The Engineering Society
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SAE J1268 FEB88

Hardenability Bands for Carbon and Alloy H Steels

SAE Standard
Revised February 1988

Submitted for Recognition as an American National Standard

The Engineering Society For Advancing Mobility Land Sea Air and Space ®

400 COMMONWEALTH DRIVE, WARRENDALE, PA 15096

Submitted for recognition as an American National Standard

MATERIALS STANDARD

SAE J1268

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Superseding J1268 JUN81

Ø HARDENABILITY BANDS FOR CARBON AND ALLOY H STEELS

1. INTRODUCTION:

The SAE Iron and Steel Technical Committee - Division 14 in cooperation with the Technical Committee on Alloy Steel Bars of the American Iron and Steel Institute devised hardenability bands for the constructional alloy steels. The initial SAE Standard for H Steels was published in 1948 and numerous revisions and additions have been issued in the intervening years. The SAE Iron and Steel Technical Committee established Division 8 in 1960 to devise hardenability bands for carbon steels. The result of Division 8 efforts is the SAE Recommended Practice J776.

Since that time, Division 14 has been dissolved and Division 1 was formed and was given responsibility for Carbon and Alloy Steel Bars. Division 8 is now responsible for Hardenability for Carbon and Alloy Steels. This trend was followed by the American Iron and Steel Institute which now has a technical committee for bars which covers both carbon and alloy steels.

SAE Recommended Practice J776 and the SAE Standard J407 were retired and the carbon and alloy H-Band Steels are combined in this new standard.

2. GRADES OF STEEL:

H steels and their corresponding minimum and maximum hardenability limits are shown for all of the carbon and alloy steels for which there are sufficient hardenability data and for grades that can use the standard end quench test. As hardenability data are accumulated for other grades, this standard will be revised to include such grades.

3. CHEMICAL COMPOSITION LIMITS:

To permit steel producers the necessary latitude to meet a common standard of hardenability limits, the chemical composition limits of these steels have been broadened somewhat from those limits applicable to the same grades when specified by chemical composition only (J403 and J404). These broader limits permit adjustments in manufacturing ranges of chemistry to correct for individual plant melting characteristics which might otherwise influence the levels and widths of the bands. The modifications have not been great enough to influence the general characteristics of the original compositions of the series under consideration.

The chemical composition limits for electric furnace, open hearth, and BOF steels are outlined in Tables 1 and 2 and are subject to the permissible variations for product analysis outlined in Tables 1 and 3 of SAE J409.

4. IDENTIFICATION:

As a means of identifying steels specified to hardenability band limits, the suffix letter H has been added to the conventional series number. In the Unified Numbering System, the H appears as a prefix. It is important that steel consumers use this letter in specification requirements, as there is no other means of determining when hardenability band limits apply. When the letter is used, all conditions pertaining to chemical composition limits, restrictions, testing technique, and so forth, as outlined herein apply.

5. GRAIN SIZE:

The limits set forth for bands are intended to apply to steels exhibiting austenitic grain size 5 or finer (see SAE J418). In cases where coarse grain steel is desired, the hardenability limits shall be a matter of agreement between producer and consumer.

6. USE OF HARDENABILITY LIMITS:

Band limits are shown graphically and are so depicted for convenience in estimating the hardness value obtainable at various locations on the end quench test bar and for quick comparisons of the various H grades.

> The values of Diameter of Rounds, with Same As-Quenched Hardness shown above each H-band, are approximate and were selected from the ranges appearing in Fig. 7 of SAE J406.

It should be noted that hardenability limits are presented graphically in both U.S. customary units and also in metric (SI) units. The metric hardenability bands were prepared by careful conversion from existing bands in U.S. customary units.

In either case, for specification purposes, the tabulated values of Rockwell hardness (HRC) are used. Values below 20 HRC are not specified because such values are not as accurate.

6. (Continued):

Two points from the tabulated values are commonly designated according to one of methods A, B, C, D, or E, which are defined in the following paragraphs. Those various methods are illustrated graphically in Figs. 1 and 2. Note that nearest whole integers of distance and hardness are to be used, not fractions.

6.1 The minimum and maximum hardness values at any desired distance. This method is illustrated in Figs. 1 and 2 as points A-A.

6.2 The minimum and maximum distance at which any desired hardness value occurs. This method is illustrated in Figs. 1 and 2 as points B-B. If the desired hardness does not fall on an exact sixteenth (or mm) position, the minimum distance selected should be the nearest sixteenth (or mm) position toward the quenched end and the maximum should be the nearest sixteenth (or mm) position away from the quenched end.

6.3 Two maximum hardness values at two desired distances, illustrated in Figs. 1 and 2 as points C-C.

6.4 Two minimum hardness values at two desired distances, illustrated in Figs. 1 and 2 as points D-D.

6.5 Any minimum hardness plus any maximum hardness, illustrated in Figs. 1 and 2 as points E-E.

When hardenability is specified according to one of the aforementioned methods A to E, the balance of the hardenability band is not applicable.

In cases when it is considered desirable, the maximum and minimum limits at a distance of 1/16 in (or 1.5 mm) from the quenched end can be specified in addition to the other two points as previously described in paragraphs A to E, inclusive.

When the full H-band is specified, the hardenability can be reported by listing hardness values from the quenched end to the test specimen for each 1/16-16/16 in and 1/4 in increments from there to 32/16 in. In the case of the metric end quench test, hardness values would be reported for 1.5, 3, 5, 7, 9, 11, 13, 15, 20, 25, 30, 35, 40, 45 and 50 mm from the quenched end. Except at the 1/16 in or 1.5 mm position, it is customary to accept a tolerance of two points HRC for a 3/16 in or 5 mm portion of the curve. This tolerance is necessary because curves of individual heats may vary somewhat in shape from the standard band limits and thus deviate slightly at one or more positions in the full length of the curves.

For shallow hardening carbon H steels, distances from the quenched end may be reported by listing hardness values for each 1/16 in or 1.5 mm or 1/32 in or 0.75 mm (rather than full sixteenths or 1.5 mm only as with alloy steels).

The technique of testing for acceptance should be in accordance with SAE J406.

7. GENERAL:

The hardenability limits in this standard are those for regular quality steels produced in accordance with the Steel Products Manuals published by AISI (American Iron and Steel Institute). Some of the steels in this standard can be specified to more restricted hardenability ranges; consult SAE J1868.

TABLE 1 - Carbon and Carbon Boron H Steels Composition

UNS No.	SAE or AISI Steel No.	Ladle Chemical Composition, Weight %				
		C	Mn	Si	P, max[b]	S, max[b]
H10380	1038H	0.34/0.43	0.50/1.00	0.15/0.35	0.040	0.050
H10450	1045H	0.42/0.51	0.50/1.00	0.15/0.35	0.040	0.050
H15220	1522H	0.17/0.25	1.00/1.50	0.15/0.35	0.040	0.050
H15240	1524H	0.18/0.26	1.25/1.75	0.15/0.35	0.040	0.050
H15260	1526H	0.21/0.30	1.00/1.50	0.15/0.35	0.040	0.050
H15410	1541H	0.35/0.45	1.25/1.75	0.15/0.35	0.040	0.050
H15211	15B21H[a]	0.17/0.24	0.70/1.20	0.15/0.35	0.040	0.050
H15281	15B28H[a]	0.25/0.34	1.00/1.50	0.15/0.35	0.040	0.050
H15301	15B30H[a]	0.27/0.35	0.70/1.20	0.15/0.35	0.040	0.050
H15351	15B35H[a]	0.31/0.39	0.70/1.20	0.15/0.35	0.040	0.050
H15371	15B37H[a]	0.30/0.39	1.00/1.50	0.15/0.35	0.040	0.050
H15411	15B41H[a]	0.35/0.45	1.25/1.75	0.15/0.35	0.040	0.050
H15481	15B48H[a]	0.43/0.53	1.00/1.50	0.15/0.35	0.040	0.050
H15621	16B62H[a]	0.54/0.67	1.00/1.50	0.40/0.60	0.040	0.050

[a]These steels contain 0.0005-0.003% boron.

[b]If electric furnace practice is specified or required, the limits for phosphorus and sulfur are 0.025%, respectively, and the prefix E is added to the SAE or AISI number.

The phi (Ø) symbol is for the convenience of the user in locating areas where technical revisions have been made to the previous issue of the report. If the symbol is next to the report title, it indicates a complete revision of the report.

TABLE 2[a] - Standard Alloy H Steel Compositions

UNS No.	SAE or AISI Steel No.	Ladle Chemical Composition, weight %[b,c]						
		C	Mn	Si	Ni	Cr	Mo	V
H13300	1330H	0.27/0.33	1.45/2.05	0.15/0.35	-	-	-	-
H13350	1335H	0.32/0.38	1.45/2.05	0.15/0.35	-	-	-	-
H13400	1340H	0.37/0.44	1.45/2.05	0.15/0.35	-	-	-	-
H13450	1345H	0.42/0.49	1.45/2.05	0.15/0.35	-	-	-	-
H40270	4027H	0.24/0.30	0.60/1.00	0.15/0.35	-	-	0.20/0.30	-
H40280[d]	4028H[d]	0.24/0.30	0.60/1.00	0.15/0.35	-	-	0.20/0.30	-
H40320	4032H	0.29/0.35	0.60/1.00	0.15/0.35	-	-	0.20/0.30	-
H40370	4037H	0.34/0.41	0.60/1.00	0.15/0.35	-	-	0.20/0.30	-
H40420	4042H	0.39/0.46	0.60/1.00	0.15/0.35	-	-	0.20/0.30	-
H40470	4047H	0.44/0.51	0.60/1.00	0.15/0.35	-	-	0.20/0.30	-
H41180	4118H	0.17/0.23	0.60/1.00	0.15/0.35	-	0.30/0.70	0.08/0.15	-
H41300	4130H	0.27/0.33	0.30/0.70	0.15/0.35	-	0.75/1.20	0.15/0.25	-
H41350	4135H	0.32/0.38	0.60/1.00	0.15/0.35	-	0.75/1.20	0.15/0.25	-
H41370	4137H	0.34/0.41	0.60/1.00	0.15/0.35	-	0.75/1.20	0.15/0.25	-
H41400	4140H	0.37/0.44	0.65/1.10	0.15/0.35	-	0.75/1.20	0.15/0.25	-
H41420	4142H	0.39/0.46	0.65/1.10	0.15/0.35	-	0.75/1.20	0.15/0.25	-
H41450	4145H	0.42/0.49	0.65/1.10	0.15/0.35	-	0.75/1.20	0.15/0.25	-
H41470	4147H	0.44/0.51	0.65/1.10	0.15/0.35	-	0.75/1.20	0.15/0.25	-
H41500	4150H	0.47/0.54	0.65/1.10	0.15/0.35	-	0.75/1.20	0.15/0.25	-
H41610	4161H	0.55/0.65	0.65/1.10	0.15/0.35	-	0.65/0.95	0.25/0.35	-
H43200	4320H	0.17/0.23	0.40/0.70	0.15/0.35	1.55/2.00	0.35/0.65	0.20/0.30	-
H43400	4340H	0.37/0.44	0.55/0.90	0.15/0.35	1.55/2.00	0.65/0.95	0.20/0.30	-
H43406[f]	E4340H[f]	0.37/0.44	0.60/0.95	0.15/0.35	1.55/2.00	0.65/0.95	0.20/0.30	-
H46200	4620H	0.17/0.23	0.35/0.75	0.15/0.35	1.55/2.00	-	0.20/0.30	-

[a]The ranges and limits on this table apply only to material not exceeding 200 in^2 (0.13 m^2) in cross sectional area, 18 in (460 mm) in width, or 10 000 lb (4.5 tonne) per piece in weight. Ranges and limits are subject to the permissible variations for product analysis shown in Table 4 of SAE J409.

[b]Small quantities of certain elements may be found in alloy steel which are not specified or required. These elements are to be considered as incidental and acceptable to the following maximum amounts: copper to 0.35%, nickel to 0.25%, chromium to 0.20%, and molybdenum to 0.06%.

[c]For open hearth and basic oxygen steels maximum sulfur content is to be 0.040% and maximum phosphorus content is to be 0.035%. Maximum phosphorus and sulfur in basic electric furnace steels are to be 0.025% each.

[d]Sulfur content range is 0.035/0.050%.

[f]Electric furnace steel.

TABLE 2[a] - Standard Alloy H Steel Compositions (Continued)

UNS No.	SAE or AISI Steel No.	Ladle Chemical Composition, weight %[b,c]						
		C	Mn	Si	Ni	Cr	Mo	V
H47180	4718H	0.15/0.21	0.60/0.95	0.15/0.35	0.85/1.25	0.30/0.60	0.30/0.40	-
H47200	4720H	0.17/0.23	0.45/0.75	0.15/0.35	0.85/1.25	0.30/0.60	0.15/0.25	-
H48150	4815H	0.12/0.18	0.30/0.70	0.15/0.35	3.20/3.80	-	0.20/0.30	-
H48170	4817H	0.14/0.20	0.30/0.70	0.15/0.35	3.20/3.80	-	0.20/0.30	-
H48200	4820H	0.17/0.23	0.40/0.80	0.15/0.35	3.20/3.80	-	0.20/0.30	-
H50401[e]	50B40H[e]	0.37/0.44	0.65/1.10	0.15/0.35	-	0.30/0.70	-	-
H50441[e]	50B44H[e]	0.42/0.49	0.65/1.10	0.15/0.35	-	0.30/0.70	-	-
H50460	5046H	0.43/0.50	0.65/1.10	0.15/0.35	-	0.13/0.43	-	-
H50461[e]	50B46H[e]	0.43/0.50	0.65/1.10	0.15/0.35	-	0.13/0.43	-	-
H50501[e]	50B50H[e]	0.47/0.54	0.65/1.10	0.15/0.35	-	0.30/0.70	-	-
H50601[e]	50B60H[e]	0.55/0.65	0.65/1.10	0.15/0.35	-	0.30/0.70	-	-
H51200	5120H	0.17/0.23	0.60/1.00	0.15/0.35	-	0.60/1.00	-	-
H51300	5130H	0.27/0.33	0.60/1.10	0.15/0.35	-	0.75/1.20	-	-
H51320	5132H	0.29/0.35	0.50/0.90	0.15/0.35	-	0.65/1.10	-	-
H51350	5135H	0.32/0.38	0.50/0.90	0.15/0.35	-	0.70/1.15	-	-
H51400	5140H	0.37/0.44	0.60/1.00	0.15/0.35	-	0.60/1.00	-	-
H51470	5147H	0.45/0.52	0.60/1.05	0.15/0.35	-	0.80/1.25	-	-
H51500	5150H	0.47/0.54	0.60/1.00	0.15/0.35	-	0.60/1.00	-	-
H51550	5155H	0.50/0.60	0.60/1.00	0.15/0.35	-	0.60/1.00	-	-
H51600	5160H	0.55/0.65	0.65/1.10	0.15/0.35	-	0.60/1.00	-	-
H51601[e]	51B60H[e]	0.55/0.65	0.65/1.10	0.15/0.35	-	0.60/1.00	-	-
H61180	6118H	0.15/0.21	0.40/0.80	0.15/0.35	-	0.40/0.80	-	0.10/0.15
H61500	6150H	0.47/0.54	0.60/1.00	0.15/0.35	-	0.75/1.20	-	0.15 min

[a]The ranges and limits on this table apply only to material not exceeding 200 in^2 (0.13 m^2) in cross sectional area, 18 in (460 mm) in width, or 10 000 lb (4.5 tonne) per piece in weight. Ranges and limits are subject to the permissible variations for product analysis shown in Table 4 of SAE J409.

