

**NATIONAL ASSOCIATION OF ROCKETRY**  
**CERTIFIED MODEL ROCKET MOTORS**  
**APPROVED FOR USE IN THE 2020 AMERICAN ROCKETRY CHALLENGE**

The commercially-made model rocket motors listed below have been subjected to rigorous safety and reliability testing conducted by the NAR Standards & Testing (S&T) Committee and are the only ones approved for sale in the U.S. or for use in this Challenge. All motors listed here are in current production. Every motor listed here will continue to be approved for use in the 2020 Challenge regardless of any subsequent announced changes to the NAR's overall official engine certification list. This list may be expanded if new motors are certified during the period of TARC; this expansion and any revised list will be communicated to all those teams enrolled in the TARC.

Download "Motor Data Sheets" from the NAR web site if you desire additional information. Each data sheet contains a thrust curve together with values from a test firing, including measured average thrust and total impulse, plus 32 data points for use in altitude simulation computer programs.

| <b><u>Abbreviation</u></b> | <b><u>Full Manufacturer Name</u></b> |
|----------------------------|--------------------------------------|
| Aerotech                   | Aerotech                             |
| Apogee                     | Apogee                               |
| Cesaroni                   | Cesaroni Technology Incorporated     |
| Estes                      | Estes Industries                     |
| Quest                      | Quest Aerospace Education            |

Note: (R) following the listed casing dimensions denotes that the motor is a reloadable motor system certified only with the manufacturer-supplied casing, closures, nozzle, and propellant. Reloadable motors are not available for sale to persons under age 18, per U.S. Consumer Products Safety Commission regulations. Also, the metal casings that reloadable motors use are quite expensive. But if the performance of these types of model rocket motor happens to be exactly what you need for your design, your supervising teacher/adult advisor can purchase them and supervise your use of them.

Manufacturers of E and F motors often use letter codes right after the motor average thrust value on the label (e.g. the "FJ" in an F23FJ motor type) which designate the type of that manufacturer's propellant used in the motor. This code, or the absence of a code, does not affect status of certification for TARC use.

Motors with "sparky" propellant or with an average thrust higher than 80 N are officially classified as "high power motors" even if their total impulse is in the F power class or below, and such motors are not listed or approved for use in TARC. Motors that are no longer in production are also not listed and may not be used.

