



Designation: ~~B637-06(Reapproved2011)~~ Designation: B637 - 12

~~Standard Specification for Precipitation-Hardening Nickel Alloy Bars, Forgings, and Forging Stock for High-Temperature Service~~ Standard Specification for Precipitation-Hardening and Cold Worked Nickel Alloy Bars, Forgings, and Forging Stock for Moderate or High Temperature Service¹

This standard is issued under the fixed designation B637; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This specification² covers hot- and cold-worked precipitation-hardenable nickel alloy rod, bar, forgings, and forging stock for moderate or high- temperature service (Table 1).

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to become familiar with all hazards including those identified in the appropriate Material Safety Data Sheet (MSDS) for this product/material as provided by the manufacturer, to establish appropriate safety and health practices, and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:³

B880 Specification for General Requirements for Chemical Check Analysis Limits for Nickel, Nickel Alloys and Cobalt Alloys

E8 Test Methods for Tension Testing of Metallic Materials

E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

E139 Test Methods for Conducting Creep, Creep-Rupture, and Stress-Rupture Tests of Metallic Materials

E1473 Test Methods for Chemical Analysis of Nickel, Cobalt, and High-Temperature Alloys

3. Terminology

3.1 Definitions:

3.1.1 *bar, n*—material of rectangular (flats), hexagonal, octagonal, or square solid section in straight lengths.

3.1.2 *rod, n*—material of round solid section furnished in straight lengths.

4. Ordering Information

4.1 It is the responsibility of the purchaser to specify all requirements that are necessary for material ordered under this specification. Examples of such requirements include, but are not limited to, the following:

4.1.1 Alloy (Table 1).

4.1.2 Condition (temper) (Table 2)

4.1.2 Condition (temper or cold worked) (Tables 2 and 3 and 6.1).

4.1.3 *Shape*—Rod or bar (round, rectangle, square, hexagon, octagon).

4.1.3.1 Forging (sketch or drawing).

¹ This specification is under the jurisdiction of ASTM Committee B02 on Nonferrous Metals and Alloys and is the direct responsibility of Subcommittee B02.07 on Refined Nickel and Cobalt and Their Alloys.

Current edition approved June 1, 2011. Published June 2011. Originally approved in 1970. Last previous edition addition approved in 2006 as B637-06^{ε1}. DOI: 10.1520/B0637-06R11.

Current edition approved May 1, 2012. Published May 2012. Originally approved in 1970. Last previous edition addition approved in 2011 as B637-06 (2011). DOI: 10.1520/B0637-12.

² For ASME Boiler and Pressure Vessel Code applications, see related Specification SB-637 in Section II of that Code.

