

MIL-STD-200K

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SUPERSEDING

MIL-STD-200J

22 November 1968

MILITARY STANDARD

ELECTRON TUBES, SELECTION OF



FSC 5960

MIL-STD-200K

DEPARTMENT OF DEFENSE

WASHINGTON, D. C. 20301

Electron Tubes, Selection of

MIL-STD-200K

1. This Military Standard is approved for use by all Departments and Agencies of the Department of Defense.
2. Recommended corrections, additions, or deletions should be addressed to Commander, Naval Electronic Systems Command, Department of the Navy, Washington, D. C. 20360.

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1. SCOPE

1.1 **Scope.** This standard establishes the requirements for the selection and application of electron tubes used in the design and manufacture of military equipment. Complete detailed requirements for electron tubes listed in this standard are covered in the applicable tube specification sheet (TSS) listed herein. The type designation or part number and the applicable TSS number shall be referenced in procurement documents for the electron tubes.

1.2 Purpose of standard.

- (a) To provide equipment designers and manufacturers with lists of electron tubes considered to be most acceptable for military applications.
- (b) To control and minimize the variety of electron tube types used in new design by military activities in order to facilitate effective logistic support of equipment in the field; to maximize economic support of, and to concentrate improvement on, production of the electron tube types listed in this standard.
- (c) To establish a requirement for requesting approval of deviation from the provisions of this standard.
- (d) To provide the equipment designer or manufacturer with principal tube characteristics taken from the TSS in effect at the time of this revision. (See 4.5.)
- (e) To provide a combined listing in type number sequence, indicating tube type, Federal Stock Number (FSN), and the North Atlantic Treaty Organization (NATO) interest. (See 4.6.)

2. REFERENCED DOCUMENTS

2.1 The issues of the following documents in effect on date of invitation for bids form a part of this standard to the extent specified herein.

SPECIFICATION

MILITARY

MIL-E-1 - Electron Tubes, General Specification for.

STANDARD

MILITARY

MIL-STD-701 - Lists of Standard Semiconductor Devices.

MIL-STD-749 - Preparation and Submission of Data for Approval of Nonstandard Electronic Parts.

(Copies of specifications, standards, drawings, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

3. DEFINITIONS

3.1 The terms, abbreviations, and symbols used in this standard are defined in MIL-E-1.

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4. GENERAL REQUIREMENTS

4.1 Selection of electron tubes. The variety of electron tubes used in any military equipment shall be the minimum necessary to provide satisfactory performance.

4.1.1 Semiconductor devices. The application of a semiconductor device (see MIL-STD-701) shall be investigated before deciding to use a receiving tube.

4.2 Application and use of electron tubes.

4.2.1 Uncontrolled characteristics. Satisfactory equipment performance shall not depend on an electron tube characteristic which is not controlled by the applicable TSS, unless prior written approval is obtained from the contracting agency. Requests for permission to use tubes in a manner that places dependence on uncontrolled tube characteristics shall be accompanied by data showing that the proposed tube application does not restrict the use of JAN branded tubes in the sockets under consideration.

4.2.1.1 Correlation of circuit requirements and specification test conditions. When an application condition varies widely from the specification limits, it shall be the responsibility of the equipment designer to establish satisfactory correlation between the circuit and specification requirements.

4.2.2 Circuit application. The circuit shall be designed so that it will meet contract specified equipment performance and reliability requirements when using any tube meeting the applicable specification requirements. The selection of special tubes, from lots meeting the specification requirements, is prohibited.

4.2.3 Ratings and filament or heater voltages.

4.2.3.1 Ratings. The maximum and minimum ratings are based on the "absolute system". These ratings are limiting values beyond which the serviceability of any individual tube may be impaired. (See MIL-E-1, section 6.)

4.2.3.2 Filament or heater voltage. Equipment shall be designed so that the filament or heater voltage of each tube is centered at the specified value or, when it can be demonstrated that reliability will be improved, below the specified value, unless prior written approval for deviation is obtained from the contracting agency.

