bottom Rail. One at each corner. Secured with two (2) #8 x .375" PPH fasteners.

Weep system: All Specimens

<u>Quantity</u>	<u>Description</u>	<u>Location</u>
Two (2)	Weep Covers	Sill face 2.00" from each sill corner (<i>drawing # W646000</i>) Draining to exterior
Two (2)	Weep Slots	Sill face 2.00" from each sill corner. Draining to exterior. (<i>drawing #100003356F-06</i>)
Two (2)	Weep Slots	Sill Frame under glass (<i>drawing #100003356F-06</i>)

Reinforcement:
All Specimens

One (1) extruded aluminum reinforcement was located in fixed meeting stile x full length (*refer to drawing #10300084*).
Two (2) extruded aluminum reinforcement were located in each sash rail x full length (*refer to drawing #10300082*).
One (1) extruded aluminum reinforcement was located in sash pull stile x full length (*refer to drawing #10300207*).

Sealant:

Latex caulking as Specimen needed to seal the test units to the wood bucks.

Screen:

All Specimens

Roll formed aluminum screen with fiberglass mesh, vinyl spline and plastic corner keys. Two (2) plastic pull tabs and two (2) aluminum spring clips.

Installation:

All Specimens

Test specimen was tested in a 2" x 12" S.Y.P. main test buck with a 2" x 4" pine/fur/spruce sub-buck utilizing twenty-six (26) #8 x 6mm (1.250") Phillips P.H., S.M.S. fasteners located as follows:

- **Frame head and sill:**
- Seven (7) located at 152mm (6.00") from each frame head, sill and jamb corner and 330 mm nominally (10.00") max. O/C thereafter.
- **Frame jambs:**
- Six (6) in each frame jamb located at 152 mm (6.00") from each frame head, sill and jamb corner and 330 mm nominally (10.00") max. O/C thereafter.

Surface Finish:
All Specimens

White



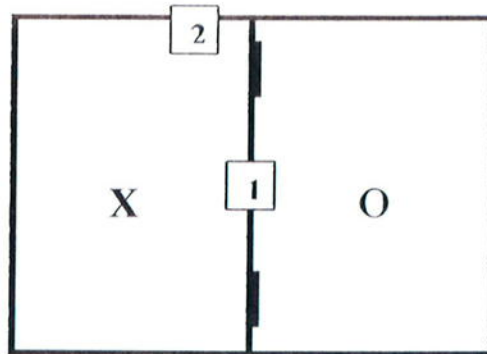
Performance Test Results

Specimen 1(Fin)

Test Sequence TAS 202-94

1. Air Infiltration
2. Water Infiltration
3. ½ Test Pressure Positive
4. ½ Test Pressure Negative
5. Design Pressure Positive
6. Design Pressure Negative
7. Full Test pressure Positive
8. Full Test Pressure Negative
9. Forced Entry Resistance

Measurement Locations



Deflection / Permanent Set were measured with two (2) Mitutoyo dial indicators SN- A066, and SN – A070

Measurements were taken at:

Location (1) - Max. Allowable Perm. Set after test load at center mid-span of the fixed meeting stile.(0.4% of (57.00”) span) = (0.228”)

Location (1) - Max. Allowable Perm. Set after test load at longest unsupported span between installation fasteners frame head.(0.4% of (12.00”) span = (0.048”)

Air Infiltration Test: Specimen 1(Fin)

Air Infiltration Tests were conducted in accordance with **DCBCCD TAS 202-94**

@ 1.57 psf

Actual
0.09 CFM/FT²

Allowable
0.34 CFM/FT²

Water Infiltration Test: Specimen 1(Fin)

Water Infiltration Test was conducted in accordance with **DCBCCD TAS 202-94**

Water @ 12 psf.

15 min. duration

Result: Passed

No water penetration was observed

The specimen was tested with & without an insect screen installed.



Performance Test Results: Cont.

