METRIC

A-A-59155
5 March 2003

COMMERCIAL ITEM DESCRIPTION

NITROGEN, HIGH PURITY, SPECIAL PURPOSE

1.0 ABSTRACT

This document provides the requirements for the procurement of gaseous or liquid primary grade nitrogen suitable for use in reactor plant, steam plant and shipyard applications where high purity nitrogen is required.

2.0 SOURCES OF REFERENCE DOCUMENTS

The list of documents and specifications pertinent to this commercial item description is provided in Table 3 of this document.

3.0 TECHNICAL REQUIREMENTS

3.1 Material Requirements

The nitrogen shall conform to the type, grade and class specified in Table A below.

Type I nitrogen shall contain no solid particles whose maximum dimensions are greater than 50 microns in size assured by the use of a 10 micron or better filter at or close to the cylinder charging manifold that is capable of removing foreign material.

Beneficial comments, (recommendations, additions, deletions) and any pertinent data which may be used in improving this document should be addressed to: Commander, Naval Sea Systems Command, ATTN 05Q, 1333 Isaac Hull Avenue SE, STOP 5160, Washington Navy Yard, DC 20376-5160.

AMSC N/A FSC 6830

Table A

Characteristics for Type I-Gaseous and Type II-Liquid Nitrogen

Characteristic	Grade	Requirement
Purity	A B	99.95 % Minimum by Volume 99.50 % Minimum by Volume
Argon, Neon & Helium	All	Includes Trace Quantities
Oxygen Content	A B	0.05 % Maximum by Volume 0.50 % Maximum by Volume
Moisture Content	All	0.02 mg/L Maximum
Oil	All	Oil Free
Odor	All	None
Hydrocarbon Content	All	< 50 ppm as Methane by Volume
Particulate Content	All	≤ 50 Microns in Size

3.2 Manufacturing and Process Requirements

3.2.1 Mercury Contamination

The nitrogen shall not contain and shall not be contaminated by mercury or mercury compounds. During the manufacturing process, tests and inspections, the product shall not have come in direct contact with mercury, nor any of its compounds, nor any mercury containing device employing a single boundary of containment.

3.2.2 Foreign Material Exclusion

The nitrogen shall be free from foreign material such as oil, grease, dirt and debris. Production operations shall be conducted so as to assure the required level of cleanliness. Such operations may include but are not limited to the following precautions: Ensuring that the nitrogen containers are free from foreign material prior to fill, providing an area for fill operations that is free of dirt and debris, and maintaining the fill equipment in a clean condition.

3.2.3 Container Requirements

New cylinders shall conform to the requirements of FED-RR-C-901. Used or Government furnished cylinders shall conform to the requirements of MIL-STD-1411 and 49 CFR 100-199 prior to refilling. Cylinders are to be color coded according to MIL-STD-101. Type II liquid nitrogen shall be contained in either supplier owned or Government owned insulated containers in accordance with 49 CFR 171-190.

3.2.4 Valve Requirements

Cylinder valves shall conform to the requirements of MIL-DTL-2, Valve Outlet Application 580 for cylinders with rated pressures less than 3000 psig and Application 680 for cylinders with rated pressures greater than 3000 psig.

3.2.5. Lot Size Requirements

A lot is defined as all nitrogen produced during a consecutive 24-hour period from the same source, by one manufacturer, at one plant, from the same materials, and under essentially the same manufacturing conditions provided the operation is continuous. A source is considered to be either an individual nitrogen producing process or an individual storage container to which no nitrogen is added after the initial filling.

In the event the process is a batch operation, each batch (see 3.2.6 below) shall constitute a lot. Even if a batch is larger, each lot of Type I nitrogen cylinders ready for delivery shall be limited to a maximum of 500 cylinders. For Type II liquid nitrogen, each individually filled container shall be considered a lot.

3.2.6 Batch Requirement

That quantity of material which has been manufactured by some unit chemical process.