[b]Small quantities of certain elements may be found in alloy steel which are not specified or required. These elements are to be considered as incidental and acceptable to the following maximum amounts: copper to 0.35%, nickel to 0.25%, chromium to 0.20%, and molybdenum to 0.06%.

[c]For open hearth and basic oxygen steels maximum sulfur content is to be 0.040% and maximum phosphorus content is to be 0.035%. Maximum phosphorus and sulfur in basic electric furnace steels are to be 0.025% each.

[e]These steels contain 0.0005-0.003% boron.

TABLE 2[a] - Standard Alloy H Steel Compositions (Continued)

UNS No.	SAE or AISI Steel No.	Ladle Chemical Composition, weight %[b,c]						
		C	Mn	Si	Ni	Cr	Mo	V
H81451[e]	81B45H[e]	0.42/0.49	0.70/1.05	0.15/0.35	0.15/0.45	0.30/0.60	0.08/0.15	-
H86170	8617H	0.14/0.20	0.60/0.95	0.15/0.35	0.35/0.75	0.35/0.65	0.15/0.25	-
H86200	8620H	0.17/0.23	0.60/0.95	0.15/0.35	0.35/0.75	0.35/0.65	0.15/0.25	-
H86220	8622H	0.19/0.25	0.60/0.95	0.15/0.35	0.35/0.75	0.35/0.65	0.15/0.25	-
H86250	8625H	0.22/0.28	0.60/0.95	0.15/0.35	0.35/0.75	0.35/0.65	0.15/0.25	-
H86270	8627H	0.24/0.30	0.60/0.95	0.15/0.35	0.35/0.75	0.35/0.65	0.15/0.25	-
H86300	8630H	0.27/0.33	0.60/0.95	0.15/0.35	0.35/0.75	0.35/0.65	0.15/0.25	-
H86301[e]	86B30H[e]	0.27/0.33	0.60/0.95	0.15/0.35	0.35/0.75	0.35/0.65	0.15/0.25	-
H86370	8637H	0.34/0.41	0.70/1.05	0.15/0.35	0.35/0.75	0.35/0.65	0.15/0.25	-
H86400	8640H	0.37/0.44	0.70/1.05	0.15/0.35	0.35/0.75	0.35/0.65	0.15/0.25	-
H86420	8642H	0.39/0.46	0.70/1.05	0.15/0.35	0.35/0.75	0.35/0.65	0.15/0.25	-
H86450	8645H	0.42/0.49	0.70/1.05	0.15/0.35	0.35/0.75	0.35/0.65	0.15/0.25	-
H86451[e]	86B45H[e]	0.42/0.49	0.70/1.05	0.15/0.35	0.35/0.75	0.35/0.65	0.15/0.25	-
H86500	8650H	0.47/0.54	0.70/1.05	0.15/0.35	0.35/0.70	0.35/0.65	0.15/0.25	-
H86550	8655H	0.50/0.60	0.70/1.05	0.15/0.35	0.35/0.75	0.35/0.65	0.15/0.25	-
H86600	8660H	0.55/0.65	0.70/1.05	0.15/0.35	0.35/0.75	0.35/0.65	0.15/0.25	-
H87200	8720H	0.17/0.23	0.60/0.95	0.15/0.35	0.35/0.75	0.35/0.65	0.20/0.30	-
H87400	8740H	0.37/0.44	0.70/1.05	0.15/0.35	0.35/0.75	0.35/0.65	0.20/0.30	-
H88220	8822H	0.19/0.25	0.70/1.05	0.15/0.35	0.35/0.75	0.35/0.65	0.30/0.40	-
H92600	9260H	0.55/0.65	0.65/1.10	1.70/2.20	-	-	-	-
H93100[f]	9310H[f]	0.07/0.13	0.40/0.70	0.15/0.35	2.95/3.55	1.00/1.45	0.08/0.15	-
H94151[e]	94B15H[e]	0.12/0.18	0.70/1.05	0.15/0.35	0.25/0.65	0.25/0.55	0.08/0.15	-
H94171[e]	94B17H[e]	0.14/0.20	0.70/1.05	0.15/0.35	0.25/0.65	0.25/0.55	0.08/0.15	-
H94301[e]	94B30H[e]	0.27/0.33	0.70/1.05	0.15/0.35	0.25/0.65	0.25/0.55	0.08/0.15	-

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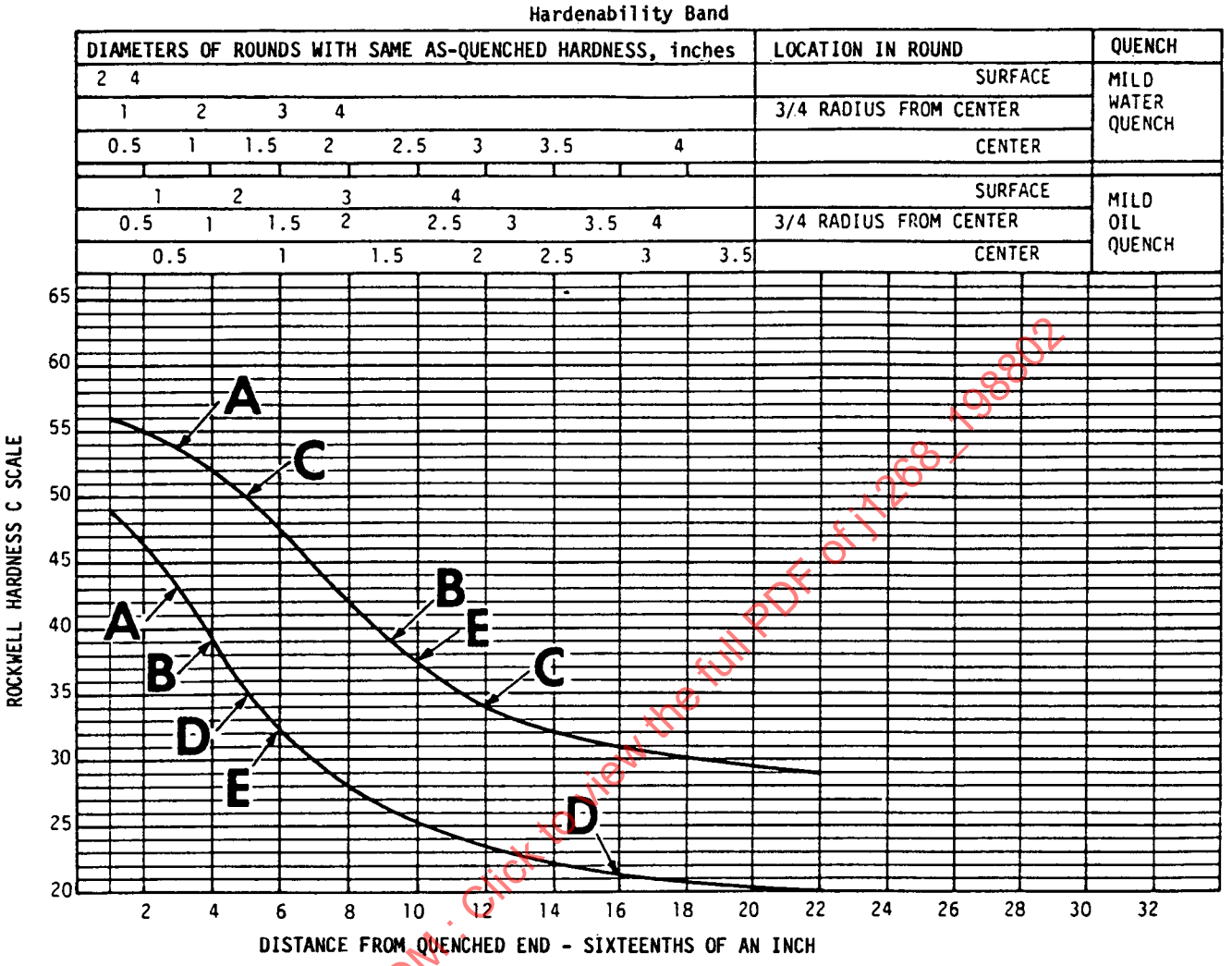
[c]For open hearth and basic oxygen steels maximum sulfur content is to be 0.040% and maximum phosphorus content is to be 0.035%. Maximum phosphorus and sulfur in basic electric furnace steels are to be 0.025% each.

[e]These steels contain 0.0005-0.003% boron.

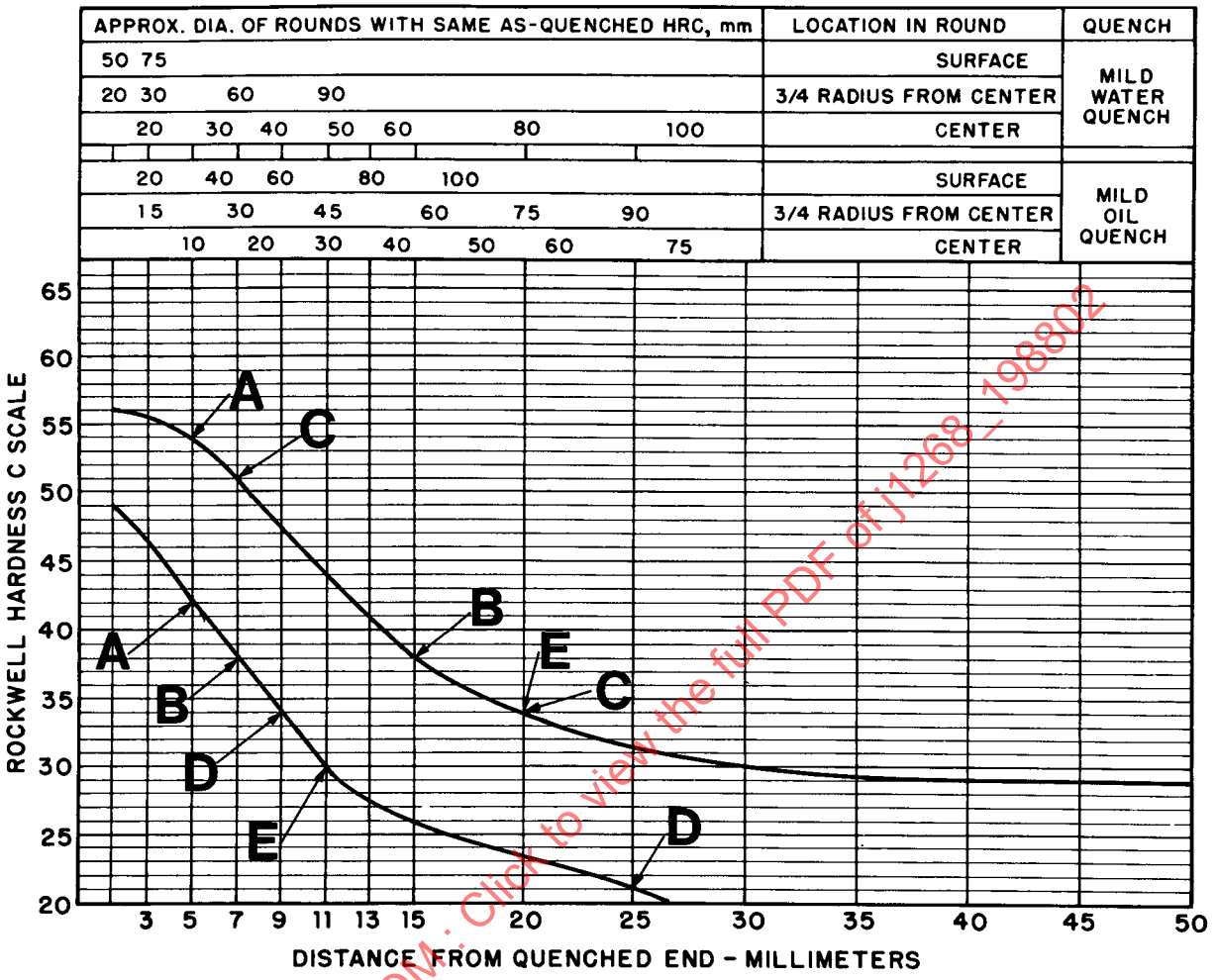
[f]Electric furnace steel.



Method		Example	
A	Minimum and maximum hardness values at a designated distance	A-A	43 to 54 HRC at J 3/16
B	A hardness value at minimum and maximum distances	B-B	39 HRC at J 4/16 min 39 HRC at J 9/16 max
C	Two maximum hardness values at two designated distances	C-C	50 HRC at J 5/16 max 34 HRC at J 12/16 max
D	Two minimum hardness values at two distances	D-D	35 HRC at J 5/16 min 21 HRC at J 16/16 min
E	Any minimum hardness plus any maximum hardness	E-E	32 HRC at J 6/16 min 37 HRC at J 10/16 max

FIGURE 1 - Examples Illustrating Alternate Methods of Specifying Hardenability Requirements in U.S. Customary Units

Hardenability Band



	Method	Example
A	Minimum and maximum hardness values at a designated distance	A-A 42 to 54 HRC at J 5 mm
B	A hardness value at minimum and maximum distance	B-B 38 HRC at J 7 mm min 38 HRC at J 15 mm max
C	Two maximum hardness values at two designated distances	C-C 51 HRC at J 7 mm max 34 HRC at J 20 mm max
D	Two minimum hardness values at two distances	D-D 34 HRC at J 9 mm min 21 HRC at J 25 mm min
E	Any minimum hardness plus any maximum hardness	E-E 30 HRC at J 11 mm min 34 HRC at J 20 mm max

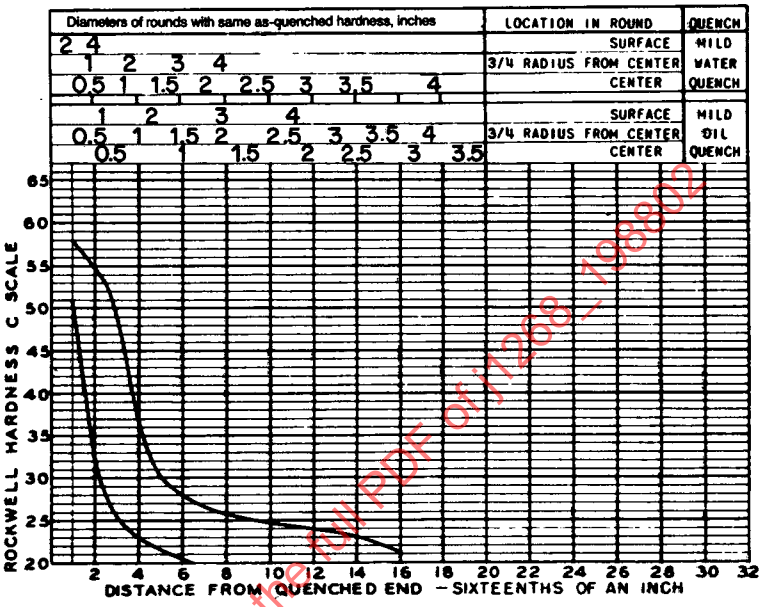
FIGURE 2 - Examples Illustrating Alternate Methods of Specifying Hardenability Requirements in Metric (SI) Units

UNS H10380 Hardenability Band SAE/AISI 1038H

C	Mn	Si	Ni	Cr	Mo	
0.36/0.43	0.50/1.00	0.15/0.35				

"J" DISTANCE SIXTEENTHS OF AN INCH	H	
	MAX.	MIN.
1	58	51
1.5	56	42
2	55	36
2.5	53	29
3	49	26
3.5	43	24
4	37	23
4.5	33	22
5	30	22
5.5	29	21
6	28	21
6.5	27	20
7	27	-
7.5	26	-
8	26	-
9	25	-
10	25	-
12	24	-
14	23	-
16	21	-

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1600 °F
AUSTENITIZE 1550 °F
*For forged or rolled specimens only.