Specimen 1(Fin)

<u>Paragraph #</u>	<u>Title of Test</u>	<u>Test Method</u>	<u>Measured</u>
10.2.2	Forced Entry Resistance Type "B" Window	ASTM F588-07 10.2.2. Test B	Passed
10.1	Lock Manipulation Test: Type "B" Window	ASTM F588-07 T ₁ = 10 minutes	Passed

Uniform Structural Load Test

Static Tests were conducted in accordance with DCBCCD TAS 202-94

Specimen 1(Fin)

<u>Range of Test</u>	<u>Time</u>	<u>Actual Load (psf.)</u>	<u>Deflection</u>	<u>Perm. Set</u>	<u>Allowable</u>
Positive loads +50psf					
1/2 Test	30 (seconds)	37.5			
Design	30 (seconds)	50.0	Loc 1	0.142" (Gross)	Report only
			Loc 2	0.158" (Gross)	Report only
Test	30 (seconds)	75.0	Loc 1	0.036"	0.228"
			Loc 2	0.040"	0.048"
Negative loads -50psf					
1/2 Test	30 (seconds)	37.5			
Design	30 (seconds)	50.0	Loc 1	0.124" (Gross)	Report only
			Loc 2	0.172" (Gross)	Report only
Test	30 (seconds)	75.0	Loc 1	0.038"	0.228"
			Loc 2	0.042"	0.048"

Location (1) - Max. Allowable Perm. Set after test load at center mid-span of the fixed meeting stile.(0.4% of (57.00") span = (0.228")

Location (1) - Max. Allowable Perm. Set after test load at longest unsupported span between installation fasteners frame head.(0.4% of (12.00") span = (0.048")

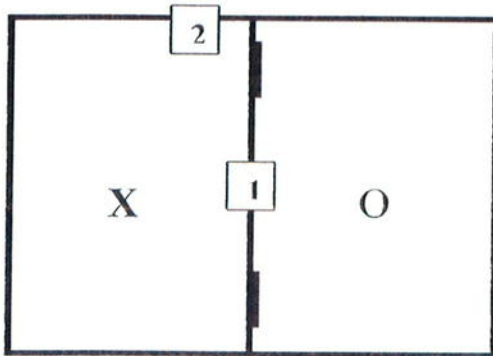


Uniform Structural Load Test

Static Tests were conducted in accordance with DCBCCD TAS 202-94

Specimen 2 (Equal Leg) Structural only

<u>Range of Test</u>	<u>Time</u>	<u>Actual Load (psf.)</u>	<u>Deflection</u>	<u>Perm. Set</u>	<u>Allowable</u>
Positive loads +50psf					
1/2 Test	30 (seconds)	37.5			
Design	30 (seconds)	50.0	Loc 1	0.090" (Gross)	Report only
			Loc 2	0.102" (Gross)	Report only
Test	30 (seconds)	75.0	Loc 1	0.028"	0.228"
			Loc 2	0.024"	0.048"
Negative loads -50psf					
1/2 Test	30 (seconds)	37.5			
Design	30 (seconds)	50.0	Loc 1	0.087" (Gross)	Report only
			Loc 2	0.115" (Gross)	Report only
Test	30 (seconds)	75.0	Loc 1	0.035"	0.228"
			Loc 2	0.027"	0.048"



Location (1) - Max. Allowable Perm. Set after test load at center mid-span of the fixed meeting stile.(0.4% of 1556 mm (57.00") span) = 6.2 mm (0.228")

Location (1) - Max. Allowable Perm. Set after test load at longest unsupported span between installation fasteners frame head.(0.4% of 305 mm (12.00") span) = 6.2 mm (0.048")



Performance Test Results: Cont.