4.3 Criteria for inclusion in this standard.

- (a) The tube shall be considered by representatives of the military departments, the best available type for current application.
- (b) The tube shall have been in production and continued availability shall be reasonably certain.
- (c) The tube shall have an approved military specification.

4.4 Request for use of tubes not listed in this standard. When a contractor has determined that it is impractical to meet circuit performance requirements using a tube listed in this standard, a written request for use of the proposed substitute shall be made in accordance with MIL-STD-749.

4.5 Lists of standard electron tubes. Tables I through XI specify the ratings and primary electrical characteristics and applicable specification for all electron tubes approved as standard for use in the design and manufacture of military equipment.

4.6 Combined listing-type to FSN. Table XII is a combined listing of tubes with applicable FSN and NATO status.

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5. DETAILED REQUIREMENTS (Not applicable).

6. NOTES

6.1 Tube complement report. A form for reporting electron tube complements for military equipment to the cognizant services group is available as DD Form 816. The use of this form is not mandatory but will be at the discretion of each military service concerned. When DD Form 816 is used by a military service, it will be processed in accordance with procedures established by that military service.

6.2 International standardization agreement. Certain provisions of this standard are the subject of international standardization agreement (NEPR No. 18 NATO). When revision or cancellation of this standard is proposed which will affect or violate the international agreement concerned, the preparing activity will take appropriate reconciliation action through international standardization channels including departmental standardization offices, if required.

Custodians:

Army - EL
Navy - EC
Air Force - 85

Preparing activity:

Navy - EC

Agent:

DSA - ES

Review activities:

Army - MI, SM, MU
Air Force - 11, 17, 80
DSA - ES

(Project 5960-2801)

User activities:

Navy - AS, OS, MC, CG, SH
Air Force - 19

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TABLE I. Cathode ray - Electrostatic deflection and focus.

Screen diameter (inches) Min	Overall length (inches) Max	If mA mA _{dc} *		Max. anode voltage			Max g1 cutoff V	Deflection factors V _{dc} /in.				Type No.	MIL-E-1/ Specifi- cation sheet No.
				Eb1 V _{dc}	Eb2 V _{dc}	Eb3 V _{dc}		D1-D2		D3-D4			
		Min	Max					Min	Max				
1.00	4.060	540	660	1200	1750	---	21	105	155	120	175	1EP1	1342
2.68	10.19	540	660	1500	2200	6600	-75	175	200	138	158	3ACP1A	311
2.68	10.19	540	660	1500	2200	6600	-75	175	200	138	158	3ACP7A	311
2.626	10.250	540*	660*	1100	3300	6600	-87	133	163	59	73	3ADP2	974
2.626	10.250	540*	660*	1100	3300	6600	-87	133	163	59	73	3ADP7	974
2.626	10.250	540*	660*	1100	3300	6600	-87	133	163	59	73	3ADP11	974
2.75	9.375	540	660	1100	2750	---	-101	109	149	78	105	3SP1	502
2.75	11.625	540	660	1100	2750	---	-75	62	76	43	52	3WP1	267
2.76	9.375	540	660	1100	2750	---	-67.5	73	99	52	70	3RP1A	390
2.88	14.00	540*	660*	1100	3300	6600	-87	68	82	42	52	4MP1	1296
4.5	16.938	540	660	1100	2850	6600	-56	40	50	30.5	37.5	5ADP1	689
4.5	16.938	540	660	1100	2850	6600	-75	54	66	40.5	50	5ADP7	689
4.5	18.5	540	660	1750	3500	10500	-75	54	66	43	53	5AFP1	1048
4.5	18.5	540	660	1750	3500	10500	-75	54	66	43	53	5AFP7	1048
4.5	16.938	540	660	1650	4400	---	-79	57	69	44	54	5AQP7	1133
4.5	18.38	540	660	1550	4000	15000	-65	130	161	110	138	5BFP7	1205
4.5	18.438	540	660	880	2200	13200	-80	70	85	14.7	19.1	5BHP2A	1395
4.5	18.875	540	660	1650	3850	7700	-90	68	84	27	37	7YP2	422
5.19	20.06	1500	1980	1550	4500	15000	-124	112	138	105	130	6DP7	1079
6.00	23.125	250	310	1650	4400	8800	-72	71	95	77	105	7BSP7	1455
7.03	19.00	540	660	3500	10000	---	-175	175	195	170	186	7AGP19	1178
3.25x 5.25	18.25	540	660	2750	4950	10000	-120	180	225	140	170	7AKP25	1219
11.00	23.875	540	660	3300	8800	17600	-240	150	230	135	195	12AKP7	1122
11.00	26.00	1620	1980	2000	6000	15000	-86	103	127	81	99	12ATP28	1400