³ For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

TABLE 1 Chemical Requirements

Element	Composition Limits, %						
	UNS N07022	UNS N07208	UNS N07252 (Formerly Grade 689)	UNS N07001 (Formerly Grade 685)	UNS N07500 (Formerly Grade 684)	UNS N07750 (Formerly Grade 688)	UNS N07718 (Formerly Grade 718)
Carbon	0.010 max	0.04–0.08	0.10–0.20	0.03–0.10	0.15 max	0.08 max	0.08 max
Carbon	0.010 max	0.04–0.08	0.10–0.20	0.03–0.10	0.15 max	0.08 max	0.08 max
Manganese	0.5 max	0.3 max	0.50 max	1.00 max	0.75 max	1.00 max	0.35 max
Manganese	0.5 max	0.3 max	0.50 max	1.00 max	0.75 max	1.00 max	0.35 max
Silicon	0.08 max	0.15 max	0.50 max	0.75 max	0.75 max	0.50 max	0.35 max
Silicon	0.08 max	0.15 max	0.50 max	0.75 max	0.75 max	0.50 max	0.35 max
Phosphorus	0.025 max	0.015 max	0.015 max	0.030 max	0.015 max	...	0.015 max
Phosphorus	0.025 max	0.015 max	0.015 max	0.030 max	0.015 max	...	0.015 max
Sulfur	0.015 max	0.015 max	0.015 max	0.030 max	0.015 max	0.01 max	0.015 max
Sulfur	0.015 max	0.015 max	0.015 max	0.030 max	0.015 max	0.01 max	0.015 max
Chromium	20.0–21.4	18.5–20.5	18.00–20.00	18.00–21.00	15.00–20.00	14.00–17.00	17.0–21.0
Chromium	20.0–21.4	18.5–20.5	18.00–20.00	18.00–21.00	15.00–20.00	14.00–17.00	17.0–21.0
Cobalt	1.0 max	9.0–11.0	9.00–11.00	12.00–15.00	13.00–20.00	1.00 max ^A	1.0 max ^A
Cobalt	1.0 max	9.0–11.0	9.00–11.00	12.00–15.00	13.00–20.00	1.00 max ^A	1.0 max ^A
Molybdenum	15.5–17.4	8.0–9.0	9.00–10.50	3.50–5.00	3.00–5.00	...	2.80–3.30
Molybdenum	15.5–17.4	8.0–9.0	9.00–10.50	3.50–5.00	3.00–5.00	...	2.80–3.30
Columbium	...	...	...	...	...	0.70–1.20	4.75–5.50
(Nb) + tantalum	...	...	...	...	...	0.70–1.20	4.75–5.50
Columbium	...	...	...	...	...	0.70–1.20	4.75–5.50
(Nb) + tantalum	...	...	...	...	...	0.70–1.20	4.75–5.50
Titanium	...	1.90–2.30	2.25–2.75	2.75–3.25	2.50–3.25	2.25–2.75	0.65–1.15
Titanium	...	1.90–2.30	2.25–2.75	2.75–3.25	2.50–3.25	2.25–2.75	0.65–1.15
Aluminum	0.5 max	1.38–1.65	0.75–1.25	1.20–1.60	2.50–3.25	0.40–1.00	0.20–0.80
Aluminum	0.5 max	1.38–1.65	0.75–1.25	1.20–1.60	2.50–3.25	0.40–1.00	0.20–0.80
Zirconium	...	0.020 max	...	0.02–0.12	...	...	...
Zirconium	...	0.020 max	...	0.02–0.12	...	...	...
Boron	0.006 max	0.003–0.010	0.003–0.01	0.003–0.01	0.003–0.01	...	0.006 max
Boron	0.006 max	0.003–0.010	0.003–0.01	0.003–0.01	0.003–0.01	...	0.006 max
Iron	1.8 max	1.5 max	5.00 max	2.00 max	4.00 max	5.00–9.00	remainder ^B
Iron	1.8 max	1.5 max	5.00 max	2.00 max	4.00 max	5.00–9.00	remainder ^B
Copper	...	0.1 max	...	0.50 max	0.15 max	0.50 max	0.30 max
Copper	0.5 max	0.1 max	...	0.50 max	0.15 max	0.50 max	0.30 max
Nickel	remainder ^B	remainder ^B	remainder ^B	remainder ^B	remainder ^B	70.00 min	50.0–55.0
Nickel	remainder ^B	remainder ^B	remainder ^B	remainder ^B	remainder ^B	70.00 min	50.0–55.0
Tantalum	0.2 max	0.1 max	...	...	...	...	...
Columbium	...	0.2 max	...	...	...	...	...
(Niobium)	...	0.2 max	...	...	...	...	...
Tungsten	0.8 max	0.5 max	...	...	...	...	...