**NAR CERTIFIED MODEL ROCKET MOTORS**  
**APPROVED FOR USE IN TARC 2020**

As of August 15, 2019

| <u>Designation</u> | <u>Mfgr.</u> | <u>Casing</u><br><u>Size</u><br>(mm) | <u>Propellant</u><br><u>Mass</u><br>(grams) | <u>Total</u><br><u>Impulse</u><br>(N-sec.) |
|--------------------|--------------|--------------------------------------|---|--|
| 1/4A3-3T           | Estes        | 13 x 45                              | 0.8   | 0.62                                       |
| 1/2A3-2T, 4T       | Estes        | 13 x 45                              | 2.0   | 1.25                                       |
| 1/2A6-2            | Estes        | 18 x 70                              | 2.6   | 1.25                                       |
| A3-4T              | Estes        | 13 x 45                              | 3.3   | 2.50                                       |
| A6-4               | Quest        | 18 x 70                              | 3.5   | 2.50                                       |
| A8-0, 3, 5         | Estes        | 18 x 70                              | 3.3   | 2.50                                       |
| A10-0T             | Estes        | 13 x 45                              | 3.6   | 1.88                                       |
| A10-3T, PT         | Estes        | 13 x 45                              | 3.8   | 2.50                                       |
| B4-2, 4            | Estes        | 18 x 70                              | 6.0   | 5.00                                       |
| B6-0               | Estes        | 18 x 70                              | 5.6   | 4.90                                       |
| B6-2, 4, 6         | Estes        | 18 x 70                              | 5.6   | 5.00                                       |
| B6-0, 2, 4         | Quest        | 18 x 70                              | 6.5   | 5.00                                       |
| C6-0, 3, 5, 7      | Estes        | 18 x 70                              | 10.8  | 9.0  |
| C6-0               | Quest        | 18 x 70                              | 11.0  | 8.8  |
| C6-3, 5            | Quest        | 18 x 70                              | 12.0  | 8.76                                       |
| C11-0, 3, 5, 7     | Estes        | 24 x 70                              | 12.0  | 9.0  |
| C12-4, 6, 8        | Quest        | 18 x 70                              | 10.4  | 9.8  |
| D5-P               | Quest        | 20 x 88                              | 25.0  | 19.6                                       |
| D8-0, 3, 5         | Quest        | 24 x 70                              | 22.0  | 18.6                                       |
| D9W-4, 7           | R Aerotech   | 24 x 70                              | 10.1  | 20.0                                       |
| D10-3, 5, 7        | Apogee       | 18 x 70                              | 9.8   | 18.3                                       |
| D10-3, 5, 7        | Aerotech     | 18 x 70                              | 9.8   | 18.3                                       |
| D11-P              | Estes        | 24 x 70                              | 24.5  | 18.0                                       |
| D12-0, 3, 5, 7     | Estes        | 24 x 70                              | 21.1  | 17.0                                       |
| D13W-4, 7, 10      | R Aerotech   | 18 x 70                              | 9.8   | 20.0                                       |
| D15T-4, 7          | R Aerotech   | 24 x 70                              | 8.9   | 20.0                                       |
| D16-4, 6, 8        | Quest        | 18 x 79                              | 12.5  | 12.4                                       |
| D21T-4, 7          | Aerotech     | 18 x 70                              | 9.6   | 20.0                                       |
| D24T-4, 7, 10      | R Aerotech   | 18 x 70                              | 8.8   | 18.5                                       |
| E6-4, 6, 8, P      | Apogee       | 24 x 70                              | 22.0  | 37.8                                       |
| E9-4, 6, 8, P      | Estes        | 24 x 95                              | 35.8  | 28.5                                       |
| E11J-3             | R Aerotech   | 24 x 70                              | 25.0  | 31.7                                       |
| E12-0, 4, 6, 8     | Estes        | 24 x 95                              | 35.9  | 27.2                                       |
| E15W-4, 7          | Aerotech     | 24 x 65                              | 16.2  | 35.0                                       |
| E16-0, 4, 6, 8     | Estes        | 29 x 114                             | 40.0  | 33.4                                       |
| E16W-4, 7          | R Aerotech   | 29 x 124                             | 19.0  | 40.0                                       |
| E18W-4, 8          | R Aerotech   | 24 x 70                              | 20.7  | 39.0                                       |
| E20-4, 7, 10       | Aerotech     | 24 x 65                              | 16.2  | 35.0                                       |
| E22SS-13A          | R Cesaroni   | 24 x 69                              | 13.4  | 24.2                                       |
| E23T-5, 8          | R Aerotech   | 29 x 124                             | 17.4  | 37.0                                       |
| E28T-4, 7          | R Aerotech   | 24 x 70                              | 18.4  | 40.0                                       |
| E30T-4, 7          | Aerotech     | 24 x 70                              | 17.8  | 33.6                                       |
| E30-4, 7           | Estes        | 24 x 70                              | 17.8  | 33.6                                       |