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TABLE II. Cathode ray - Magnetic deflection, electrostatic and magnetic focus.

Screen diameter (inches) Min	Overall length (inches) Max	Focus type	If mA		Max anode voltage Vdc		Max grid cutoff Vdc Ec1	Max grid voltage Ec2	Focus voltage Vdc Max	Deflection angle (°)	Type No.	MIL-E-1/ Specification sheet No.
			Min	Max	Eb1	Eb2						
4.25	11.38	Elec	540	660	1100	11000	-77	770	250	---	5AHP7A	972
4.25	11.13	Mag	540	660	8800	---	-70	770	---	---	5FP7A	1392
4.25	11.5	Mag	540	660	8800	---	-70	770	---	---	5FP14A	1392
6.00	13.5	Elec	540	660	1100	11000	-77	770	250	50	7ABP7A	866
6.00	13.13	Mag	540	660	8800	---	-63	770	---	50	7MP7	67
9.00	18.0	Mag	540	660	11000	---	-63	770	---	50	10KP7A	1162
9.00	17.31	Elec	540	660	900	13200	-77	600	600	50	10WP7	1005
11.00	18.38	Elec	540	660	1100	13200	---	770	300	55	12ABP7A	1261
20.00	22.06	Mag	540	660	18000	---	-77	450	---	70	22CP7A	1072
20.00	22.06	Mag	540	660	18000	---	-77	450	---	70	22CP25A	1072

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TABLE III. Image converters.

Useful image screen diameter (Min)	Eb Vdc Max	Ib μ Adc Max	Ib μ Adc Max	Alt ft	Type No.	MIL-E-1/ Specification sheet No.
0.860(21.84 mm)	16,000	3.5	0.35	10,000	6914	1049
0.570(14.48 mm)	12,000	3.5	0.35	10,000	6929	1583

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TABLE IV. Planar and pencil.

Pp W	F1 MHz	Maximum dimensions (inches)	Design	Function	Type No.	MIL-E-1/ Specification sheet No.
---	7,500	Hgt 0.327 Dia 0.331	Planar diode ceramic-metal	Small-signal diode detector	7266	1333
1.1	7,500	Hgt 0.460 Dia 1.264	Planar triode ceramic-metal	Low-noise, small- signal amplifier	7077	1203
2.0	3,000	Hgt 1.040 Dia 0.497	Planar triode ceramic-metal	Low-noise, grounded grid amplifier	6299	484
2.5	550	Hgt 1.620 Dia 0.557	Pencil triode ceramic-metal	Class C amplifier	7554	1325
5.5	3,000	Hgt 0.959 Dia 0.758	Planar triode ceramic-metal	Low-noise, broad band amplifier	7768	1517
8.0	2,500	Hgt 2.609 Dia 0.818	Planar triode ceramic-metal	Oscillator or amplifier	6442	1055
10	3,000	Hgt 2.701 Dia 1.195	Planar triode ceramic-metal	Anode, grid pulsed oscillator or amplifier	7815	1429
35	3,000	Hgt 2.701 Dia 1.264	Planar triode ceramic-metal	Anode, grid pulsed oscillator or amplifier	2C41	1047
58	3,000	Hgt 2.386 Dia 1.264	Planar triode ceramic-metal	Anode, grid pulsed oscillator or amplifier	8403	1660
100	2,500	Hgt 2.701 Dia 1.264	Planar triode ceramic-metal	CW, anode pulsed oscillator, amplifier or frequency multiplier	7289	1120
100	3,000	Hgt 2.701 Dia 1.264	Planar triode ceramic-metal	Anode, grid pulsed oscillator or amplifier	8745	1702