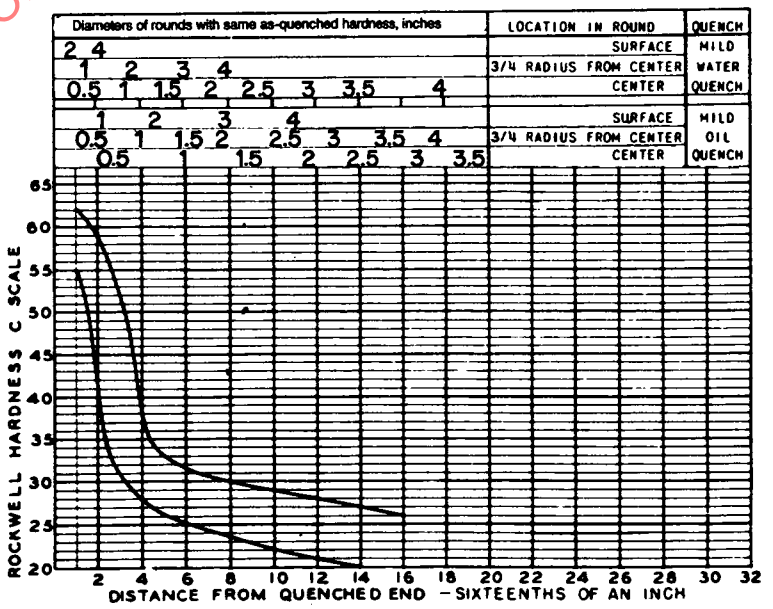


UNS H10450 Hardenability Band SAE/AISI 1045H

C	Mn	Si	Ni	Cr	Mo	
0.42/0.51	0.50/1.00	0.15/0.35				

"J" DISTANCE SIXTEENTHS OF AN INCH	H	
	MAX.	MIN.
1	62	55
1.5	61	52
2	59	42
2.5	56	34
3	52	31
3.5	46	29
4	38	28
4.5	34	27
5	33	26
5.5	32	26
6	32	25
6.5	31	25
7	31	25
7.5	30	24
8	30	24
9	29	23
10	29	22
12	28	21
14	27	20
16	26	-

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1600 °F
AUSTENITIZE 1550 °F
*For forged or rolled specimens only.



UNS H15220 Hardenability Band SAE/AISI 1522H

C	Mn	Si	Ni	Cr	Mo	
0.17/0.25	1.00/1.50	0.15/0.35				

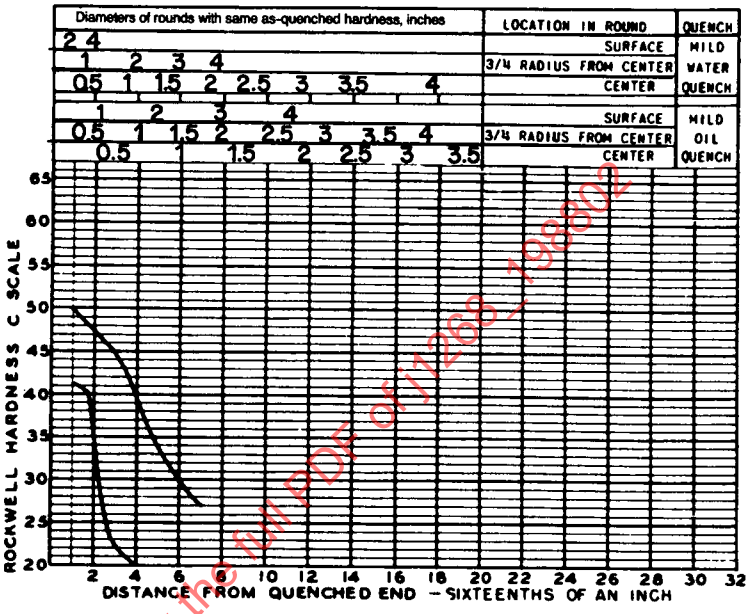
"J" DISTANCE SIXTEENTHS OF AN INCH	H	
	MAX.	MIN.
1	50	41
1.5	48	41
2	47	32
2.5	46	27
3	45	22
3.5	42	21
4	39	20
4.5	37	-
5	34	-
5.5	32	-
6	30	-
6.5	28	-
7	27	-
7.5	-	-
8	-	-
9	-	-
10	-	-
12	-	-
14	-	-
16	-	-

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE 1700 °F

AUSTENITIZE 1700 °F

*For forged or rolled specimens only.



UNS H15240 Hardenability Band SAE/AISI 1524H

C	Mn	Si	Ni	Cr	Mo	
0.18/0.26	1.25/1.75	0.15/0.35				

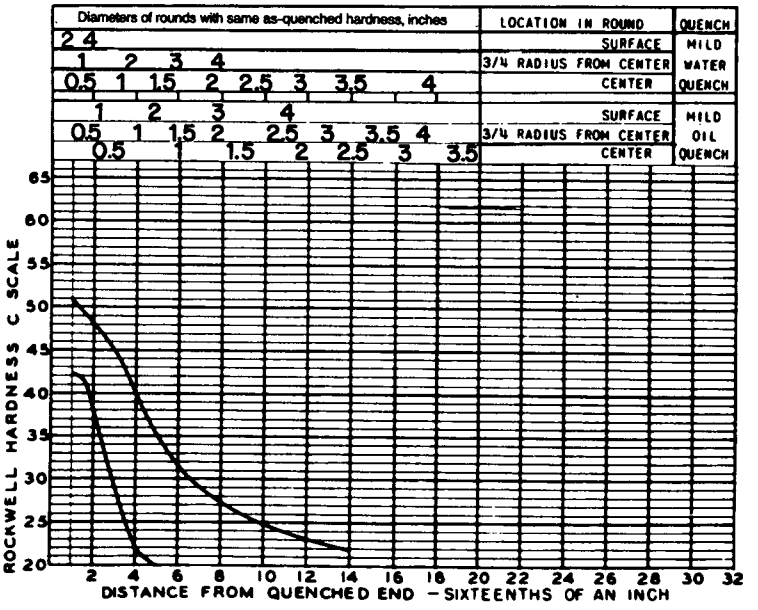
"J" DISTANCE SIXTEENTHS OF AN INCH	H	
	MAX.	MIN.
1	51	42
1.5	49	42
2	48	38
2.5	47	34
3	45	29
3.5	43	25
4	39	22
4.5	38	20
5	35	-
5.5	34	-
6	32	-
6.5	30	-
7	29	-
7.5	28	-
8	27	-
9	26	-
10	25	-
12	23	-
14	22	-
16	-	-

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE 1650 °F

AUSTENITIZE 1600 °F

*For forged or rolled specimens only.

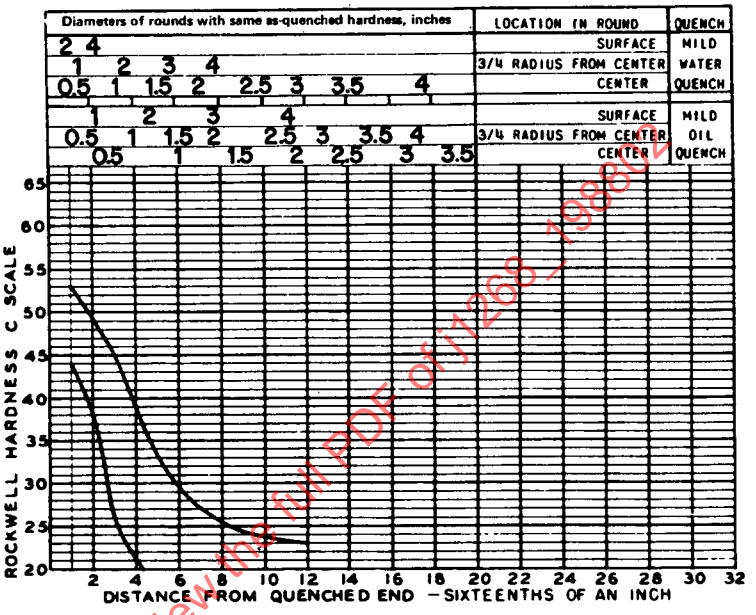


HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	H	
	MAX.	MIN.
1	53	44
1.5	50	42
2	49	38
2.5	47	33
3	46	26
3.5	42	25
4	39	21
4.5	37	20
5	33	-
5.5	31	-
6	30	-
6.5	28	-
7	27	-
7.5	26	-
8	26	-
9	24	-
10	24	-
12	23	-
14	-	-
16	-	-

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1650 °F
AUSTENITIZE 1600 °F
*For forged or rolled specimens only.

UNS H15260 Hardenability Band SAE/AISI 1526H

C	Mn	Si	Ni	Cr	Mo	
0.21/0.30	1.00/1.50	0.15/0.35				

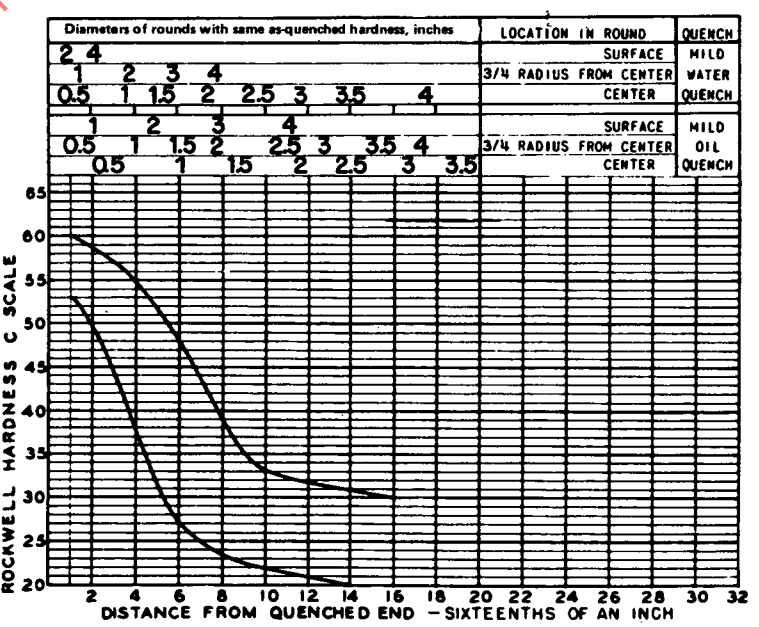


HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	H	
	MAX.	MIN.
1	60	53
1.5	59	52
2	59	50
2.5	58	47
3	57	44
3.5	56	41
4	55	38
4.5	53	35
5	52	32
5.5	50	29
6	48	27
6.5	46	26
7	44	25
7.5	41	24
8	39	23
9	35	23
10	33	22
12	32	21
14	31	20
16	30	-

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1600 °F
AUSTENITIZE 1550 °F
*For forged or rolled specimens only.

UNS H15410 Hardenability Band SAE/AISI 1541H

C	Mn	Si	Ni	Cr	Mo	
0.35/0.45	1.25/1.75	0.15/0.35				



HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	H	
	MAX.	MIN.
1	48	41
1.5	48	41
2	47	40
2.5	47	39
3	46	38
3.5	45	36
4	44	30
4.5	42	23
5	40	20
5.5	38	-
6	35	-
6.5	32	-
7	27	-
7.5	22	-
8	20	-
9	-	-
10	-	-
12	-	-
14	-	-
16	-	-

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

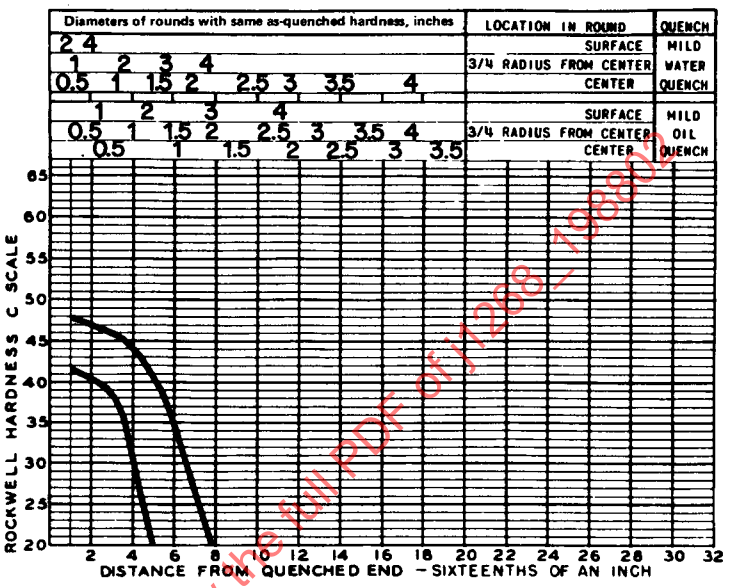
*NORMALIZE 1700 °F

AUSTENITIZE 1700 °F

*For forged or rolled specimens only.

UNS H15211 Hardenability Band SAE/AISI 15B21H

C	Mn	Si	Ni	Cr	B	
0.17/0.24	0.70/1.20	0.15/0.35			0.0005/ 0.003	



HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	HRC	
	MAX.	MIN.
1	53	47
2	53	47
3	52	46
4	51	45
5	51	42
6	50	32
7	49	25
8	48	21
9	46	20
10	43	--
11	40	--
12	37	--
13	34	--
14	31	--
15	30	--
16	29	--
18	27	--
20	25	--
22	25	--
24	24	--
26	23	--
28	22	--
30	21	--
32	20	--

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

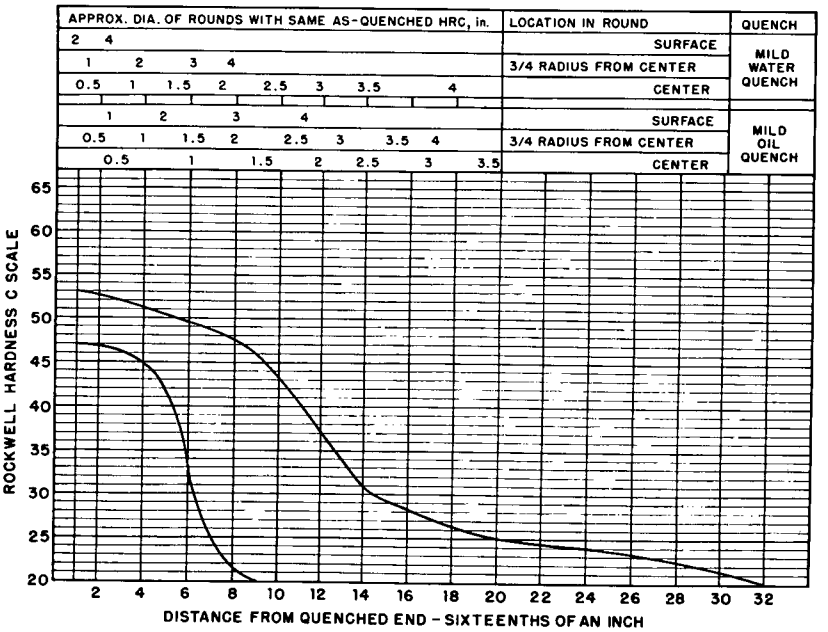
*NORMALIZE 1650 °F

AUSTENITIZE 1600 °F

*For forged or rolled specimens only

UNS H15281 HARDENABILITY BAND SAE/AISI 15B28H

%C	%Mn	%Si	%Ni	%Cr	%Mo	% B
0.25/0.34	1.00/1.50	0.15/0.35	--	--	--	0.0005/ 0.003



HARDNESS LIMITS FOR SPECIFICATION PURPOSES

"J" DISTANCE SIXTEENTHS OF AN INCH	HRC MAX.	HRC MIN.
1	55	48
2	53	47
3	52	46
4	51	44
5	50	32
6	48	22
7	43	20
8	38	--
9	33	--
10	29	--
11	27	--
12	26	--
13	25	--
14	24	--
15	23	--
16	22	--
18	20	--
20	--	--
22		
24		
26		
28		
30		
32		