Element	UNS N07080 (Formerly Grade 80A)	UNS N07752	UNS N09925	UNS N07725
	Carbon	0.10 max	0.020–0.060	0.03 max	0.03 max
Carbon	0.10 max	0.020–0.060	0.03 max	0.03 max
Manganese	1.00 max	1.00 max	1.0 max	0.35 max
Manganese	1.00 max	1.00 max	1.0 max	0.35 max
Silicon	1.00 max	0.50 max	0.5 max	0.20 max
Silicon	1.00 max	0.50 max	0.5 max	0.20 max
Phosphorus	...	0.008 max	0.03 max	0.015 max
Phosphorus	...	0.008 max	0.03 max	0.015 max
Sulfur	0.015 max	0.003 max	0.03 max	0.010 max
Sulfur	0.015 max	0.003 max	0.03 max	0.010 max
Chromium	18.00–21.00	14.50–17.00	19.5–22.5†	19.00–22.50†
Chromium	18.00–21.00	14.50–17.00	19.5–22.5†	19.00–22.50†
Cobalt	...	0.050 max	...	...
Cobalt	...	0.050 max	...	...
Molybdenum	...	...	2.5–3.5	7.00–9.50
Molybdenum	...	...	2.5–3.5	7.00–9.50
Columbium	...	0.70–1.20	0.5 max (Nb only)	2.75–4.00
(Nb) + tantalum	...	0.70–1.20	0.5 max (Nb only)	2.75–4.00
Columbium	...	0.70–1.20	0.5 max (Nb only)	2.75–4.00
(Nb) + tantalum	...	0.70–1.20	0.5 max (Nb only)	2.75–4.00
Titanium	1.80–2.70	2.25–2.75	1.9–2.40	1.00–1.70
Titanium	1.80–2.70	2.25–2.75	1.9–2.40	1.00–1.70
Aluminum	0.50–1.80	0.40–1.00	0.1–0.5	0.35 max
Aluminum	0.50–1.80	0.40–1.00	0.1–0.5	0.35 max
Boron	...	0.007 max	...	...
Boron	...	0.007 max	...	...
Iron	3.00 max	5.00–9.00	22.0 min	5.00–9.00
Iron	3.00 max	5.00–9.00	3.00 max	5.00–9.00
Copper	...	0.50 max	1.5–3.0	...
Copper	...	0.50 max	1.5–3.0	...
Zirconium	...	0.050 max	...	...
Zirconium	...	0.050 max	...	...
Vanadium	...	70.0 min	...	...
Vanadium	...	70.0 min	...	...
Nickel	remainder ^B	70.0 min	...	...
Nickel	remainder ^B	70.0 min	...	...