3.2.7 Processing Requirements

Type I gaseous nitrogen shall be manufactured by any process known not to introduce oil into the nitrogen. Type I gaseous nitrogen shall be compressed with a water-lubricated or dry-seal compressor or produced using a cryogenic converter from a liquid nitrogen source. Cylinders shall be filled using a 10-micron or better filter, positioned at or close to the cylinder charging manifold, that is capable of removing both oil and solid particulates.

The settled pressure in a filled container shall be within 25 psig of the pressure that corresponds to the settled container temperature as shown on Table 2.

4.0. QUALITY ASSURANCE PROVISIONS

4.1 Inspection System Requirements

The vendor shall maintain complete records for all inspections and tests performed on the product. The records shall be traceable by the vendor's lot or batch number. These records shall indicate the nature and number of observations made, the number and type of deficiencies found, the quantities approved and rejected, and the specific actions taken to correct the deficiencies.

4.2 Test Equipment Requirements

All gages, measuring and test equipment used in the tests, inspection and processing of the product shall be calibrated to certified standards that have known, valid relationships to nationally accepted industry standards. The calibration frequency for each device shall be based on its stability, purpose and usage. A positive means (such as stickers) shall be provided to identify the calibration interval, last date of calibration and date calibration is due for each device. Complete written records of calibration data traceable to the individual test devices shall be available for Contracting Agency review.

4.3 Contract Certification Requirements

The contractor shall certify and maintain substantiating evidence that the product offered meets the salient characteristics of this Commercial Item Description in accordance with the required frequency of testing specified in Section 3.2.5 and that the product conforms to the producer's own drawings, specifications, standards, and quality assurance practices, and is the same product offered for sale in the commercial marketplace. The Government reserves the right to require proof of such conformance prior to first delivery and thereafter as may be provided for under the provisions of the contract.

4.4 Inspection Requirements

Sampling for visual inspection of Type I containers shall be performed on those containers that are ready for delivery. Samples shall be chosen randomly and in accordance with Table 1. Type I containers should be sampled from near the beginning and end of the production run, and if more than two containers are required, from points in between. Type II containers shall be visually inspected individually.

Table 1

Sampling Requirements For Type I Containers

Lot Size	Number of Containers
≤ 25	2
26 to 150	3
151 to 500	5

Each selected container shall be inspected for conformance with the requirements specified in Section 3.2.3 (Container Requirements), Section 3.2.4 (Valve Requirements), Section 5.0 (Shipping Requirements) and Section 6.0 (Marking Requirements) of this description. Failure of any one container constitutes failure of the entire lot. A failed lot may be resubmitted for inspection provided the vendor has corrected all the non-conforming attributes.

4.5 Testing Requirements

Sampling for testing of a lot of Type I gaseous nitrogen shall be from containers that are ready for delivery in accordance with the requirements specified in Section 4.4 of this specification. Sampling for testing of a container of Type II liquid nitrogen shall be in accordance with ASTM F 310. Before any test is performed, sufficient nitrogen shall be permitted to flow to displace any other gas present in the test equipment lines. Liquid nitrogen shall be in the vapor form when tested. The following tests shall be performed on each sample selected for testing per the designated procedure. Acceptance criteria are as specified:

Characteristic	Test Method	Acceptance Limit
Purity	CGA G-10.1	Grade A 99.95 % Minimum by Volume Grade B 99.50 % Minimum by Volume
Oxygen Content	CGA G-10.1	Grade A 0.05 % Maximum by Volume Grade B 0.50 % Maximum by Volume
Moisture Content	CGA G-10.1	Grade A 0.02 *mg/L Maximum Grade B 0.02 *mg/L Maximum
Odor	CGA G-10.1	None Detectable
Hydrocarbon Content	CGA G-10.1	<50 ppm as Methane by Volume
Leakage (Type I Only)	MIL-STD-1411	None

* Note: The 0.02 milligram water per liter of gas is equivalent to 26.3 ppm water vapor by volume and also to a dewpoint of minus 63.5 degrees Fahrenheit.