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

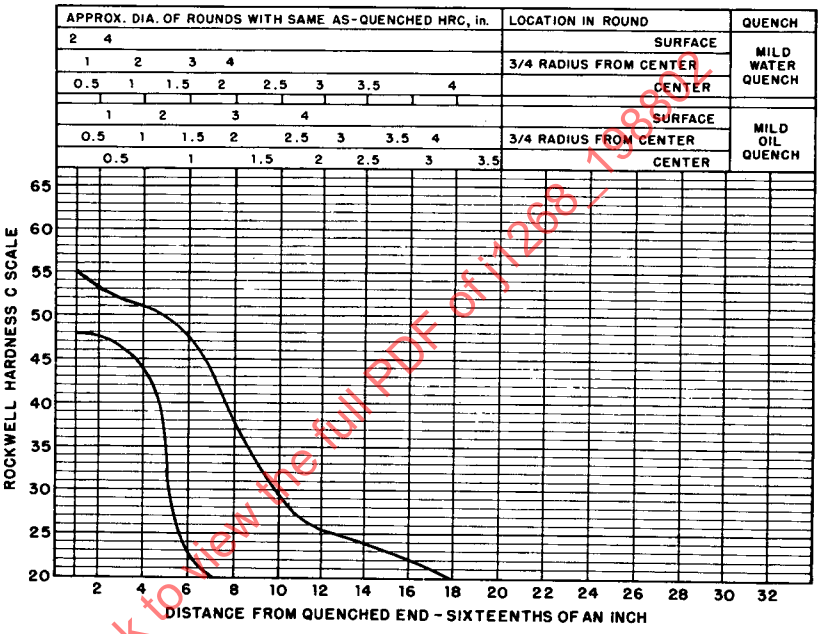
*NORMALIZE	1650	°F
AUSTENITIZE	1600	°F

*For forged or rolled specimens only

UNS H15301

HARDENABILITY BAND SAE/AISI 15B30H

%C	%Mn	%Si	%Ni	%Cr	%Mo	% B
0.27/0.35	0.70/1.20	0.15/0.35	--	--	--	0.0005/ 0.003



HARDNESS LIMITS FOR SPECIFICATION PURPOSES

"J" DISTANCE SIXTEENTHS OF AN INCH	HRC MAX.	HRC MIN.
1	58	51
2	56	50
3	55	48
4	54	46
5	53	39
6	51	28
7	47	24
8	41	22
9	-	-
10	30	20
11	-	-
12	27	-
13	-	-
14	26	-
15	-	-
16	25	-
18	-	-
20	24	-
22	-	-
24	22	-
26	-	-
28	20	-
30	-	-
32	-	-

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

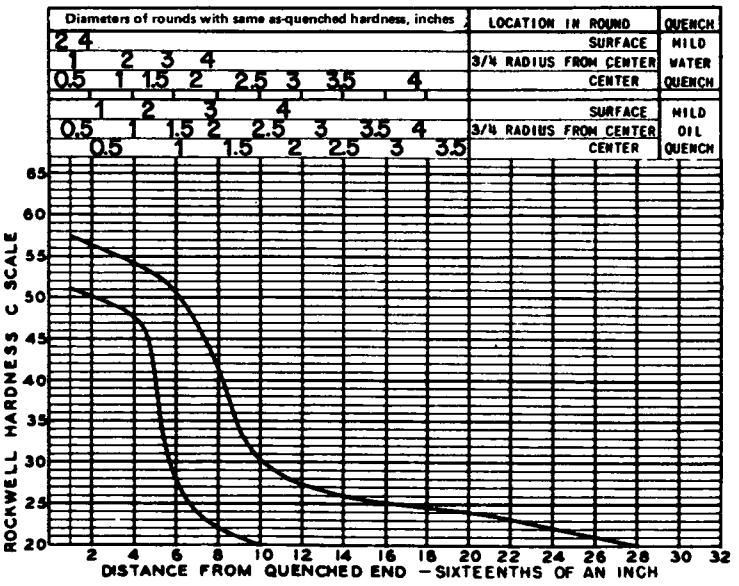
*NORMALIZE	1600	°F
AUSTENITIZE	1550	°F

*For forged or rolled specimens only.

UNS H15351 Hardenability Band SAE/AISI 15B35H

C	Mn	Si	Ni	Cr	Mo	B
0.31/0.39	0.70/1.20	0.15/0.35				*

*Contains 0.0005–0.003% boron.



HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	H	
	MAX.	MIN.
1	58	50
2	56	50
3	55	49
4	54	48
5	53	43
6	52	37
7	51	33
8	50	26
9	-	-
10	45	22
11	-	-
12	40	21
13	-	-
14	33	20
15	-	-
16	29	-
18	-	-
20	27	-
22	-	-
24	25	-
26	-	-
28	23	-
30	-	-
32	-	-

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE 1600 °F

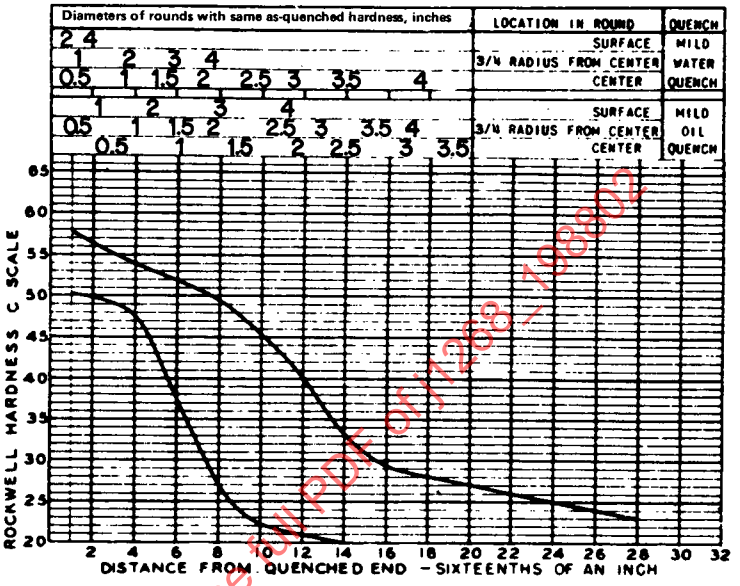
AUSTENITIZE 1550 °F

*For forged or rolled specimens only.

UNS H15371 Hardenability Band SAE/AISI 15B37H

C	Mn	Si	Ni	Cr	Mo	B
0.30/0.39	1.00/1.50	0.15/0.35				*

*Contains 0.0005–0.003% boron.



HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	H	
	MAX.	MIN.
1	60	53
2	59	52
3	59	52
4	58	51
5	58	51
6	57	50
7	57	49
8	56	48
9	55	46
10	55	37
11	54	32
12	53	28
13	52	26
14	51	25
15	50	25
16	49	24
18	46	23
20	42	22
22	39	21
24	36	21
26	34	20
28	33	
30	31	
32	31	

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE 1600 °F

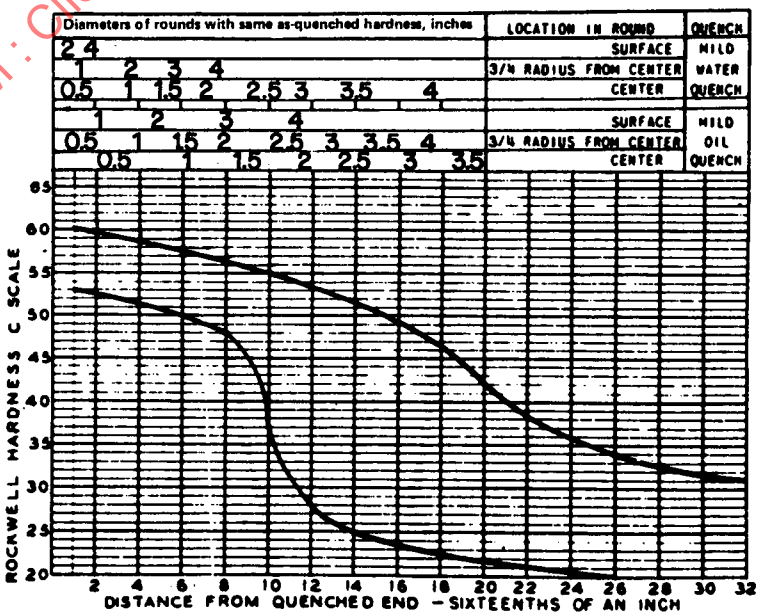
AUSTENITIZE 1550 °F

*For forged or rolled specimens only

UNS H15411 Hardenability Band SAE/AISI 15B41H

C	Mn	Si	Ni	Cr	Mo	B
0.35/0.45	1.25/1.75	0.15/0.35				*

*Contains 0.0005–0.003% boron.



HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	H	
	MAX.	MIN.
1	63	56
2	62	56
3	62	55
4	61	54
5	60	53
6	59	52
7	58	42
8	57	34
9	56	31
10	55	30
11	53	29
12	51	28
13	48	27
14	45	27
15	41	26
16	38	26
18	34	25
20	32	24
22	31	23
24	30	22
26	29	21
28	29	20
30	28	
32	28	

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

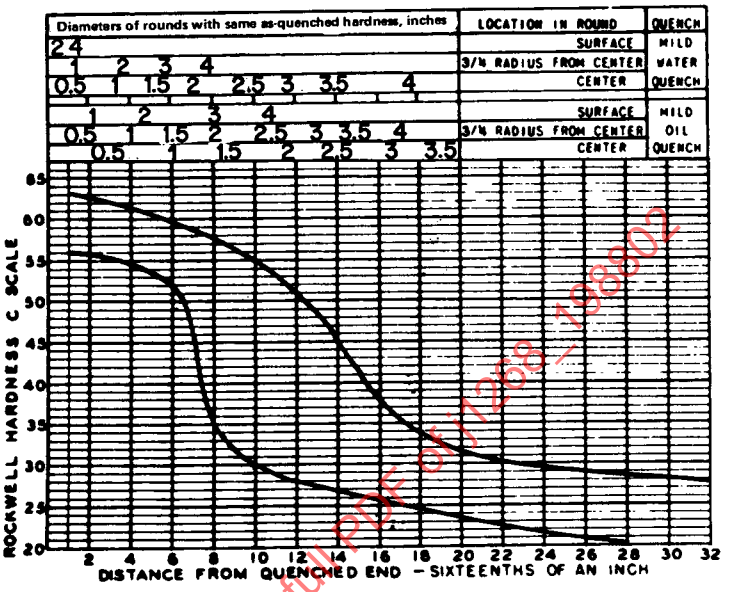
*NORMALIZE	1600 °F
AUSTENITIZE	1550 °F

*For forged or rolled specimens only

UNS H15481 Hardenability Band SAE/AISI 15B48H

C	Mn	Si	Ni	Cr	Mo	B
0.43/0.53	1.00/1.50	0.15/0.35				*

*Contains 0.0005—0.003% boron.



HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	H	
	MAX.	MIN.
1	-	60
2	-	60
3	-	60
4	-	60
5	65	59
6	65	58
7	64	57
8	64	52
9	64	43
10	63	39
11	63	37
12	63	35
13	62	35
14	62	34
15	61	33
16	60	33
18	58	32
20	54	31
22	48	30
24	43	30
26	40	29
28	37	28
30	35	27
32	34	26

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

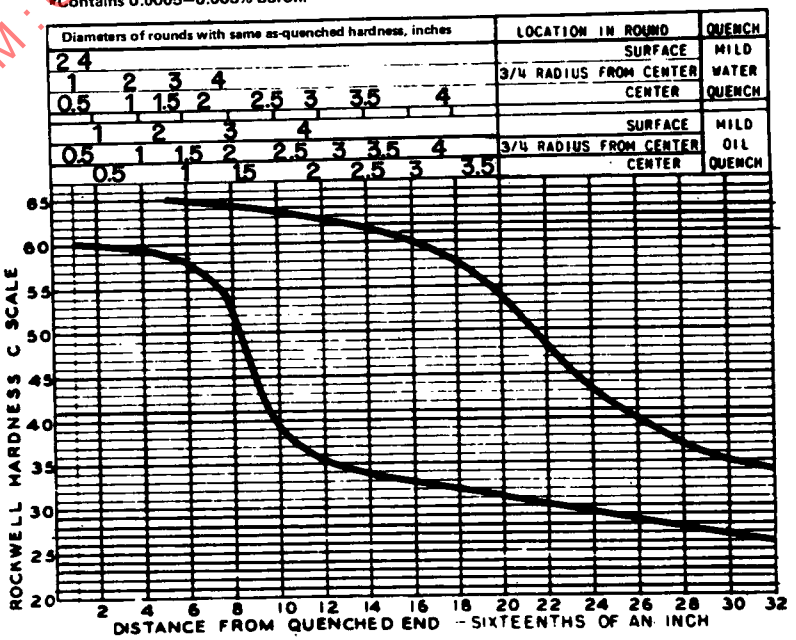
*NORMALIZE	1600 °F
AUSTENITIZE	1550 °F

*For forged or rolled specimens or y.

UNS H15621 Hardenability Band SAE/AISI 15B62H

C	Mn	Si	Ni	Cr	Mo	B
0.54/0.67	1.00/1.50	0.40/0.60				

*Contains 0.0005—0.003% boron.

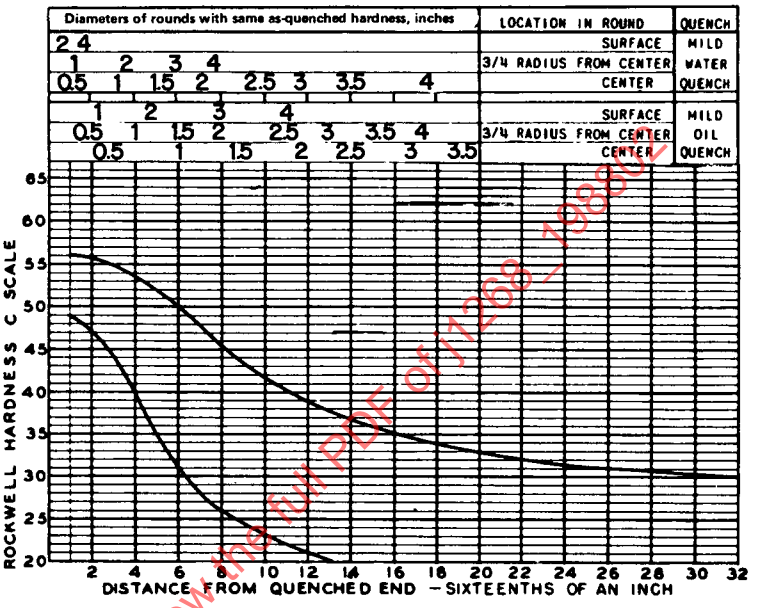


HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	1330 H	
	MAX	MIN
1	56	49
2	56	47
3	55	44
4	53	40
5	52	35
6	50	31
7	48	28
8	45	26
9	43	25
10	42	23
11	40	22
12	39	21
13	38	20
14	37	-
15	36	-
16	35	-
18	34	-
20	33	-
22	32	-
24	31	-
26	31	-
28	31	-
30	30	-
32	30	

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1650 °F
AUSTENITIZE 1600 °F
*For forged or rolled specimens only.