TABLE 2 Heat Treatment^A

Alloy	Recommended Annealing Treatment	Recommended Solution Treatment	Recommended Stabilizing Treatment	Precipitation Hardening Treatment
N07252	...	1950 ± 25°F [1066 ± 14°C], hold 4 h, air cool	...	
N07022 ^B Type 1	...	1800 to 2000°F (982 to 1093°C), hold ½ h/in., 5 minutes minimum, rapid air cool or water quench	...	
N07022 ^C Type 2	...	1400 ± 25°F [760 ± 14°C], hold 15 h, air cool or furnace cool	...	1125 ± 25°F (605 ± 14°C), hold
N07022 ^C Type 2	...	1800 to 2000°F (982 to 1093°C), hold ½ h/in., 5 minutes minimum, rapid air cool or water quench	...	1125 ± 25°F (605 ± 14°C), hold 10 h, air cool ^B
N07001
N07022 Type 3	...	1825 to 1900°F (996 to 1038°C), hold 4 h, oil or water quench	1550 ± 25°F [843 ± 14°C], hold 4 h, air cool	1400 ± 25°F (760 ± 14°C), hold 16 h, air cool or furnace cool
N07022 Type 3	...	1800 to 2000°F (982 to 1093°C), hold ½ h/in., 5 minutes minimum, rapid air cool	1550 ± 25°F [843 ± 14°C], hold 4 h, air cool or water quench	1300 ± 25°F (715 ± 14°C), hold 16 h, air cool or furnace cool
N07208	...	2000 to 2125°F (1093 to 1163°C), hold ½ h/in., hold 16 h, air cool or furnace cool	...	1850 ± 25°F (1010 ± 14°C), hold 2 h, air cool, followed by 1450 ± 25°F (788 ± 14°C), hold 8 h, air cool
N07208	...	2000 to 2125°F (1093 to 1163°C), hold ½ h/in., 5 to 10 minutes minimum, water quench or rapid air cool	...	1850 ± 25°F (1010 ± 14°C), hold 2 h, air cool, followed by 1450 ± 25°F (788 ± 14°C), hold 8 h, air cool
N07500	...	2150 ± 25°F [1177 ± 14°C], hold 2 h, air cool (bars only)	...	1975 ± 25°F [1080 ± 14°C], hold 4 h, air cool or furnace cool
N07252	...	1950 ± 25°F (1066 ± 14°C), hold 4 h, air cool	...	1400 ± 25°F (760 ± 14°C), hold 15 h, air cool or furnace cool
N07001	...	1550 ± 25°F [843 ± 14°C], hold 2 h, air cool	143 ± 14°C, hold 4 h, air cool	1400 ± 25°F [760 ± 14°C], hold 16 h, air cool or furnace cool
N07001	...	1825 to 1900°F (996 to 1038°C), hold 4 h, oil or water quench	1550 ± 25°F (843 ± 14°C), hold 4 h, air cool	1400 ± 25°F (760 ± 14°C), hold 16 h, air cool or furnace cool
N07500	2150 ± 25°F (1177 ± 14°C), hold 2 h, air cool (bars only)	1975 ± 25°F (1080 ± 14°C), hold 4 h, air cool	1550 ± 25°F (843 ± 14°C), hold 24 h, air cool	1400 ± 25°F (760 ± 14°C), hold 16 h, air cool or furnace cool
N07750 Type 1 (Service above 1100°F) [593°C]	...	2100 ± 25°F [1140 ± 14°C], hold 2 to 4 h, air cool	1550 ± 25°F [843 ± 14°C], hold 24 h, air cool	1300 ± 25°F [704 ± 14°C], hold 20 h, air cool or furnace cool
N07750 Type 1 (Service above 1100°F) [593°C]	...	2100 ± 25°F (1149 ± 14°C), hold 2 to 4 h, air cool	1550 ± 25°F (843 ± 14°C), hold 24 h, air cool	1300 ± 25°F (704 ± 14°C), hold 20 h, air cool or furnace cool
N07750 Type 2 (Service up to 1100°F) [593°C]	...	1800 ± 25°F [982 ± 14°C], hold ½ h min, cool at rate equivalent to air cool or faster	...	1350 ± 25°F [732 ± 14°C], hold 8 h, furnace cool to 1150 ± 25°F [621 ± 14°C], hold until total precipitation heat treatment has reached 18 h, air cool