5.0 SHIPPING REQUIREMENTS

The shipment of nitrogen containers shall be in accordance with 49 CFR 171-190. Containers shall conform to the Uniform Freight Classification, National Classification Board or regulations of other carriers as applicable to the mode of transportation. Palletization of containers shall be in accordance with MIL-HDBK-774.

A Material Safety Data Sheet (MSDS) prepared per FED-STD-313 shall be provided with each pallet and affixed/packaged in a manner for easy accessibility without being lost or damaged during shipment and storage. In accordance with 29 CFR 1910.1200, one copy of the MSDS shall be provided with the bill of lading for each shipment of material.

6.0 MARKING REQUIREMENTS

Containers of nitrogen shall be marked in accordance with 49 CFR 171-190 and MIL-STD-129 specifically having the type and grade either stenciled or tagged on the container.

Preparing Activity:
Navy – SH
(Project 6830-1061)

Table 2

Pressure-Temperature Conversion Chart for Nitrogen

Settled Temp F	1800 psig	2015 psig	2200 psig	2265 psig	2400 psig	3500 psig
-50	1270	1407	1528	1574	1653	2385
-48	1279	1417	1540	1588	1667	2404
-46	1288	1427	1552	1601	1680	2423
-44	1297	1437	1564	1614	1693	2442
-42	1306	1447	1575	1627	1707	2460
-40	1315	1457	1585	1630	1720	2479
-38	1324	1468	1597	1643	1733	2497
-36	1333	1478	1609	1655	1746	2516
-34	1342	1488	1621	1667	1758	2534
-32	1351	1499	1632	1678	1771	2552
-30	1360	1509	1643	1689	1783	2571
-28	1369	1519	1654	1701	1795	2589
-26	1378	1529	1665	1713	1807	2608
-24	1387	1539	1676	1724	1819	2627
-22	1396	1550	1688	1735	1831	2645
-20	1405	1560	1699	1746	1843	2664
-18	1414	1570	1710	1757	1855	2683
-16	1423	1580	1722	1768	1868	2711
-14	1432	1590	1733	1780	1881	2730
-12	1441	1601	1744	1792	1893	2748
-10	1449	1611	1755	1804	1905	2757
-8	1458	1621	1767	1815	1918	2776
-6	1467	1631	1778	1827	1930	2795
-4	1476	1641	1789	1839	1943	2813
-2	1484	1651	1800	1850	1955	2832
0	1494	1661	1811	1861	1968	2851
2	1503	1671	1823	1873	1980	2869
4	1511	1682	1833	1885	1993	2888
6	1520	1692	1845	1896	2005	2906
8	1528	1702	1856	1908	2017	2925
10	1538	1712	1867	1920	2030	2943
12	1546	1722	1878	1931	2042	2962
14	1555	1732	1889	1942	2055	2980
16	1563	1742	1901	1954	2067	2999
18	1573	1753	1912	1966	2079	3017
20	1582	1763	1923	1978	2092	3036
22	1590	1773	1934	1989	2104	3055