Impact Test: Large Missile

Impact tests were conducted in accordance with DCBCCD TAS 201-94

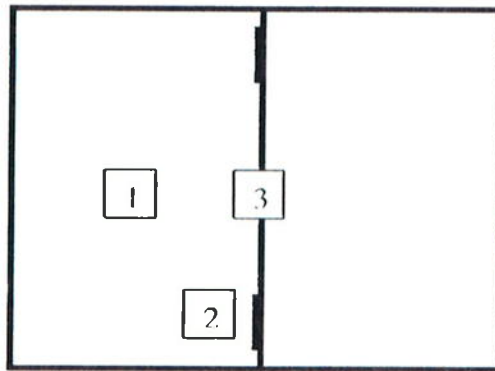
Each specimen was impacted with an 8 ft., 9 lb. Southern yellow pine 50mm x 100mm (2" x 4") at the following locations:

Specimens 3, 4 & 5 (Fin)

X measurement from left edge of specimen.

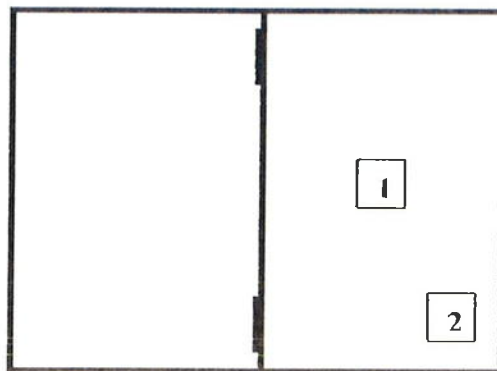
Y measurement from top edge of test specimen.

Specimen 3

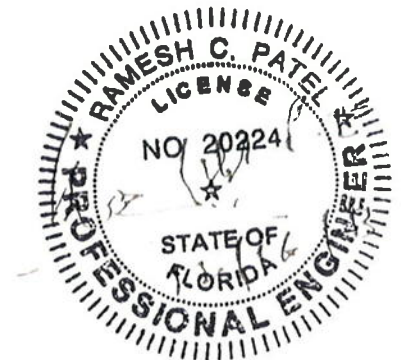


Specimen	X Impact Loc.	O Speed Ft/Sec	X Meas.	Y Meas.
No. 3	Loc: 1.	50.1	16.750"	31.500"
	Loc: 2.	50.0	27.000"	52.000"
	Loc: 3.	50.0	36.250"	31.000"

Specimen 4

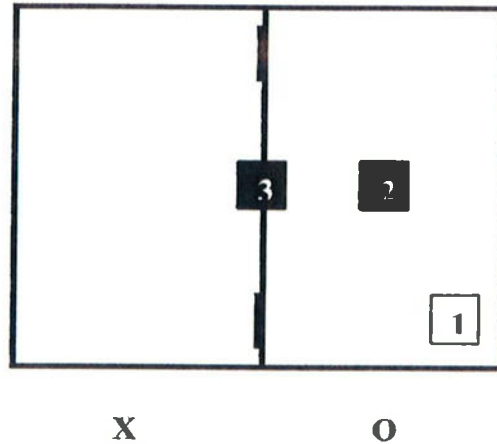


Specimen	X Impact Loc.	O Speed Ft/Sec	X Meas.	Y Meas.
No. 4	Loc: 1.	50.0	53.000"	32.000"
	Loc: 2.	50.1	63.000"	51.750"



Performance Test Results Continued

Specimen 5



<u>Specimen</u>	<u>Impact Loc.</u>	<u>Speed Ft/Sec</u>	<u>X Meas.</u>	<u>Y Meas.</u>
No. 5	Loc: 1.	50.0	63.500"	52.000"
	Loc: 2.	49.9	53.500"	31.000"
	Loc: 3.	50.0	36.000"	30.250"

Results: All specimens tested resisted the large missile impact, without penetration of the inner plane of the glazing. With no tear forming longer than 5" and wider than 1/16" thru which air can pass, or no opening through which a 3" diameter solid sphere could freely pass.



Performance Test Results: Cont.