UNS H13300 Hardenability Band SAE/AISI 1330H

C	Mn	Si
.27 / .33	1.45 / 2.05	0.15/0.35

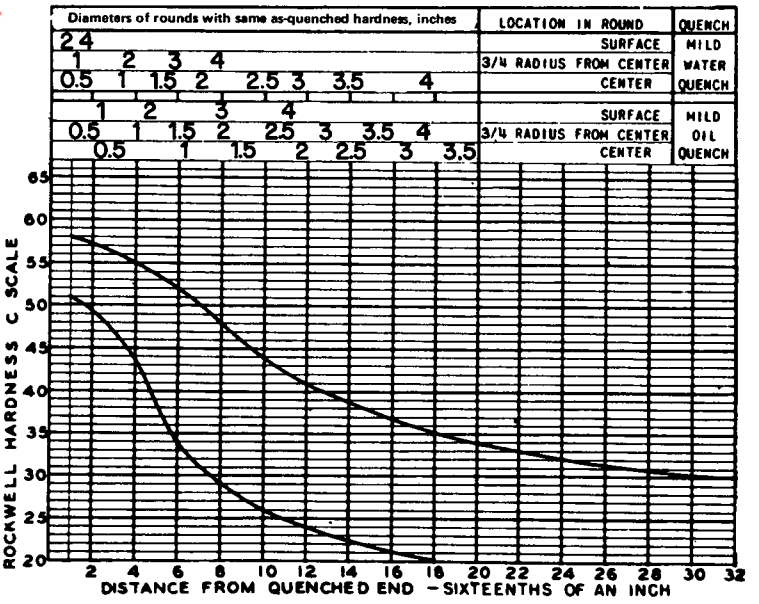


HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	1335 H	
	MAX	MIN
1	58	51
2	57	49
3	56	47
4	55	44
5	54	38
6	52	34
7	50	31
8	48	29
9	46	27
10	44	26
11	42	25
12	41	24
13	40	23
14	39	22
15	38	22
16	37	21
18	35	20
20	34	-
22	33	-
24	32	-
26	31	-
28	31	-
30	30	-
32	30	-

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1600 °F
AUSTENITIZE 1550 °F
*For forged or rolled specimens only.

UNS H13350 Hardenability Band SAE/AISI 1335H

C	Mn	Si
.32 / .38	1.45 / 2.05	0.15/0.35



HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	1340 H	
	MAX	MIN
1	60	53
2	60	52
3	59	51
4	58	49
5	57	46
6	56	40
7	55	35
8	54	33
9	52	31
10	51	29
11	50	28
12	48	27
13	46	26
14	44	25
15	42	25
16	41	24
18	39	23
20	38	23
22	37	22
24	36	22
26	35	21
28	35	21
30	34	20
32	34	20

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

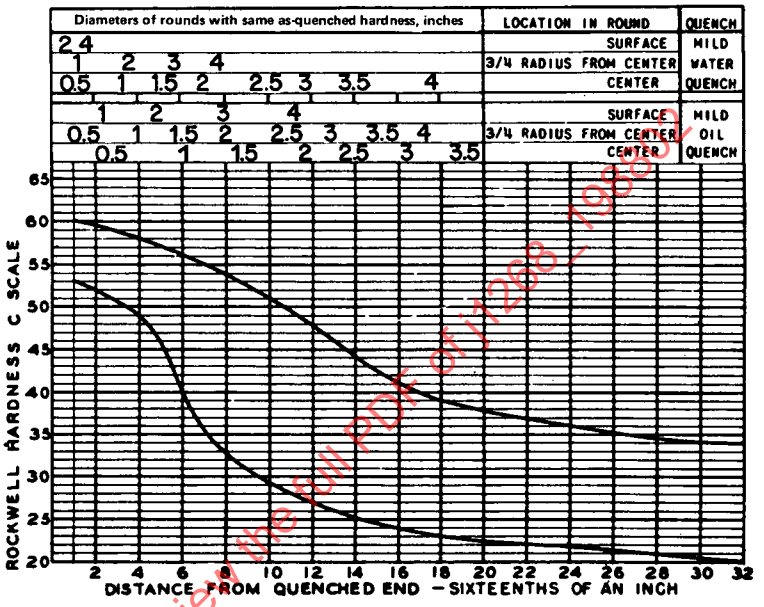
*NORMALIZE 1600 °F

AUSTENITIZE 1550 °F

*For forged or rolled specimens only.

UNS H13400 Hardenability Band SAE/AISI 1340H

C	Mn	Si				
.37 / .44	1.45 / 2.05	0.15/0.35				



HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	1345 H	
	MAX.	MIN.
1	63	56
2	63	56
3	62	55
4	61	54
5	61	51
6	60	44
7	60	38
8	59	35
9	58	33
10	57	32
11	56	31
12	55	30
13	54	29
14	53	29
15	52	28
16	51	28
18	49	27
20	48	27
22	47	26
24	46	26
26	45	25
28	45	25
30	45	24
32	45	24

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

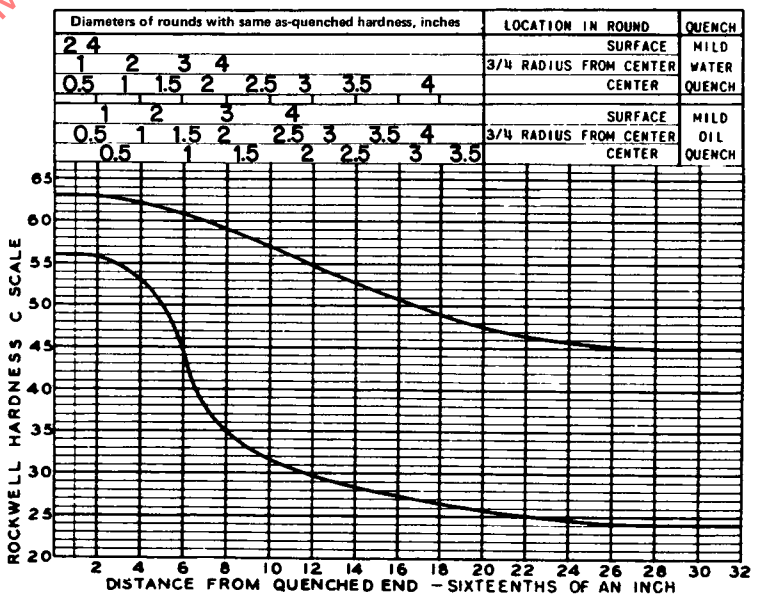
*NORMALIZE °F

AUSTENITIZE °F

*For forged or rolled specimens only.

UNS H13450 Hardenability Band SAE/AISI 1345H

C	Mn	Si	Ni	Cr	Mo	
42 / 49	1.45 / 2.05	0.15/0.35				



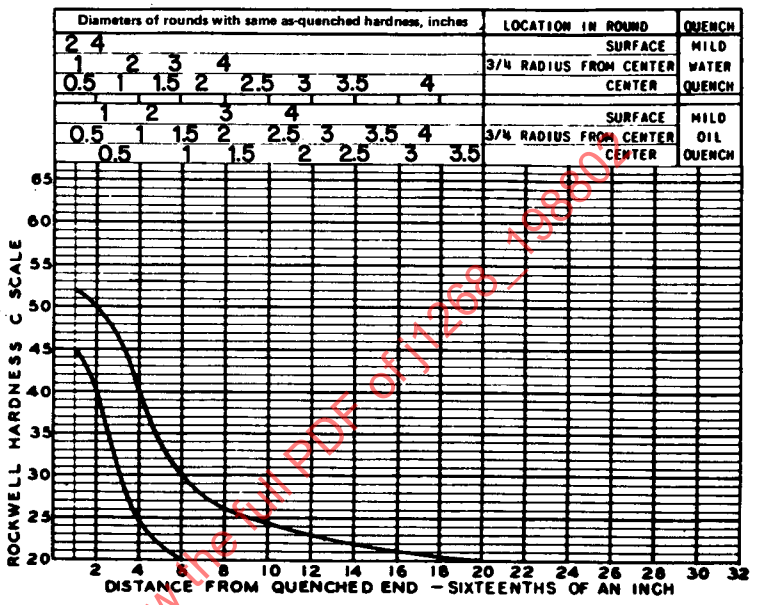
UNS H40270 Hardenability Band SAE/AISI 4027H
UNS H40280* Hardenability Band SAE/AISI 4028H*

C	Mn	Si			Mo	
.24 / .30	.60 / 1.00	0.15/0.35			.20 / .30	

*SULPHUR CONTENT 0.035 0.050

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	4027H & 4028H	
	MAX	MIN
1	52	45
2	50	40
3	46	31
4	40	25
5	34	22
6	30	20
7	28	-
8	26	-
9	25	-
10	25	-
11	24	-
12	23	-
13	23	-
14	22	-
15	22	-
16	21	-
18	21	-
20	20	-
22	-	-
24	-	-
26	-	-
28	-	-
30	-	-
32	-	-

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1650 °F
AUSTENITIZE 1600 °F
*For forged or rolled specimens only.

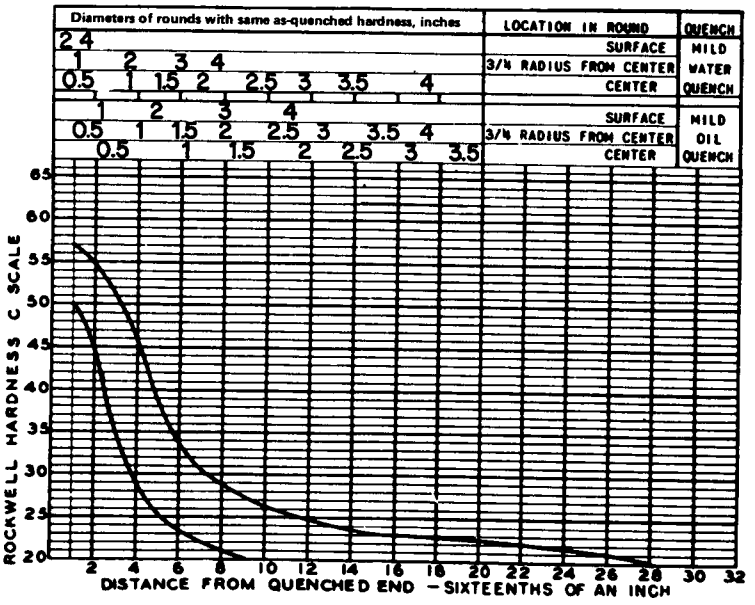


UNS H40320 Hardenability Band SAE/AISI 4032H

C	Mn	Si			Mo	
.29 / .35	.60 / 1.00	0.15/0.35			.20 / .30	

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	4032 H	
	MAX	MIN
1	57	50
2	54	45
3	51	36
4	46	29
5	39	25
6	34	23
7	31	22
8	29	21
9	28	20
10	26	-
11	26	-
12	25	-
13	24	-
14	24	-
15	23	-
16	23	-
18	23	-
20	22	-
22	22	-
24	21	-
26	21	-
28	20	-
30	-	-
32	-	-

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1650 °F
AUSTENITIZE 1600 °F
*For forged or rolled specimens only.

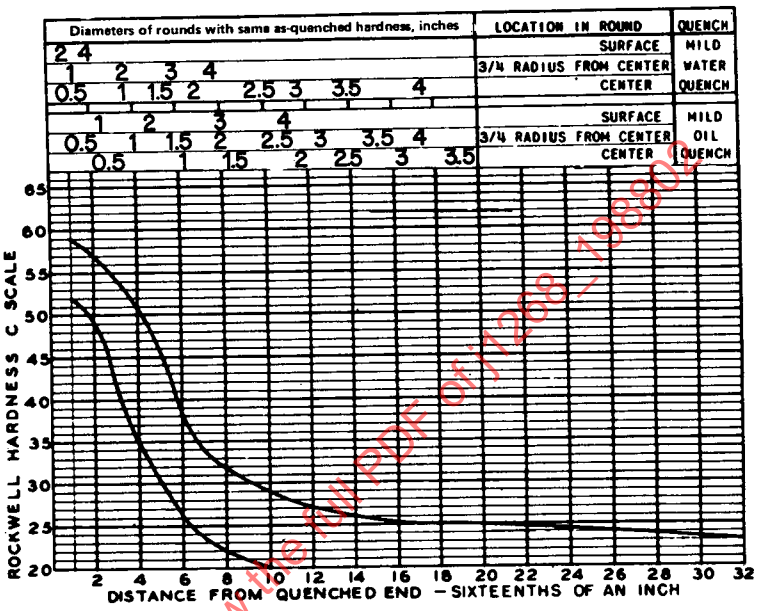


UNS H40370 Hardenability Band SAE/AISI 4037H

C	Mn	Si			Mo	
.34/.41	.60/1.00	0.15/0.35			.20/.30	

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	4037 H	
	MAX	MIN
1	59	52
2	57	49
3	54	42
4	51	35
5	48	30
6	38	26
7	34	23
8	32	22
9	30	21
10	29	20
11	28	-
12	27	-
13	26	-
14	26	-
15	26	-
16	25	-
18	25	-
20	25	-
22	25	-
24	24	-
26	24	-
28	24	-
30	23	-
32	23	-

HEAT TREATING TEMPERATURES
RECOMMENDED BY SAE
*NORMALIZE 1600 °F
AUSTENITIZE 1550 °F
*For forged or rolled specimens only.

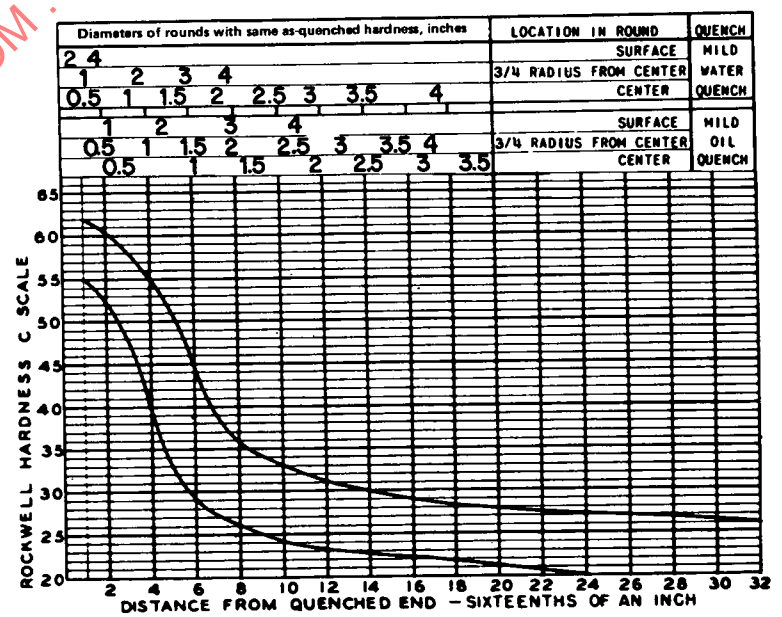


UNS H40420 Hardenability Band SAE/AISI 4042H

C	Mn	Si			Mo	
.39/.46	.60/1.00	0.15/0.35			.20/.30	

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	4042 H	
	MAX	MIN
1	62	55
2	60	52
3	58	48
4	55	40
5	50	33
6	45	29
7	39	27
8	36	26
9	34	25
10	33	24
11	32	24
12	31	23
13	30	23
14	30	23
15	29	22
16	29	22
18	28	22
20	28	21
22	28	20
24	27	20
26	27	-
28	27	-
30	26	-
32	26	-

HEAT TREATING TEMPERATURES
RECOMMENDED BY SAE
*NORMALIZE 1600 °F
AUSTENITIZE 1550 °F
*For forged or rolled specimens only.



HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	4047 H	
	MAX	MIN
1	64	57
2	62	55
3	60	50
4	58	42
5	55	35
6	52	32
7	47	30
8	43	28
9	40	28
10	38	27
11	37	26
12	35	26
13	34	25
14	33	25
15	33	25
16	32	25
18	31	24
20	30	24
22	30	23
24	30	23
26	30	22
28	29	22
30	29	21
32	29	21

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

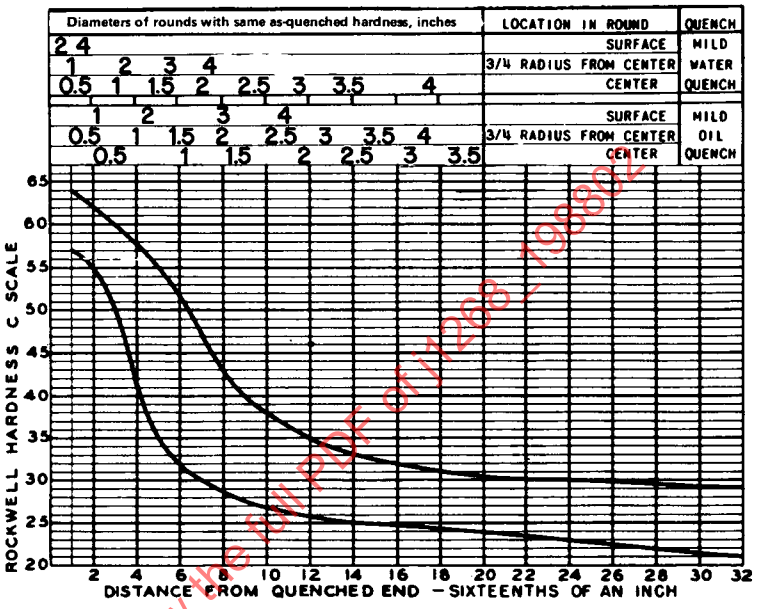
*NORMALIZE 1600 °F

AUSTENITIZE 1550 °F

*For forged or rolled specimens only.

UNS H40470 Hardenability Band SAE/AISI 4047H

C	Mn	Si			Mo	
.44/.51	.60/1.00	0.15/0.35			.20/.30	



HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	4118 H	
	MAX	MIN
1	48	41
2	46	36
3	41	27
4	35	23
5	31	20
6	28	-
7	27	-
8	26	-
9	24	-
10	23	-
11	22	-
12	21	-
13	21	-
14	20	-
15	-	-
16	-	-
18	-	-
20	-	-
22	-	-
24	-	-
26	-	-
28	-	-
30	-	-
32	-	-

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

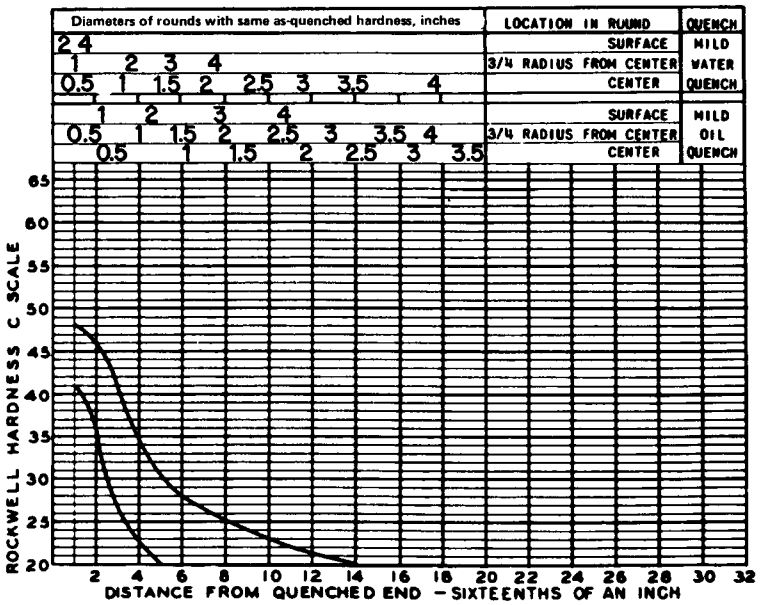
*NORMALIZE 1700 °F

AUSTENITIZE 1700 °F

*For forged or rolled specimens only.

UNS H41180 Hardenability Band SAE/AISI 4118H

C	Mn	Si		Cr	Mo	
.17/.23	.60/1.00	0.15/0.35		.30/.70	.08/.15	

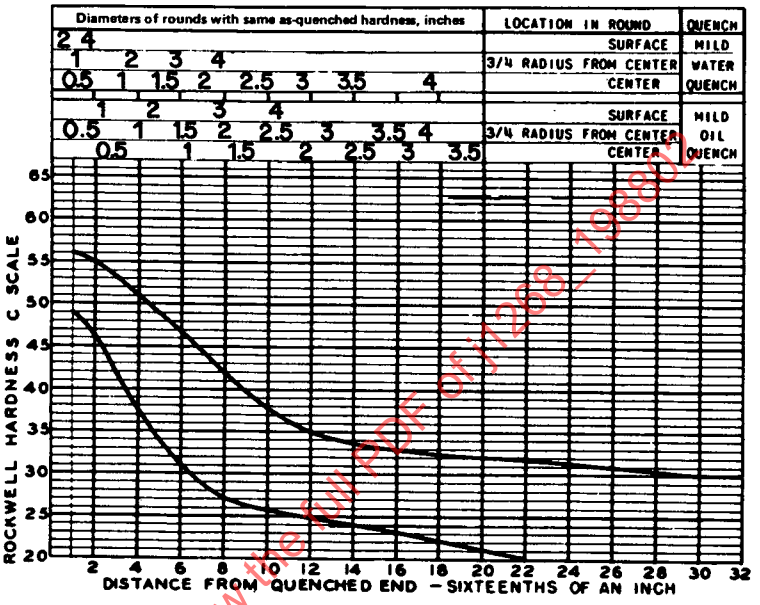


HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	4130 H	
	MAX	MIN
1	56	49
2	55	46
3	53	42
4	51	38
5	49	34
6	47	31
7	44	29
8	42	27
9	40	26
10	38	26
11	36	25
12	35	25
13	34	24
14	34	24
15	33	23
16	33	23
18	32	22
20	32	21
22	32	20
24	31	-
26	31	-
28	30	-
30	30	-
32	29	-

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1650 °F
AUSTENITIZE 1600 °F
*For forged or rolled specimens only.

UNS H41300 Hardenability Band SAE/AISI 4130H

C	Mn	Si		Cr	Mo	
.27/.33	.30/.70	0.15/0.35		.75/1.20	.15/.25	

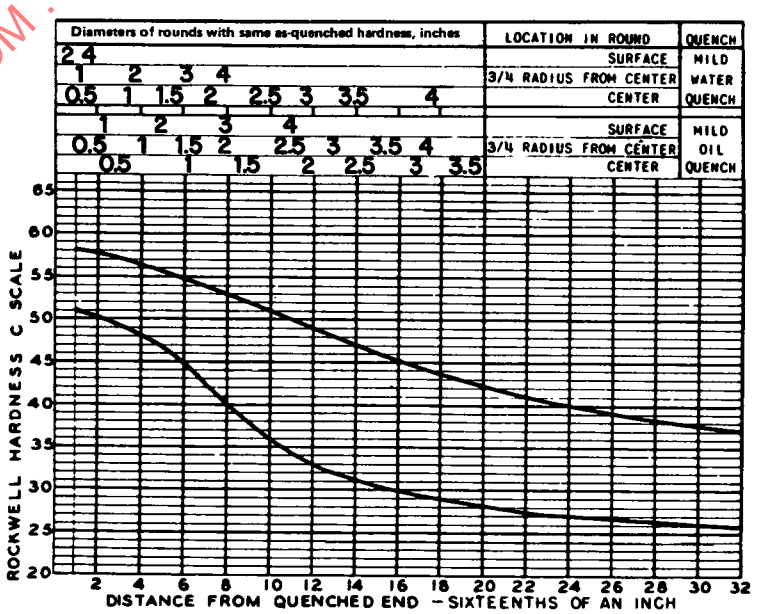


HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	4135 H	
	MAX	MIN
1	58	51
2	58	50
3	57	49
4	56	48
5	56	47
6	55	45
7	54	42
8	53	40
9	52	38
10	51	36
11	50	34
12	49	33
13	48	32
14	47	31
15	46	30
16	45	30
18	44	29
20	42	28
22	41	27
24	40	27
26	39	27
28	38	26
30	38	26
32	37	26

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1600 °F
AUSTENITIZE 1550 °F
*For forged or rolled specimens only.

UNS H41350 Hardenability Band SAE/AISI 4135H

C	Mn	Si		Cr	Mo	
.32/.38	.60/1.00	0.15/0.35		.75/1.20	.15/.25	

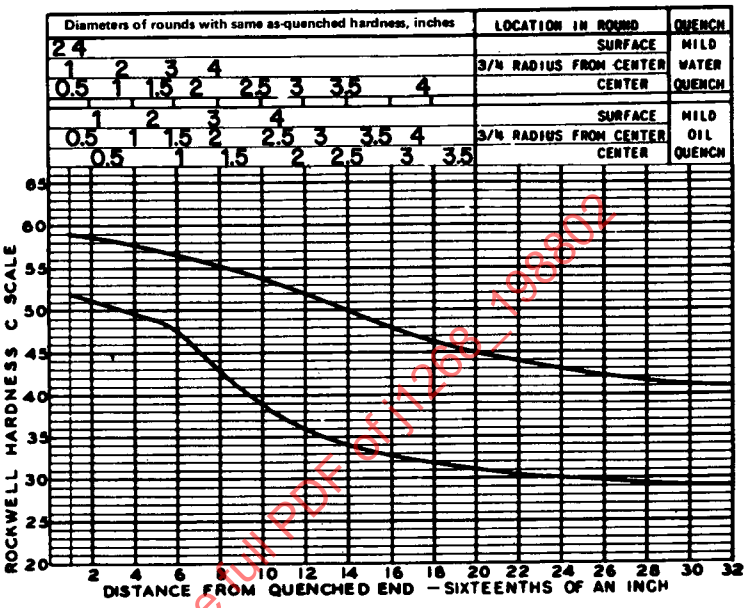


UNS H41370 Hardenability Band SAE/AISI 4137H

C	Mn	Si		Cr	Mo	
.34/.41	.60/1.00	0.15/0.35		.75/1.20	.15/.25	

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	4137 H	
	MAX	MIN
1	59	52
2	59	51
3	58	50
4	58	49
5	57	49
6	57	48
7	56	45
8	56	43
9	55	40
10	54	39
11	53	37
12	52	36
13	51	35
14	50	34
15	49	33
16	48	33
18	46	32
20	45	31
22	44	30
24	43	30
26	42	30
28	42	29
30	41	29
32	41	29

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1600 °F
AUSTENITIZE 1550 °F
*For forged or rolled specimens only.

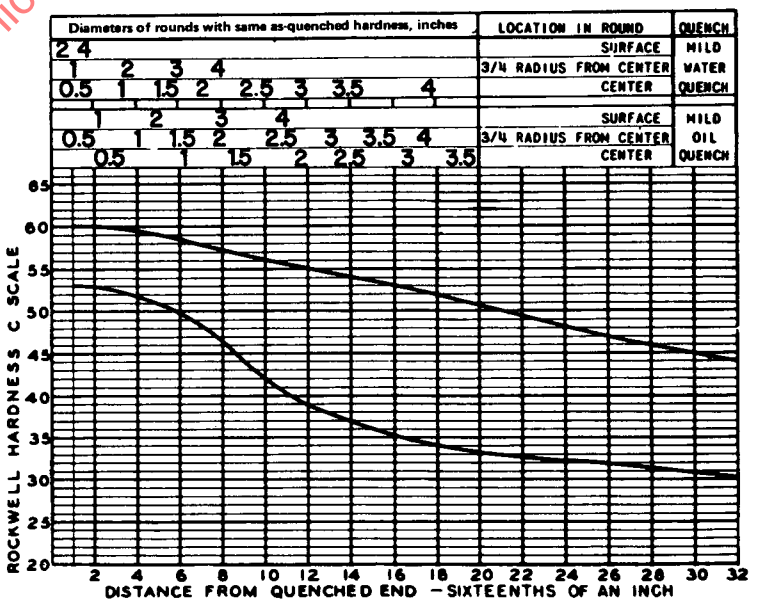


UNS H41400 Hardenability Band SAE/AISI 4140H

C	Mn	Si		Cr	Mo	
.37/.44	.65/1.10	0.15/0.35		.75/1.20	.15/.25	

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	4140 H	
	MAX	MIN
1	60	53
2	60	53
3	60	52
4	59	51
5	59	51
6	58	50
7	58	48
8	57	47
9	57	44
10	56	42
11	56	40
12	55	39
13	55	38
14	54	37
15	54	36
16	53	35
18	52	34
20	51	33
22	49	33
24	48	32
26	47	32
28	46	31
30	45	31
32	44	30

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1600 °F
AUSTENITIZE 1550 °F
*For forged or rolled specimens only.

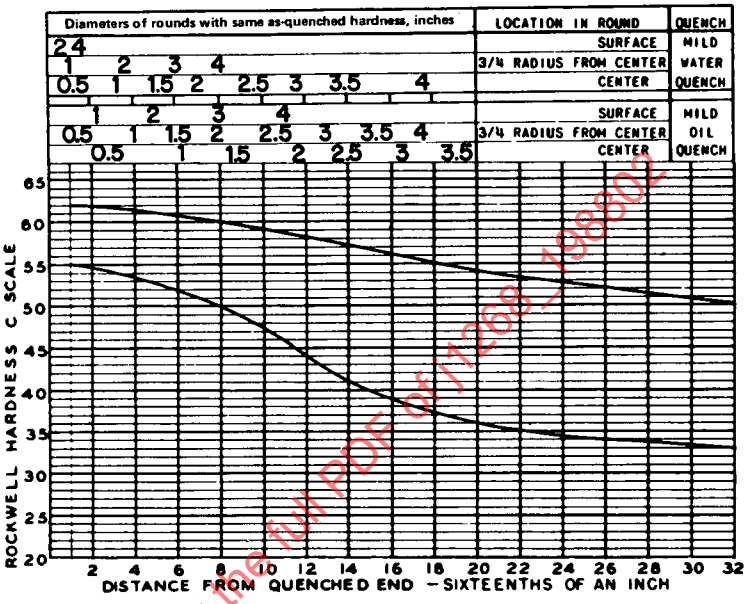


HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	4142 H	
	MAX	MIN
1	62	55
2	62	55
3	62	54
4	61	53
5	61	53
6	61	52
7	60	51
8	60	50
9	60	49
10	59	47
11	59	46
12	58	44
13	58	42
14	57	41
15	57	40
16	56	39
18	55	37
20	54	36
22	53	35
24	53	34
26	52	34
28	51	34
30	51	33
32	50	33

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1600 °F
AUSTENITIZE 1550 °F
*For forged or rolled specimens only.