4.1.4 Dimensions, including length.

4.1.5 Quantity (mass or number of pieces).

TABLE 2 *Continued*

Alloy	Recommended Annealing Treatment	Recommended Solution Treatment	Recommended Stabilizing Treatment	Precipitation Hardening Treatment
<u>N07750 Type 2</u> (Service up to 1100°F) (593°C)	...	1800 ± 25°F (982 ± 14°C), hold ½ h min, cool at rate equivalent to air cool or faster	...	1350 ± 25°F (732 ± 14°C), hold 8 h, furnace cool to 1150 ± 25°F (621 ± 14°C), hold until total precipitation heat treatment has reached 18 h, air cool
<u>N07750 Type 3</u>	...	1975 – 2050°F [1079 – 1121°C], hold 1 to 2 h, air cool	...	1300 ± 25°F [704 ± 14°C], hold 20 h, + 4 – 0 h, air cool
<u>N07750 Type 3</u>	...	1975 – 2050°F (1079 – 1121°C), hold 1 to 2 h, air cool	...	1300 ± 25°F (704 ± 14°C), hold 20 h, + 4 – 0 h, air cool
<u>N07752 Type 1</u>	...	1975 ± 25°F [1080 ± 14°C], hold 1 to 2 h, cool by water or oil quenching	...	1320 ± 25°F [715 ± 14°C], hold 20 h, + 2, – 0 h, air cool
<u>N07752 Type 1</u>	...	1975 ± 25°F (1080 ± 14°C), hold 1 to 2 h, cool by water or oil quenching	...	1320 ± 25°F (715 ± 14°C), hold 20 h, + 2, – 0 h, air cool
<u>N07752 Type 2</u>	...	1975 ± 25°F [1080 ± 14°C], hold 1 to 2 h, cool by water or oil quenching	...	1400 ± 25°F [760 ± 14°C], hold 100 h, + 4, – 0 h, air cool
<u>N07752 Type 2</u>	...	1975 ± 25°F (1080 ± 14°C), hold 1 to 2 h, cool by water or oil quenching	...	1400 ± 25°F (760 ± 14°C), hold 100 h, + 4, – 0 h, air cool
<u>N07718</u>	...	1700 to 1850°F [924 to 1010°C], hold ½ h min, cool at rate equivalent to air cool or faster	...	1325 ± 25°F [718 ± 14°C], hold at temperature for 8 h, furnace cool to 1150 ± 25°F [621 ± 14°C], hold until total precipitation heat treatment time has reached 18 h, air cool
<u>N07718</u>	...	1700 to 1850°F (924 to 1010°C), hold ½ h min, cool at rate equivalent to air cool or faster	...	1325 ± 25°F (718 ± 14°C), hold at temperature for 8 h, furnace cool to 1150 ± 25°F (621 ± 14°C), hold until total precipitation heat treatment time has reached 18 h, air cool
<u>N07080</u>	...	1950 ± 25°F [1066 ± 14°C], hold 8 h, air cool	1560 ± 25°F [849 ± 14°C], hold 24 h, air cool	1290 ± 25°F [699 ± 14°C], hold 16 h, air cool
<u>N07080</u>	...	1950 ± 25°F (1066 ± 14°C), hold 8 h, air cool	1560 ± 25°F (849 ± 14°C), hold 24 h, air cool	1290 ± 25°F (699 ± 14°C), hold 16 h, air cool
<u>N07725</u>	...	1900 ± 25°F [1038 ± 14°C], hold ½ min, and 4 h max, cool at rate equivalent to air cool	...	1350 ± 25°F [732 ± 14°C], hold at temperature for 5 to 8½ h, furnace cool to 1150 ± 25°F [621 ± 14°C], hold at temperature for 5 to 8½ h, air cool or faster
<u>N07725</u>	...	1900 ± 25°F (1038 ± 14°C), hold ½ min, and 4 h max, cool at rate equivalent to air cool	...	1350 ± 25°F (732 ± 14°C), hold at temperature for 5 to 8½ h, furnace cool to 1150 ± 25°F [621 ± 14°C], hold at temperature for 5 to 8½ h, air cool or faster
<u>N09925</u>	...	1825 to 1875°F [996 to 1024°C], hold ½ min, and 4 h max, cool at rate equivalent to air cool or faster	...	1365 ± 25°F [740 ± 14°C], hold at temperature for 6 to 9 hr, furnace cool to 1150 ± 25°F [621 ± 14°C], hold until total precipitation heat treatment time has reached 18 h, air cool or faster

TABLE 2 *Continued*

Alloy	Recommended Annealing Treatment	Recommended Solution Treatment	Recommended Stabilizing Treatment	Precipitation Hardening Treatment
N09925	...	1825 to 1875°F (996 to 1024°C), hold ½ min, and 4 h max, cool at rate equivalent to air cool or faster	...	1365 ± 25°F (740 ± 14°C), hold at temperature for 6 to 9 hr, furnace cool to 1150 ± 25°F (621 ± 14°C), hold until total precipitation heat treatment time has reached 18 h, air cool or faster

^A The purchaser shall designate on the purchase order or inquiry any partial stage of heat treatment required on material to be shipped.

^B For solution treated + cold worked material only, when specified.

^C For solution treated + cold worked + precipitation hardened material only, when specified.

4.1.6 *Forging Stock*—Specify if material is stock for reforging.

4.1.7 *Finish*.

4.1.8 *Certification*—State if certification is required (Section 15).

4.1.9 *Samples for Product (Check) Analysis*—Whether samples for product (check) analysis shall be furnished (9.2).

4.1.10 *Purchaser Inspection*—If the purchaser wishes to witness tests or inspection of material at the place of manufacture, the purchase order must so state indicating which tests or inspections are to be witnessed (Section 13).