Fatigue Loading Test (TAS 203)

Specimens 3, 4 and 5 (Fin):

Cycle tests were conducted in accordance with DCBCCD TAS 203-94

Specimen 3

Design Load +50.0 psf, -50.0 psf

Positive loads

<u>Range of test</u>	<u>actual load psf</u>		<u># of cycles</u>	<u>cycles/min</u>
0.2 - .5	10.0	25.0	3500	55
0.0 - .6	0.00	30.0	300	55
0.5 - .8	25.0	40.0	600	55
0.3 - 1.0	15.0	50.0	100	55

4500 cycles complete

Deflection/ Set
1.437" .125"

Negative Loads

<u>Range of test</u>	<u>actual load psf</u>		<u># of cycles</u>	<u>cycles/min</u>
-.3 - 1.0	15.0	50.0	50	55
-.5 - .8	25.0	40.0	1050	55
-.0 - .6	0.00	30.0	50	55
-.2 - .5	10.0	25.0	3350	55

4500 cycles complete

Deflection/ Set
1.750" .250"

9000 cycles completed

Specimen 4

Design Load + 50.0 psf, -50.0 psf

Positive loads

<u>Range of test</u>	<u>actual load psf</u>		<u># of cycles</u>	<u>cycles/min</u>
0.2 - .5	10.0	25.0	3500	55
0.0 - .6	0.00	30.0	300	55
0.5 - .8	25.0	40.0	600	55
0.3 - 1.0	15.0	50.0	100	55

4500 cycles complete

Deflection/ Set
1.500" .1875"

Negative Loads

<u>Range of test</u>	<u>actual load psf</u>		<u># of cycles</u>	<u>cycles/min</u>
-.3 - 1.0	15.0	50.0	50	55
-.5 - .8	25.0	40.0	1050	55
-.0 - .6	0.00	30.0	50	55
-.2 - .5	10.0	25.0	3350	55

4500 cycles complete

9000 cycles completed

Deflection/ Set
1.687" .375"



Performance Test Results: Cont.

Specimen 5

Design Load + 50.0 psf, -50.0 psf

Positive loads

<u>Range of test</u>	<u>actual load psf</u>		<u># of cycles</u>	<u>cycles/min</u>
0.2 - .5	10.0	25.0	3500	55
0.0 - .6	0.00	30.0	300	55
0.5 - .8	25.0	40.0	600	55
0.3 - 1.0	15.0	50.0	100	55

4500 cycles complete

Deflection/ Set

1.625" .125"

Negative Loads

<u>Range of test</u>	<u>actual load psf</u>		<u># of cycles</u>	<u>cycles/min</u>
-.3 - 1.0	15.0	50.0	50	55
-.5 - .8	25.0	40.0	1050	55
-.0 - .6	0.00	30.0	50	55
-.2 - .5	10.0	25.0	3350	55

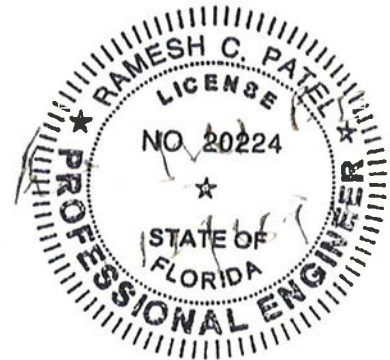
4500 cycles complete

Deflection/ Set

2.000" .250"

9000 cycles completed

Results: All specimens tested resisted the large missile impact, without penetration of the inner plane of the glazing and resisted the cycle pressure loading specified in Table 1. With no tear forming longer than 5" or no opening through which a 3" diameter solid sphere could freely pass.



Performance Test Results: Cont.

Impact Test: Large Missile

Impact tests were conducted in accordance with **DCBCCD TAS 201-94**

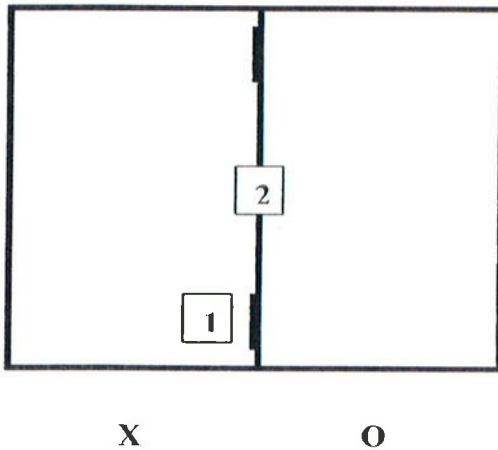
Each specimen was impacted with an 8 ft., 9 lb. Southern yellow pine 50mm x 100mm (2" x 4") at the following locations:

Specimen 6 (Equal Leg)

X measurement from left edge of specimen.