|                |   |          |          |      |      |
|----------------|---|----------|----------|------|------|
| E31WT-15A      | R | Cesaroni | 24 x 69  | 11.2 | 26.1 |
| E75VM-17A      | R | Cesaroni | 24 x 69  | 10.4 | 24.8 |
| F10-4, 6, 8    |   | Apogee   | 29 x 93  | 40.0 | 74.3 |
| F12J-3, 5      | R | Aerotech | 24 x 70  | 30.0 | 45.0 |
| F15-0, 4, 6, 8 |   | Estes    | 29 x 114 | 60.0 | 49.6 |
| F20W-4, 7      |   | Aerotech | 29 x 73  | 30.0 | 51.8 |
| F21W-4, 6, 8   |   | Aerotech | 24 x 98  | 30.0 | 55.0 |
| F22J-5, 7      | R | Aerotech | 29 x 124 | 46.3 | 65.0 |
| F23FJ-4, 7     |   | Aerotech | 29 x 83  | 30.0 | 41.2 |
| F24W-4, 7      | R | Aerotech | 24 x 70  | 19.0 | 50.0 |
| F25W-4, 6, 9   |   | Aerotech | 29 x 98  | 35.6 | 80.0 |
| F26FJ-6, 9     |   | Aerotech | 29 x 98  | 43.1 | 62.2 |
| F26FJ-6        |   | Estes    | 29 x 98  | 43.1 | 62.2 |
| F27R-4, 8      |   | Aerotech | 29 x 83  | 28.4 | 49.6 |
| F29-12A        | R | Cesaroni | 29 x 98  | 30.9 | 54.8 |
| F30FJ-4, 6, 8  |   | Aerotech | 24 x 90  | 31.2 | 47.0 |
| F30WH/LB-6A    | R | Cesaroni | 24 x 133 | 40.0 | 73.1 |
| F31CL-12A      | R | Cesaroni | 29 x 98  | 25.7 | 55.5 |
| F32T-4, 6, 8   |   | Aerotech | 24 x 90  | 25.8 | 56.9 |
| F32WH-12A      | R | Cesaroni | 29 x 98  | 29.9 | 52.8 |
| F35W-5, 8, 11  | R | Aerotech | 24 x 95  | 30.0 | 57.1 |
| F36SS-11A      | R | Cesaroni | 29 x 98  | 29.5 | 41.2 |
| F36BS-14A      | R | Cesaroni | 29 x 98  | 25.6 | 51.5 |
| F37W-S, M, L   | R | Aerotech | 29 x 99  | 28.2 | 50.0 |
| F39T-3, 6      | R | Aerotech | 24 x 70  | 22.7 | 50.0 |
| F40W-4, 7, 10  | R | Aerotech | 29 x 124 | 40.0 | 80.0 |
| F42T-4, 8      |   | Aerotech | 29 x 83  | 27.0 | 52.9 |
| F44W-4, 8      |   | Aerotech | 24 x 70  | 19.7 | 41.5 |
| F50T-4, 6, 9   |   | Aerotech | 29 x 98  | 37.9 | 80.0 |
| F50T-4, 6      |   | Estes    | 29 x 98  | 37.9 | 80.0 |
| F51BS-13A      | R | Cesaroni | 24 x 101 | 22.0 | 49.9 |
| F51CL-12A      | R | Cesaroni | 24 x 133 | 33.0 | 75.0 |
| F51NT-10       | R | Aerotech | 24 x 70  | 26.5 | 55.1 |
| F52T-5, 8, 11  | R | Aerotech | 29 x 124 | 36.6 | 78.0 |
| F59WT-12A      | R | Cesaroni | 29 x 98  | 26.1 | 57.0 |
| F62T-S, M, L   | R | Aerotech | 29 x 89  | 30.5 | 51.0 |
| F62FJ-10       | R | Aerotech | 24 x 95  | 32.2 | 47.6 |
| F63R-10        | R | Aerotech | 24 x 95  | 27.6 | 49.5 |
| F67W-4, 6, 9   |   | Aerotech | 29 x 89  | 30.0 | 61.1 |
| F70WT-14A      | R | Cesaroni | 24 x 101 | 22.5 | 52.9 |
| F79SS-13A      | R | Cesaroni | 24 x 133 | 40.1 | 67.8 |

Additional notes:

- The manufacturer-reported total impulse and propellant mass of motors often differs from the values reported above, which are based on testing by the NAR Standards & Testing Committee. The values above are the ones that will be used in TARC.