Settled Temp F	1800 psig	2015 psig	2200 psig	2265 psig	2400 psig	3500 psig
24	1599	1783	1945	2000	2116	3073
26	1608	1793	1956	2013	2129	3092
28	1616	1803	1967	2024	2141	3111
30	1625	1814	1978	2035	2154	3129
32	1634	1824	1990	2046	2166	3148
34	1643	1834	2001	2058	2178	3167
36	1652	1844	2012	2070	2190	3185
38	1660	1854	2023	2082	2203	3204
40	1669	1864	2034	2093	2215	3222
42	1677	1874	2045	2105	2227	3241
44	1686	1884	2056	2116	2240	3260
46	1695	1894	2068	2128	2252	3278
48	1704	1904	2079	2139	2264	3297
50	1713	1914	2090	2150	2276	3316
52	1721	1924	2101	2162	2289	3334
54	1730	1934	2112	2173	2301	3353
56	1739	1944	2123	2185	2313	3371
58	1748	1954	2134	2196	2326	3389
60	1756	1964	2145	2208	2338	3408
62	1765	1975	2156	2219	2350	3426
64	1774	1985	2167	2230	2362	3445
66	1782	1995	2178	2242	2375	3463
68	1791	2005	2189	2253	2387	3482
70	1800	2015	2200	2265	2400	3500
72	1809	2025	2211	2279	2412	3519
74	1817	2035	2222	2288	2424	3537
76	1826	2045	2233	2300	2437	3556
78	1834	2055	2244	2310	2449	3574
80	1843	2065	22556	2322	2461	3598
82	1851	2075	2267	2333	2473	3601
84	1861	2085	2278	2345	2486	3620
86	1869	2095	2289	2357	2498	3639
88	1878	2105	2300	2368	2510	3658
90	1887	2115	2311	2379	2522	3686
92	1896	2125	2322	2390	2534	3705
94	1904	2135	2333	2402	2546	3723
96	1912	2145	2344	2414	2559	3741
98	1921	2154	2355	2425	2571	3760
100	1930	2164	2366	2436	2583	3778

Settled Temp F	1800 psig	2015 psig	2200 psig	2265 psig	2400 psig	3500 psig
102	1939	2174	2377	2448	2595	3796
104	1948	2184	2388	2459	2608	3814
106	1956	2194	2399	2470	2620	3832
108	1964	2204	2410	2482	2631	3850
110	1973	2214	2421	2494	2644	3868
112	1982	2224	2432	2505	2656	3887
114	1991	2234	2443	2516	2669	3905
116	2000	2244	2454	2528	2680	3924
118	2008	2254	2465	2539	2693	3942
120	2017	2263	2476	2550	2705	3961
122	2025	2273	2486	2561	2718	3979
124	2034	2283	2498	2573	2729	3996
126	2043	2293	2509	2584	2741	4014
128	2051	2303	2520	2595	2754	4032
130	2060	2313	2530	2607	2766	4049
132	2069	2323	2541	2618	2778	4067
134	2078	2333	2553	2630	2790	4084
136	2086	2342	2564	2641	2803	4101
138	2094	2352	2574	2652	2814	4119
140	2103	2362	2585	2663	2826	4136
142	2111	2372	2596	2675	2839	4154
144	2120	2381	2608	2686	2851	4172
146	2129	2391	2619	2697	2863	4189
148	2138	2401	2630	2709	2875	4207
150	2147	2411	2641	2720	2887	4224

Table 3

Sources of Reference Documents

DOCUMENT NUMBER	TITLE
Federal Specifications	
FED-RR-C-901	Cylinders, Compressed Gas: High Pressure, Steel DOT 3AA, and Aluminum Application, General Specification for
FED-STD-313	Material Safety Data, Transportation Safety Data and Disposal Data for Hazardous Material Furnished to Government Activities
Military Specifications	
MIL-DTL-2	Detail Specification, Valves, Cylinder, Gas (For Compressed or Liquefied Gases)
MIL-STD-101	Color Code for Pipelines and Compressed Gas Cylinders
MIL-STD-129	Marking for Shipment and Storage
MIL-HDBK-774	Department of Defense Handbook, Palletized Unit Loads
MIL-STD-1411	Standard Practice, Inspection and Maintenance of Compressed Gas Cylinders
Others	
Title 29	Occupational Safety and Health Administration Requirements Code of Federal Regulations Chapter XVII
Title 49	Department of Transportation Code of Federal Regulations Hazardous Material Regulations Parts 100 – 199
ASTM F 310	American Society for Testing and Materials, Standard Practice for Sampling Cryogenic Aerospace Fluids

DOCUMENT NUMBER	TITLE
CGA G-10.1	Commodity Specification for Nitrogen
Uniform Freight Classification Rules	National Railroad Freight Committee
National Classification Board Rules	National Motor Freight Classification