UNS H41420 Hardenability Band SAE/AISI 4142H

C	Mn	Si		Cr	Mo	
.39 / .46	.65 / 1.10	0.15/0.35		.75 / 1.20	.15 / .25	

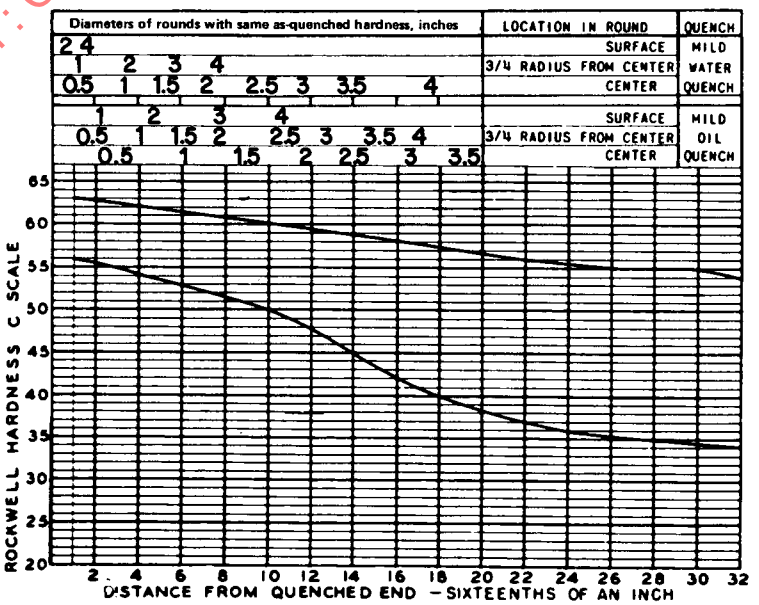


HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	4145 H	
	MAX	MIN
1	63	56
2	63	55
3	62	55
4	62	54
5	62	53
6	61	53
7	61	52
8	61	52
9	60	51
10	60	50
11	60	49
12	59	48
13	59	46
14	59	45
15	58	43
16	58	42
18	57	40
20	57	38
22	56	37
24	55	36
26	55	35
28	55	35
30	55	34
32	54	34

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1600 °F
AUSTENITIZE 1550 °F
*For forged or rolled specimens only.

UNS H41450 Hardenability Band SAE/AISI 4145H

C	Mn	Si		Cr	Mo	
.42 / .49	.65 / 1.10	0.15/0.35		.75 / 1.20	.15 / .25	

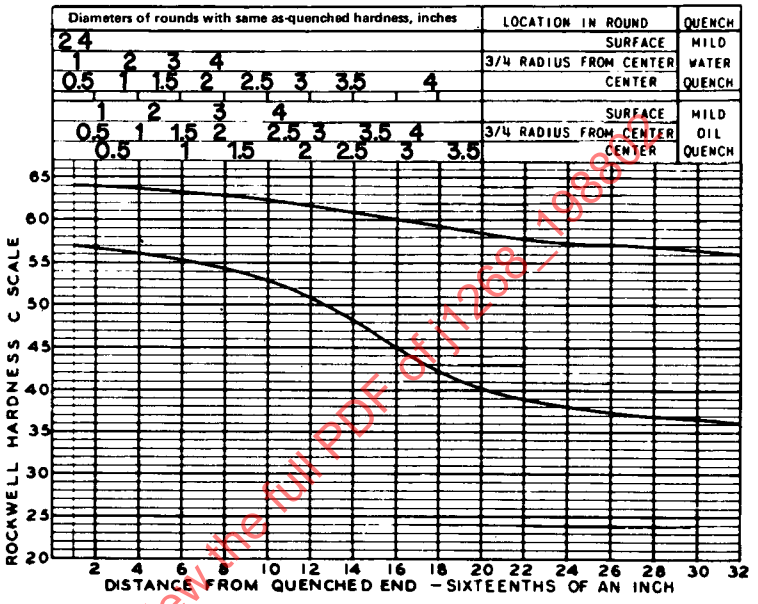


HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	4147 H	
	MAX	MIN
1	64	57
2	64	57
3	64	56
4	64	56
5	63	55
6	63	55
7	63	55
8	63	54
9	63	54
10	62	53
11	62	52
12	62	51
13	61	49
14	61	48
15	60	46
16	60	45
18	59	42
20	59	40
22	58	39
24	57	38
26	57	37
28	57	37
30	56	37
32	56	36

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1600 °F
AUSTENITIZE 1550 °F
*For forged or rolled specimens only.

UNS H41470 Hardenability Band SAE/AISI 4147H

C	Mn	*Si		Cr	Mo	
.44 / .51	.65 / 1.10	0.15/0.35		.75 / 1.20	.15 / .25	

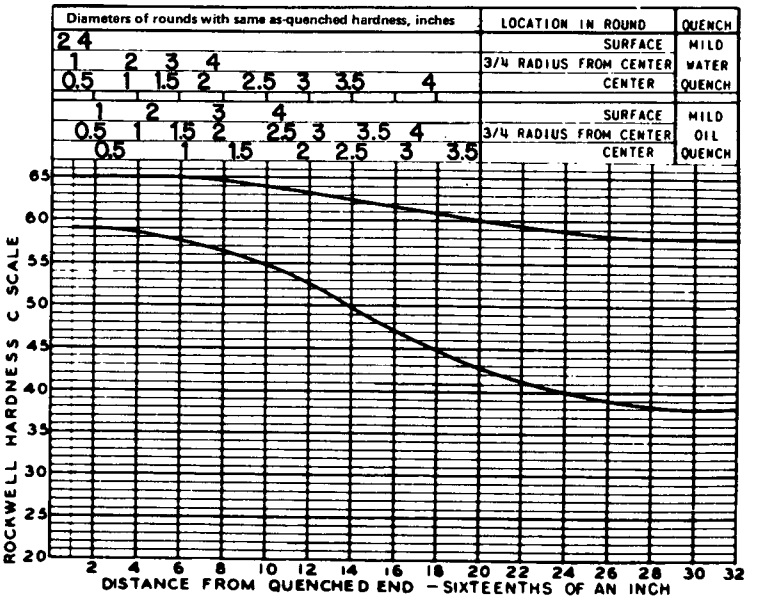


HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	4150 H	
	MAX	MIN
1	65	59
2	65	59
3	65	59
4	65	58
5	65	58
6	65	57
7	65	57
8	64	56
9	64	56
10	64	55
11	64	54
12	63	53
13	63	51
14	62	50
15	62	48
16	62	47
18	61	45
20	60	43
22	59	41
24	59	40
26	58	39
28	58	38
30	58	38
32	58	38

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1600 °F
AUSTENITIZE 1550 °F
*For forged or rolled specimens only.

UNS H41500 Hardenability Band SAE/AISI 4150H

C	Mn	Si		Cr	Mo	
.47 / .54	.65 / 1.10	0.15/0.35		.75 / 1.20	.15 / .25	

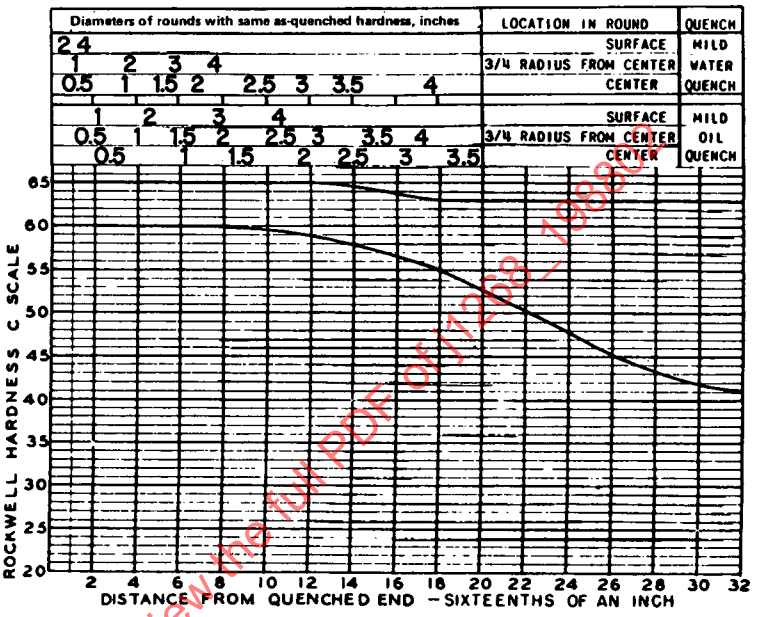


HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	4161 H	
	MAX.	MIN.
1	65	60
2	65	60
3	65	60
4	65	60
5	65	60
6	65	60
7	65	60
8	65	60
9	65	59
10	65	59
11	65	59
12	64	59
13	64	58
14	64	58
15	64	57
16	64	56
18	64	55
20	63	53
22	63	50
24	63	48
26	63	45
28	63	43
30	63	42
32	63	41

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1600 °F
AUSTENITIZE 1550 °F
*For forged or rolled specimens only.

UNS H41610 Hardenability Band SAE/AISI 4161H

C	Mn	Si	Ni	Cr	Mo	
.55/.65	.65/1.10	0.15/0.35		.65/.95	.25/.35	

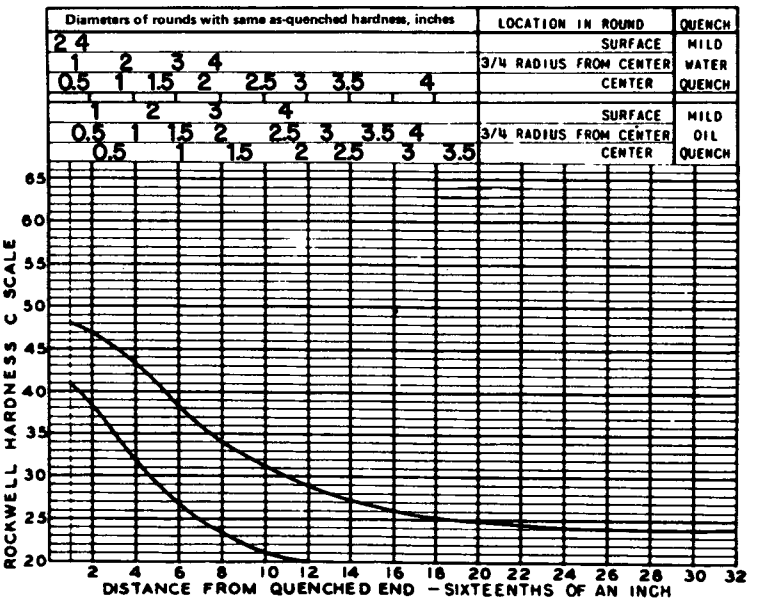


HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	4320 H	
	MAX	MIN
1	48	41
2	47	38
3	45	35
4	43	32
5	41	29
6	38	27
7	36	25
8	34	23
9	33	22
10	31	21
11	30	20
12	29	20
13	28	-
14	27	-
15	27	-
16	26	-
18	25	-
20	25	-
22	24	-
24	24	-
26	24	-
28	24	-
30	24	-
32	24	-

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1700 °F
AUSTENITIZE 1700 °F
*For forged or rolled specimens only.

UNS H43200 Hardenability Band SAE/AISI 4320H

C	Mn	Si	Ni	Cr	Mo	
.17/.23	.40/.70	0.15/0.35	1.55/2.00	.35/.65	.20/.30	

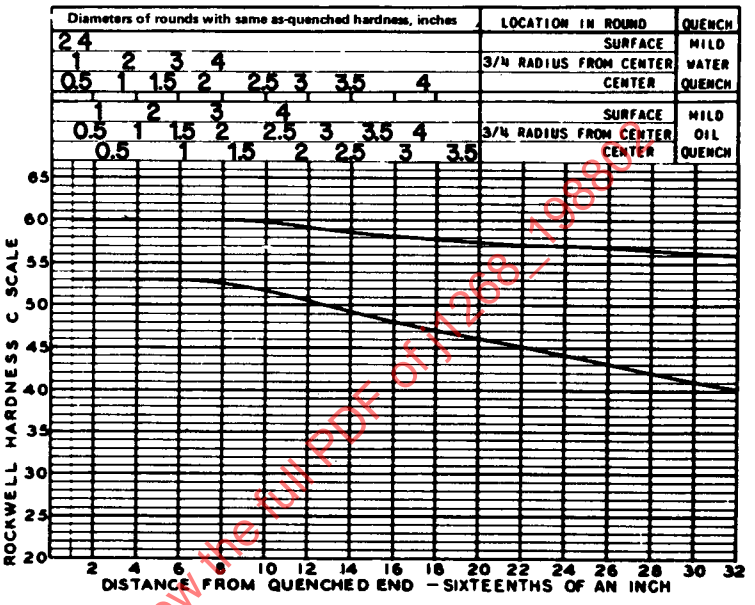


HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	4340 H	
	MAX	MIN
1	60	53
2	60	53
3	60	53
4	60	53
5	60	53
6	60	53
7	60	53
8	60	52
9	60	52
10	60	52
11	59	51
12	59	51
13	59	50
14	58	49
15	58	49
16	58	48
18	58	47
20	57	46
22	57	45
24	57	44
26	57	43
28	56	42
30	56	41
32	56	40

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1600 °F
AUSTENITIZE 1550 °F
*For forged or rolled specimens only.

UNS H43400 Hardenability Band SAE/AISI 4340H

C	Mn	Si	Ni	Cr	Mo	
.37/.44	.55/.90	0.15/0.35	1.55/2.00	.65/.95	.20/.30	

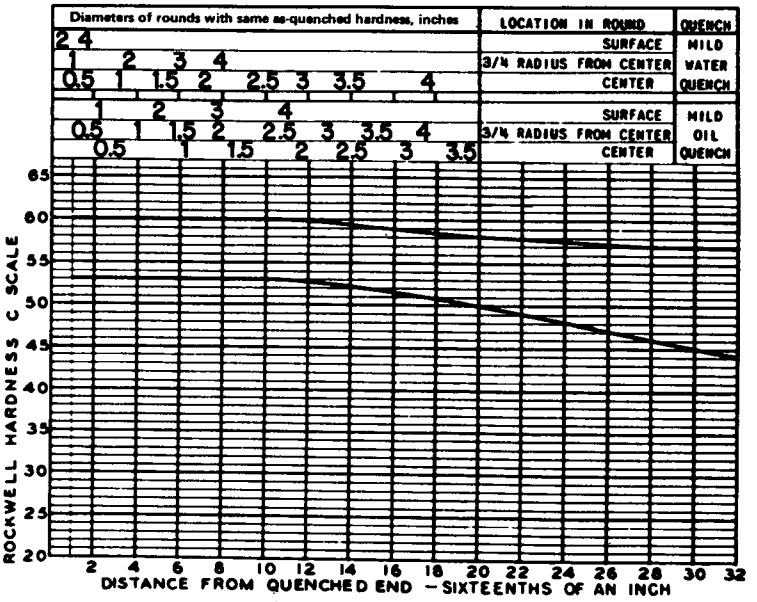


HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	E4340 H	
	MAX	MIN
1	60	53
2	60	53
3	60	53
4	60	53
5	60	53
6	60	53
7	60	53
8	60	53
9	60	53
10	60	53
11	60	53
12	60	52
13	60	52
14	59	52
15	59	52
16	59	51
18	58	51
20	58	50
22	58	49
24	57	48
26	57	47
28	57	46
30	57	45
32	57	44

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1600 °F
AUSTENITIZE 1550 °F
*For forged or rolled specimens only.