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TABLE V. Pulse modulators (gas).

epx kv	lb a	lb Adc	Pb x10 ⁹	Maximum dimensions (inches)	Type No.	MIL-E-1/ Specification sheet No.
8	90	0.100	2.7	Hgt 2.355 Dia 1.150	7621	1428
12	350	0.2	4.0	Hgt 2.281 Dia 1.875	7782	1636
16	350	0.50	5.0	Hgt 2.806 Dia 2.250	7665	1485
20	500	0.5	10	Hgt 4.985 Dia 3.300	7620	1612
25	1,000	2.2	25	Hgt 5.895 Dia 3.430	8354	1426
33	2,000	4.0	30	Hgt 13.875 Dia 6.063	7390	1361

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TABLE VI. Vidicons.

Faceplate diameter (inches) Max	Overall length (inches) Max	Cutoff Vdc		Corner resolution (lines) Min	Center resolution (1) (lines) Min	Center resolution (2) (lines) Min	Type No.	MIL-E-1/ Specification sheet No.
		Min	Max					
1.045	6.380	-50	-95	350	650	500	7038	1534
1.045	5.170	-50	-95	350	650	500	7283A	1294
1.045	6.375	-50	-95	350	650	500	7735A	1410

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TABLE VII. Klystrons.

Center frequency MHz	Power output W	Frequency range MHz	Duty		Type No.	MIL-E-1/ Specification sheet No.
			CW	Pulse		
AMPLIFIERS						
1088	25K	960 to 1115		X	8493	1112
3040	6720	2980 to 3100		X	8237	1589
5642	300	5385 to 5900		X	8315	1290
5650	3M	5400 to 5900		X	8361	1228
5657	2	5385 to 5930	X		8404	1289
OSCILLATORS						
1800	.05	785 to 2820	X	X	5837	602
2175	.05	550 to 3800	X		6BM6A	746
2613	.095	1500 to 3750	X	X	6133	200
4575	.100	4240 to 4910	X		2K22	1638
5650	.03	5500 to 5800	X		7471	1283
7275	1.0	7125 to 7425	X		VA-220B	1631
7500	.02	4000 to 11000	X		2K48	374
8882	.045	6700 to 11065	X	X	6390	840
9080	.02	8500 to 9660	X		6940	1229
9275	.040	8500 to 10000	X		6781	1180
9500	.020	8500 to 10500	X		7511	1119
13450	.140	12400 to 14500	X		8467	1571

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TABLE VIII. Traveling wave.

Frequency range GHz	Power output	Duty Du	Gain dB	Function	Type No.	MIL-E-1/ Specification sheet No.
2.9 to 3.1	1 kw	0.0055	28.5	Amplifier	8175	1623
5.4 to 5.9	50 w	0.012		Amplifier	8362	1653
5.4 to 5.9	200 mW			Amplifier	8364	1654

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TABLE IX. Magnetrons.

Frequency GHz	Po Du (kW)	Description	Du	epy (kV)	ib A	Type	MIL-E-1/
5.45-5.825	240	Mechanically tunable, pulsed, coaxial, integral magnet	0.0012	28	35	SFD373	---
9.05-10.00	200	Mechanically tunable, pulsed, coaxial, integral magnet	0.0011	19	18	QKH1757	---
9.345 ±0.020	10	Fixed, tuned, light- weight, pulsed, integral magnet	0.0005	5	5	L5362	---

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TABLE X. Power tetrodes.

