

# ESTES E16

## CERTIFIED VALUES

Total Impulse: **33.38 newton-seconds**  
Delays: **0, 4, 6, 8 seconds**

Propellant Type: **Black Powder**  
Propellant Mass: **40.0 grams**

Casing Dimensions: **29 mm X 114 mm**

Certification Type: **Model Rocket**

## STATIC TEST DATA

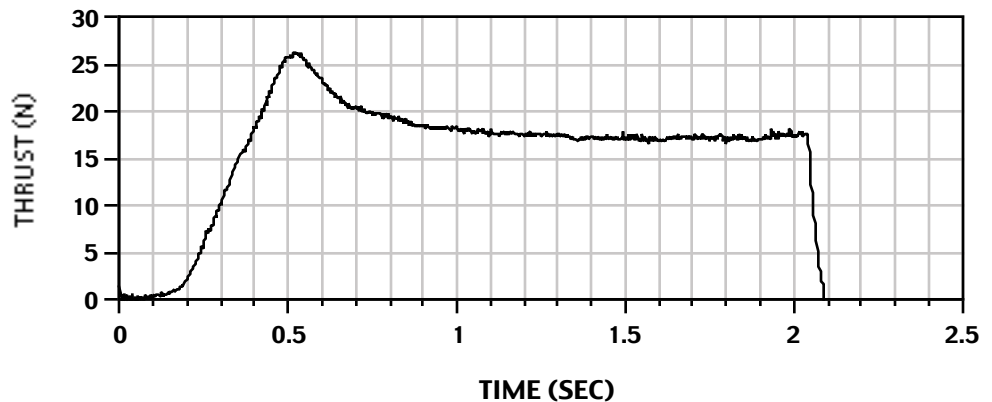
Date Tested: **6-January-2013**

Total Impulse: **33.38 newton-seconds** ( 1.43 )  
Peak Thrust: **26.44 newtons** ( 1.53 )  
Burn Time: **2.09 seconds** ( 0.07 )  
Average Thrust: **15.97 newtons**

Mass After Firing: **34.5 grams**

Delay Time	Average Measured Delay	Initial Mass
0	0.00	73.2 g
4	4.14	81.0 g
6	5.82	82.7 g
8	8.07	84.7 g

## TYPICAL THRUST-TIME CURVE



## REMARKS

FILE NAME	MOTOR	IT	F-MAX	F-AVG	T-BURN	T-DELAY
E130101	E16-0	32.120	26.142	15.964	2.012	0.000
E130102	E16-0	29.508	26.673	15.321	1.926	0.000
E130104	E16-4	33.515	25.612	15.574	2.152	4.158
E130105	E16-4	33.959	25.611	16.049	2.116	4.156
E130106	E16-4	34.073	25.652	15.907	2.142	4.118
E130107	E16-6	33.766	26.002	15.778	2.140	5.668
E130108	E16-6	33.936	26.776	16.023	2.118	5.942
E130109	E16-6	34.153	25.566	16.217	2.106	5.854
E130110	E16-8	34.025	27.878	16.203	2.100	7.944
E130111	E16-8	33.976	26.588	16.194	2.098	8.162
E130112	E16-8	34.140	28.304	16.180	2.110	8.114
AVG		33.379	26.437	15.946	2.093	
SD		1.428	1.529	0.153	0.069	
SD %		4.279	5.783	0.958	3.311	

ALLOWABLE		DELAYS				
RANGE	INDICATED	AVG	ACTUAL			
2.5 TO 5.5	4 SEC	4.14	4.158	4.156	4.118	0.000
4.5 TO 7.5	6 SEC	5.82	5.668	5.942	5.854	4.144
6.5 TO 9.5	8 SEC	8.07	7.944	8.162	8.114	5.821
						8.073

; Estes E16 RASP.ENG file made from NAR published data  
; File produced, 2013  
; The total impulse, peak thrust, average thrust and burn time are  
; the same as the averaged static test data on the NAR web site in  
; the certification file. The curve drawn with these data points is as  
; close to the certification curve as can be with such a limited  
; number of points (32) allowed with WRASP up to v1.6.

E16 29 114 0-4-6-8 .0400 .0820 E

0.150	1.371
0.186	1.920
0.206	3.387
0.242	5.587
0.252	7.422
0.277	8.705
0.333	13.474
0.359	15.858
0.374	16.592
0.394	18.509
0.435	21.344
0.476	24.631
0.521	26.440
0.643	21.610
0.725	20.202
0.821	19.201
0.898	18.538
1.025	18.109
1.142	18.012
1.259	17.634
1.396	17.472
1.569	17.172
1.757	17.165
1.895	17.076
2.027	17.516
2.042	12.294
2.052	8.337
2.063	4.850
2.090	0.000