Y measurement from top edge of test specimen.

Specimen 6



Specimen 6

Impact No.	Impact Loc.	Speed Ft/Sec.	X Meas.	Y Meas.
1.	1	50.1	26.750"	51.500"
2.	2	50.1	36.250"	31.500"

Results: All specimens tested resisted the large missile impact, without penetration of the inner plane of the glazing. With no tear forming longer than 5" or no opening through which a 3" diameter solid sphere could freely pass.



Performance Test Results: Cont.

Fatigue Loading Test (TAS 203)

Specimen 6 (Equal Leg):

Cycle tests were conducted in accordance with **DCBCCD TAS 203-94**

Specimen 6

Design Load +50.0 psf, -50.0 psf

Positive loads

<u>Range of test</u>	<u>actual load psf</u>		<u># of cycles</u>	<u>cycles/min</u>
0.2 - .5	10.0	25.0	3500	55
0.0 - .6	0.00	30.0	300	55
0.5 - .8	25.0	40.0	600	55
0.3 - 1.0	15.0	50.0	100	55

4500 cycles complete

Deflection/ Set

1.500" .125"

Negative Loads

<u>Range of test</u>	<u>actual load psf</u>		<u># of cycles</u>	<u>cycles/min</u>
-.3 - 1.0	15.0	50.0	50	55
-.5 - .8	25.0	40.0	1050	55
-.0 - .6	0.00	30.0	50	55
-.2 - .5	10.0	25.0	3350	55

4500 cycles complete

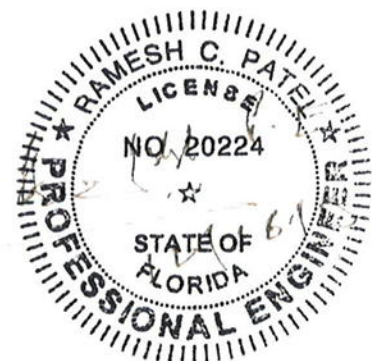
Deflection/ Set

1.750" .250"

9000 cycles completed

Results: All specimens tested resisted the large missile impact, without penetration of the inner plane of the glazing and resisted the cycle pressure loading specified in Table I. With no tear forming longer than 5" or no opening through which a 3" diameter solid sphere could freely pass.

Comment: Nominal 2-mil polyethylene film was used to seal against air leakage during structural loads. The film was used in a manner that did not influence the test results.



Remarks: Detail drawings were available for laboratory records and comparison to the test specimen at the time of this report. A copy of this report along with representative sections of the test specimen will be retained by Element Materials Technology for a period of ten (10) years. The results obtained apply only to the specimen tested.

This test report does not constitute certification of this product, but only the above test results were obtained using the designated test methods and they indicate compliance with the performance requirements (paragraphs as listed) of the above referenced specifications.

Element Materials Technology assumed that all information provided by the client is accurate and that the physical and chemical properties of the components are as stated by the manufacturer.

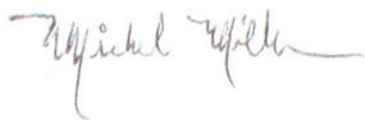
Element Materials Technology

Testing Performed & Witnessed By:

Michael Miller	Element Materials Technology
Washington Romero	Element Materials Technology
Ramesh Patel P.E.	Patel Engineering

Client Present:

Dennis Cox	Deccuninck NA
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Michael Miller
Documentation Manager
Element Materials Technology

cc:	Deccuninck NA	(2)
	Dade Co.	(2)
	Ramesh Patel P.E.	(1)
	File	(1)