5. Chemical Composition

5.1 The material shall conform to the requirements as to chemical composition prescribed in Table 1.

5.2 If a product (check) analysis is performed by the purchaser, the material shall conform to the product (check) analysis variations prescribed in Specification B880.

6. Mechanical Properties

6.1 Unless otherwise specified, the material shall be supplied in the cold worked or solution treated condition, suitable for subsequent age hardening.

6.2 The cold worked or solution treated material shall be capable of meeting the mechanical property requirements of Table 3, and the stress rupture requirements of Table 4 (except alloys UNS N07022, N09925 and N07725), following the precipitation hardening treatment described in Table 2.

6.3 When the material is to be supplied in the cold worked or solution treated plus aged condition, the requirements of Table 3 and Table 4 (except alloys UNS N07022, N09925 and N07725) shall apply, with the precipitation hardening treatment of Table 2, or as agreed upon between the purchaser and the manufacturer as part of the purchase contract.

7. Dimensions and Permissible Variations

7.1 *Diameter, Thickness, or Width*—The permissible variations from the specified dimensions of cold-worked rod and bar shall be as prescribed in Table 5, and of hot-worked rod and bar as prescribed in Table 6.

7.1.1 *Out of Round*—Cold-worked and hot-worked rod, all sizes, in straight lengths, shall not be out-of-round by more than one half the total permissible variations in diameter shown in Table 5 and Table 6, except for hot-worked rod ½ in. {~~12.7 mm~~}(12.7 mm) and under, which may be out-of-round by the total permissible variations in diameter shown in Table 6.

7.1.2 *Corners*—Cold-worked bar shall have practically exact angles and sharp corners.

7.1.3 *Cut Lengths*—A specified length to which all rod and bar will be cut with a permissible variation of + ⅛ in. {~~3.18 mm~~}, -0 (3.18 mm), -0 for sizes 8 in. {~~203 mm~~}(203 mm) and less in diameter or the distance between parallel surfaces. For larger sizes, the permissible variation shall be + ¼ in. {~~6.35 mm~~}, -0. (6.35 mm), -0.

7.1.4 *Straightness for Cold-Worked and Hot-Worked Rod and Bar*—The maximum curvature (depth of chord) shall not exceed 0.050 in. multiplied by the length in feet {0.04(0.04 mm multiplied by the length in centimetres)}. Material under ½ in. {~~12.7 mm~~}(12.7 mm) in diameter or the distance between parallel surfaces shall be reasonably straight and free of sharp bends and kinks.

7.1.5 For forgings, dimensions and tolerances shall be as specified on the order, sketch, or drawing.

7.1.6 Dimensions and tolerances for forging stock shall be as agreed upon between the purchaser and the manufacturer.

8. Workmanship, Finish and Appearance

8.1 The material shall be uniform in quality and condition, smooth, commercially straight or flat, and free of injurious imperfections.

9. Sampling

9.1 *Lot*—Definition:

9.1.1 A lot for chemical analysis shall consist of one heat.

TABLE 3 Tensile and Hardness Requirements^A

Alloy	Heat Treatment	Tensile Strength, min, psi-† (MPa)‡	Yield Strength (0.2 % offset), min, psi-† (MPa)‡	Elongation in 2 in.-† (50 mm)‡ or 4D, min, %	Reduction of Area, min, %	Brinell Hardness
N07022 Type 1	solution + cold worked	178 000 (1227)	160 000 (1103)	17	35	414 max
N07022 Type 2	solution + cold worked + precipitation harden	178 000 (1227)	160 000 (1103)	15	24	479 max
N07022 Type 3	solution + precipitation harden	145 000 (1000)	80 000 (552)	15	14	228 min
N07208	solution + precipitation harden	150 000 (1034)	90 000 (620)	20	14	250 min
N07252	solution + precipitation harden	160 000 (1100)	90 000 (620)	20	18	310 min
N07001	solution + stabilize + precipitation harden	160 000 (1100)	110 000 (760)	15 ^B	18 ^B	310 min
N07001	solution + stabilize + precipitation harden	160 000 (1100)	110 000 (760)	15 ^B	18 ^B	310 min
N07500 (rod and bar)	anneal + solution + stabilize + precipitation harden	175 000 (120)	105 000 (725)	15	15	310 min
N07500 (rod and bar)	anneal + solution + stabilize + precipitation harden	175 000 (120)	105 000 (725)	15	15	310 min
N07500 (forgings)	solution + stabilize + precipitation harden	170 000 (1170)	100 000 (690)	20	18	310 min
N07500 (forgings)	solution + stabilize + precipitation harden	170 000 (1170)	100 000 (690)	20	18	310 min
N07750 Type 1	solution at 2100°F [1149°C] + stabilize + precipitation harden	140 000 (965)	90 000 (620)	8	...	262 min
N07750 Type 1	solution at 2100°F (1149°C) + stabilize + precipitation harden	140 000 (965)	90 000 (620)	8	...	262 min
N07750 Type 2 ^C	solution at 1800°F [982°C] + precipitation harden	170 000 (1170)	115 000 (790)	18	18	302 to 363
N07750 Type 2 ^C	solution at 1800°F (982°C) + precipitation harden	170 000 (1170)	115 000 (790)	18	18	302 to 363
N07750 Type 2 ^D	solution at 1800°F [982°C] + precipitation harden	170 000 (1170)	115 000 (790)	15 (10) ^E	15 (12) ^E	302 to 363
N07750 Type 2 ^D	solution at 1800°F (982°C) + precipitation harden	170 000 (1170)	115 000 (790)	15 (10) ^E	15 (12) ^E	302 to 363
N07750 Type 3	solution anneal at 2000°F [1093°C] + precipitation harden	160 000 (1103), min 185 000 (1276), max	100 000 (689), min 130 000 (896), max	20	20	267–363, Bm 27–40, Rc
N07750 Type 3	solution anneal at 2000°F (1093°C) + precipitation harden	160 000 (1103), min 185 000 (1276), max	100 000 (689), min 130 000 (896), max	20	20	267–363, Bm 27–40, Rc
N07752 Type 1	solution anneal at 1975°F [1080°C] + precipitation harden	160 000 (1103), min 185 000 (1276), max	100 000 (689), min 130 000 (896), max	20	20	267 to 363, Ba 27 to 40, Rc
N07752 Type 1	solution anneal at 1975°F (1080°C) + precipitation harden	160 000 (1103), min 185 000 (1276), max	100 000 (689), min 130 000 (896), max	20	20	267 to 363, Ba 27 to 40, Rc
N07752 Type 2	solution anneal at 1975°F [1080°C] + precipitation harden	140 000 (965)	85 000 (585)	20	20	...
N07752 Type 2	solution anneal at 1975°F (1080°C) + precipitation harden	140 000 (965)	85 000 (585)	20	20	...
N07718	solution + precipitation harden	185 000 (1275)	150 000 (1034)	12 (6) ^E	15 (8) ^E	331 min
N07718	solution + precipitation harden	185 000 (1275)	150 000 (1034)	12 (6) ^E	15 (8) ^E	331 min
N07080	solution + stabilize + precipitation harden	135 000 (930)	90 000 (620)	20	...	...
N07080	solution + stabilize + precipitation harden	135 000 (930)	90 000 (620)	20	...	...
N07725	solution + precipitation harden	150 000 (1034)	120 000 (827)	20	35	43, Rc max
N07725	solution + precipitation harden	150 000 (1034)	120 000 (827)	20	35	43, Rc max
N09925 ^E	solution + precipitation harden	140 000 (965)	105 000 (724)	18	25	38, Rc max
N09925 ^E	solution + precipitation harden	140 000 (965)	105 000 (724)	18	25	38, Rc max
N09925 ^G	solution + precipitation harden	140 000 (965)	110 000 (758)	18	25	38, Rc max
N09925 ^G	solution + precipitation harden	140 000 (965)	110 000 (758)	18	25	38, Rc max

^A The supplier shall demonstrate that the material will meet fully heat-treated properties after full heat treatment in accordance with Table 2.

^B Forgings.