Pp W	F1 MHz	Maximum dimensions (inches)	Function	Type No.	MIL-E-1/ Specification sheet No.
115	1,215	Hgt 1.955 Dia 1.265	C telegraphy	6816	1239
115	1,215	Hgt 1.955 Dia 1.265	C telegraphy	6884	1239
250	30	Hgt 2.464 Dia 1.640	Class AB1	7580W	1385
250	500	Hgt 2.464 Dia 1.640	Class AB1	8621	1580
250	500	Hgt 2.813 Dia 1.640	C telegraphy	8590	1670
250	1,500	Hgt 2.813 Dia 1.640	C pulsed	8245	1506
300	500	Hgt 2.500 Dia 1.640	Class AB1	8167	1313
300	1,215	Hgt 2.820 Dia 1.625	C telegraphy	8226	---
350	175	Hgt 2.464 Dia 1.640	Class AB1	8321	1634
350	30	Hgt 2.464 Dia 1.640	Class AB1	8904	1728
400	110	Hgt 2.500 Dia 1.640	C telegraphy	8561	1541
480	900	Hgt 4.344 Dia 2.323	C telegraphy	6283	1314
480	900	Hgt 3.453 Dia 2.323	C telegraphy	8500	1314
600	1,215	Hgt 2.40 Dia 2.09	Linear RF power amplifier	7650	1552
600	1,215	Hgt 2.40 Dia 2.09	Pulsed RF amplifier	7651	1553
1,000	110	Hgt 4.800 Dia 3.365	Class AB1 or B1	8168	1569
1,500	30	Hgt 4.800 Dia 3.365	Class B or AB	8660	1648
2,500	1,215	Hgt 3.25 Dia 3.75	C telegraphy	7213	---
3,000	150	Hgt 7.900 Dia 4.625	C telegraphy	8169	1725
5,000	100	Hgt 9.125 Dia 4.938	C telegraphy	8170W	1427
8,000	550	Hgt 8.93 Dia 8.75	Anode pulsed amplifier: class B	6952	1106
12,000	220	Hgt 11.500 Dia 6.100	C telegraphy	6166A	1543
20,000	575	Hgt 8.93 Dia 8.75	Screen and grid pulsed amplifier: class B	2041	1383

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TABLE XI. Power triodes.

Pp (kW)	F1 (MHz)	Maximum dimensions (inches)	Function	Type No.	MIL-E-1/ Specification sheet No.
0.0125	30	Hgt 15.75 Dia 4.50	B or C telephony or telegraphy	6423	1544
0.120	30	Hgt 23.25 Dia 8.031	B or C telephony or telegraphy	5682	1551
0.175	30	Hgt 38.00 Dia 10.06	C oscillator or amplifier	7560-V	1476
2.5	110	Hgt 7.125 Dia 4.688	Power amplifier	5762	824
4.0	110	Hgt 9.000 Dia 4.156	C telegraphy	8161	1619
150	195	Hgt 37.24 Dia 14.12	B pulsed amplifier	6950	1332

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TABLE XII. Graphic indicators.

Dimensions (inches)	Ionization voltage Vdc	Cathode current (individual) mA	Character display	Type No.	MIL-E-1/ Specification sheet No.
Hgt 1.120 Dia 1.020	170	3.5	Numerals 0 thru 9	8422	1519
Hgt 1.175 Dia .650	170	2.0	Numerals 0 thru 9	7009	1500
Hgt 1.200 Dia .680	170	2.0	Numerals 0 thru 9	7977	1497
Hgt 1.380 Dia 1.080	170	3.5	Numerals 0 thru 9	8421	1454
Hgt 1.380 Dia 1.080	170	4.0	Numerals 0 thru 9	6844A	1266
Hgt 1.522 Dia 1.350	170	4.5	Numerals 0 thru 9	8423	1518

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TABLE XIII. Combined listing (type number sequence): Tubes with applicable Federal Stock Number (FSN) and North Atlantic Treaty Organization (NATO) interest.

Type number	Federal Stock Number 5960-	Table reference	NATO status 1/
1EP1	752-6118	I	-
2C41	542-7068	IV	-
2K22	188-8618	VII	-
2K48	193-5106	VII	-
3ACP1A	556-0667	I	-
3ACP7A	556-2087	I	-
3ADP2	060-3446	I	-
3ADP7	060-3447	I	-
3ADP11	060-3448	I	-
3RP1A	088-9897	I	-
3SP1	261-8639	I	2
3WP1	270-5511	I	1
4MP1	809-7582	I	2
5ADP1	296-0517	I	1
5ADP7	296-0512	I	1
5AFP1	825-1286	I	-
5AFP7	543-1135	I	-
5AHP7A	853-6452	II	1
5AQP7	543-1675	I	-
5BFP7	060-3461	I	-
5BHP2A	881-6636	I	-
5FP7A	170-4583	II	1
5FP14A	060-3463	II	1
6BM6A	355-7269	VII	-
6DP7	636-1527	I	-
7ABP7A	809-4958	II	1
7AGP19	809-2698	I	-
7AKP25	681-9521	I	-
7BSP7	958-0094	I	-
7MP7	262-0242	II	-
7YP2	272-9185	I	-
10KP7A	686-6757	II	-
10WP7	844-3125	II	1
12ABP7A	821-6691	II	1
12AKP7	805-4452	I	-
12ATP28	060-3475	I	-
22CP7A	060-3476	II	-
22CP25A	892-0921	II	-
VA-220B	179-3861	VII	-
SFD-373	NSL	IX	-
QKH1757	NSL	IX	-
2041	814-0765	X	-
L5362	NSL	IX	-
5682	985-9001	XI	-
5762	262-0204	XI	-
5837	296-2462	VII	-
6133	808-1728	VII	-
6166A	902-7423	X	-
6283	752-5798	X	-
6299	519-6176	IV	2

See footnote at end of table.

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TABLE XIII. Combined listing (type number sequence): Tubes with applicable Federal Stock Number (FSN) and North Atlantic Treaty Organization (NATO) interest - Continued.

Type number	Federal Stock Number 5960-	Table reference	NATO status 1/
6390	542-7039	VII	-
6423	926-7263	XI	-
6442	617-3541	IV	2
6781	844-5823	VII	-
6816	878-2929	X	-
6844A	833-5515	XII	-
6884	752-6039	X	-
6914	082-3326	III	2
6929	762-0103	III	-
6940	752-6122	VII	-
6950	752-5426	XI	-
6952	583-4396	X	-
7009	726-0161	XII	-
7038	899-7994	VI	-
7077	688-6706	IV	-
7213	755-0180	X	-
7263A	958-0082	VI	-
7266	855-3783	IV	-
7289	815-0813	IV	1
7390	833-6042	V	2
7471	993-0694	VII	-
7511	082-3402	VII	-
7554	840-5465	IV	-
7560-V	179-8054	XI	-
7580W	985-9019	X	1
7620	981-2004	V	-
7621	944-3548	V	-
7650	926-0122	X	-
7651	985-9002	X	-
7665	069-2107	V	-
7735A	068-5330	VI	-
7768	050-9200	IV	-
7782	011-3658	V	-
7815	082-3688	IV	-
7977	760-7382	XII	-
8161	926-2636	X	-
8167	082-3973	X	-
8168	985-8983	X	-
8169	078-7091	X	-
8170W	052-4112	X	-
8175	474-0095	VIII	-
8226	433-5437	X	-
8237	959-5226	VII	-
8245	181-0182	X	-
8315	958-6740	VII	-
8321	226-5222	X	-
8354	082-3489	V	-
8361	479-1749	VII	-
8362	486-0288	VIII	-
8364	135-9489	VIII	-

See footnote at end of table.

MIL-STD-200K

TABLE XIII. Combined listing (type number sequence): Tubes with applicable Federal Stock Number (FSN) and North Atlantic Treaty Organization (NATO) interest - Continued.

Type number	Federal Stock Number 5960-	Table reference	NATO status ^{1/}
8403	106-0545	IV	-
8404	952-3011	VII	-
8421	914-0144	XII	-
8422	892-8632	XII	-
8423	899-9341	XII	-
8467	982-6472	VII	-
8493	079-4043	VII	-
8500	477-6551	X	-
8561	402-7564	X	-
8590	106-2121	X	-
8621	926-0211	X	-
8660	230-8366	X	-
8745	106-2239	IV	-
8904	369-7460	X	-

- ^{1/} NATO status: Tube types which are also on the NATO list of recommended tubes (NEPR-18).
 1 - NATO preferred type.
 2 - NATO guidance type.

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