UNS H43406 Hardenability Band SAE/AISI E4340H

C	Mn	Si	Ni	Cr	Mo	
.37/.44	.60/.95	0.15/0.35	1.55/2.00	.65/.95	.20/.30	



HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	4620 H	
	MAX	MIN
1	48	41
2	45	35
3	42	27
4	39	24
5	34	21
6	31	-
7	29	-
8	27	-
9	26	-
10	25	-
11	24	-
12	23	-
13	22	-
14	22	-
15	22	-
16	21	-
18	21	-
20	20	-
22	-	-
24	-	-
26	-	-
28	-	-
30	-	-
32	-	-

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

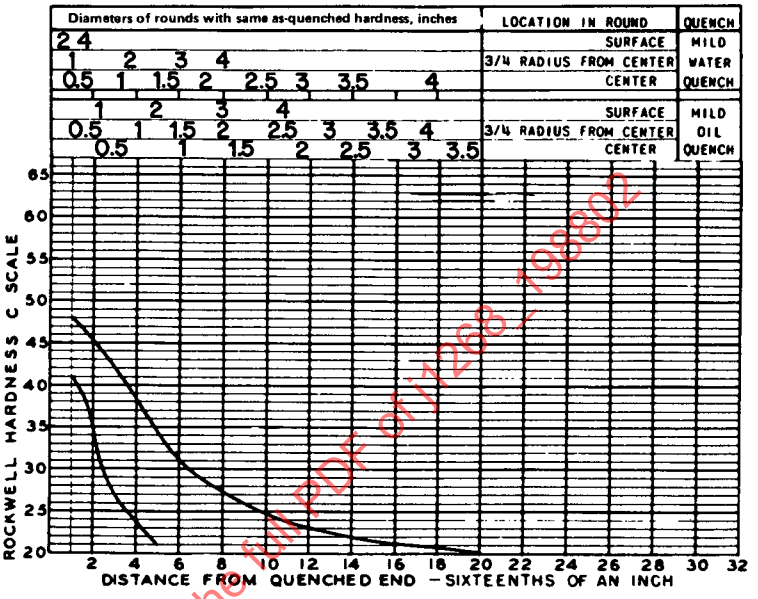
*NORMALIZE 1700 °F

AUSTENITIZE 1700 °F

*For forged or rolled specimens only.

UNS H46200 Hardenability Band SAE/AISI 4620H

C	Mn	Si	Ni		Mo	
.17/.23	.35/.75	0.15/0.35	1.55/2.00		.20/.30	



HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	4718 H	
	MAX.	MIN.
1	47	40
2	47	40
3	45	38
4	43	33
5	40	29
6	37	27
7	35	25
8	33	24
9	32	23
10	31	22
11	30	22
12	29	21
13	29	21
14	28	21
15	27	20
16	27	20
18	27	-
20	26	-
22	26	-
24	25	-
26	25	-
28	24	-
30	24	-
32	24	-

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

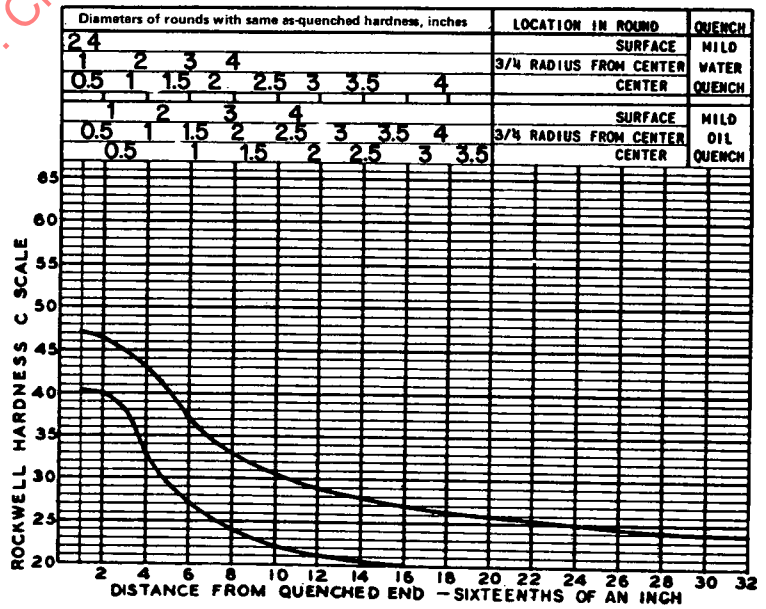
*NORMALIZE 1700 °F

AUSTENITIZE 1700 °F

*For forged or rolled specimens only.

UNS H47180 Hardenability Band SAE/AISI 4718H

C	Mn	Si	Ni	Cr	Mo	
.15/.21	.60/.95	0.15/0.35	.85/1.25	.30/.60	.30/.40	

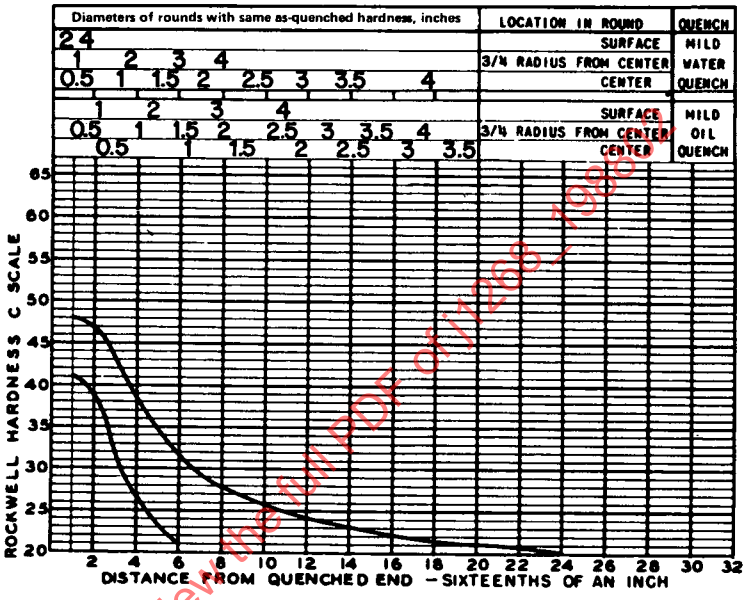


UNS H47200 Hardenability Band SAE/AISI 4720H

C	Mn	Si	Ni	Cr	Mo	
.17/.23	.45/.75	0.15/0.35	.85/1.25	.30/.60	.15/.25	

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	4720 H	
	MAX	MIN
1	48	41
2	47	39
3	43	31
4	39	27
5	35	23
6	32	21
7	29	-
8	28	-
9	27	-
10	26	-
11	25	-
12	24	-
13	24	-
14	23	-
15	23	-
16	22	-
18	21	-
20	21	-
22	21	-
24	20	-
26	-	-
28	-	-
30	-	-
32	-	-

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1700 °F
AUSTENITIZE 1700 °F
*For forged or rolled specimens only.

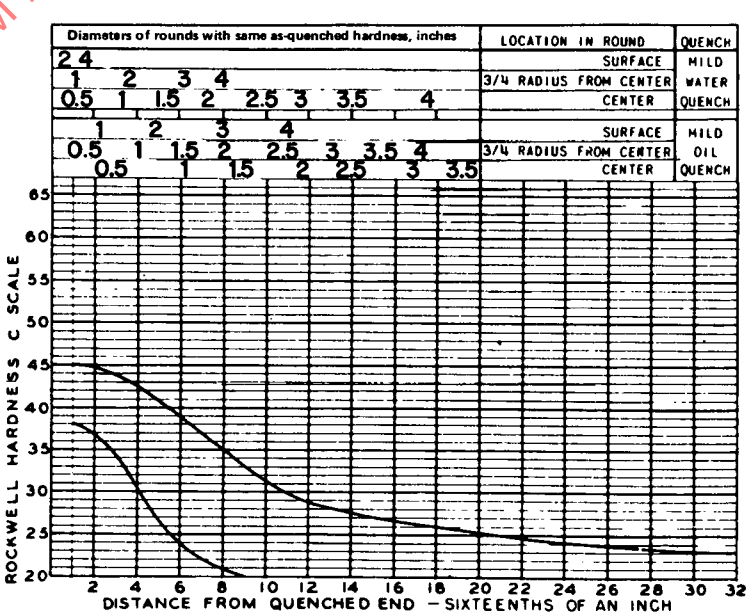


UNS H48150 Hardenability Band SAE/AISI 4815H

C	Mn	Si	Ni		Mo	
.12/.18	.30/.70	0.15/0.35	3.20/3.80		.20/.30	

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	4815 H	
	MAX	MIN
1	45	38
2	44	37
3	44	34
4	42	30
5	41	27
6	39	24
7	37	22
8	35	21
9	33	20
10	31	-
11	30	-
12	29	-
13	28	-
14	28	-
15	27	-
16	27	-
18	26	-
20	25	-
22	24	-
24	24	-
26	24	-
28	23	-
30	23	-
32	23	-

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1700 °F
AUSTENITIZE 1550 °F
*For forged or rolled specimens only.

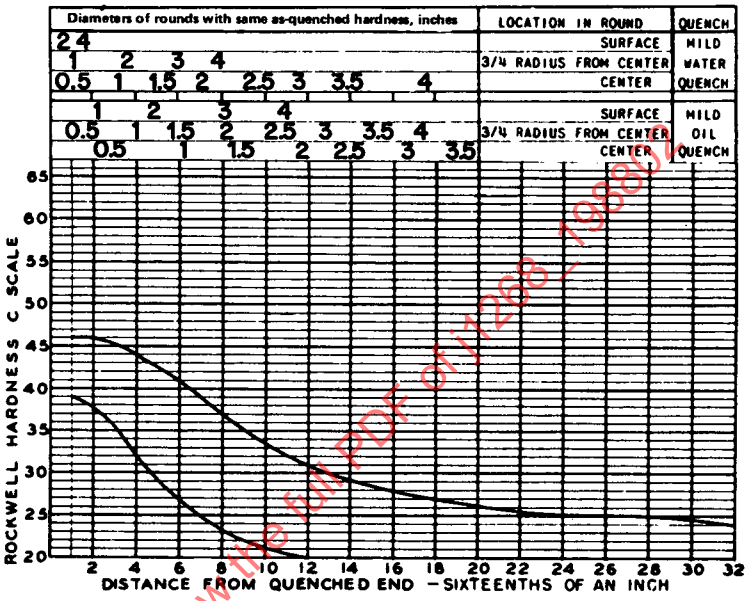


HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	4817 H	
	MAX	MIN
1	46	39
2	46	38
3	45	35
4	44	32
5	42	29
6	41	27
7	39	25
8	37	23
9	35	22
10	33	21
11	32	20
12	31	20
13	30	-
14	29	-
15	28	-
16	28	-
18	27	-
20	26	-
22	25	-
24	25	-
26	25	-
28	25	-
30	24	-
32	24	-

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1700 °F
AUSTENITIZE 1550 °F
*For forged or rolled specimens only.

UNS H48170 Hardenability Band SAE/AISI 4817H

C	Mn	Si	Ni		Mo	
.14/.20	.30/.70	0.15/0.35	3.20/3.80		.20/.30	

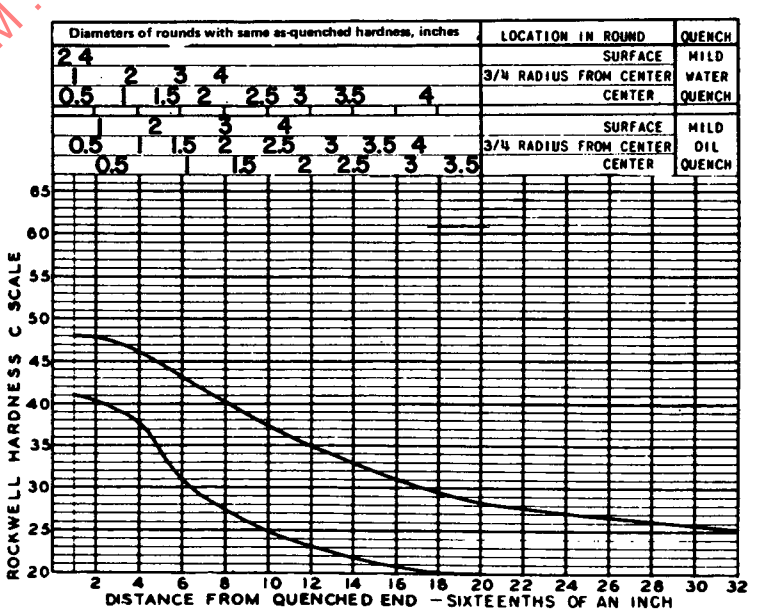


HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	4820 H	
	MAX	MIN
1	48	41
2	48	40
3	47	39
4	46	38
5	45	34
6	43	31
7	42	29
8	40	27
9	39	26
10	37	25
11	36	24
12	35	23
13	34	22
14	33	22
15	32	21
16	31	21
18	29	20
20	28	20
22	28	-
24	27	-
26	27	-
28	26	-
30	26	-
32	25	-

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1700 °F
AUSTENITIZE 1550 °F
*For forged or rolled specimens only.

UNS H48200 Hardenability Band SAE/AISI 4820H

C	Mn	Si	Ni		Mo	
.17/.23	.40/.80	0.15/0.35	3.20/3.80		.20/.30	



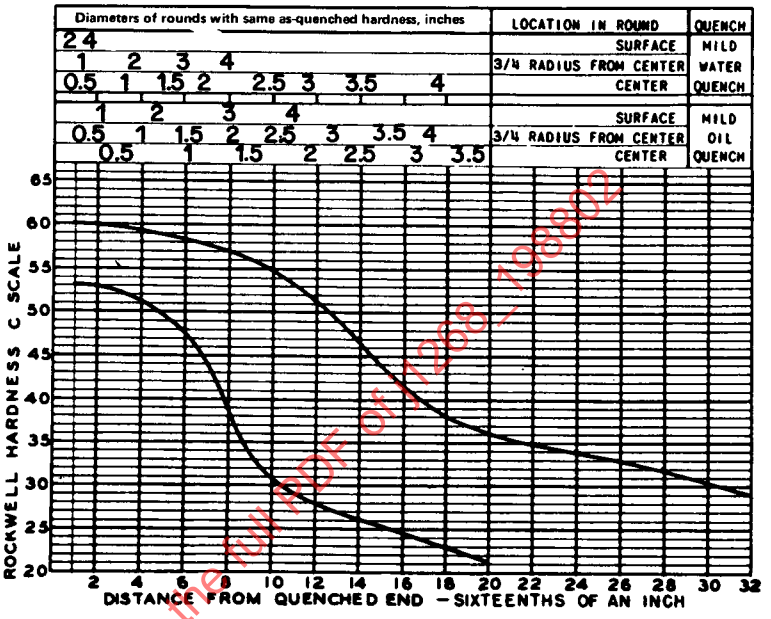
HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	50B40 H	
	MAX	MIN
1	60	53
2	60	53
3	59	52
4	59	51
5	58	50
6	58	48
7	57	44
8	57	39
9	56	34
10	55	31
11	53	29
12	51	28
13	49	27
14	47	26
15	44	25
16	41	25
18	38	23
20	36	21
22	35	-
24	34	-
26	33	-
28	32	-
30	30	-
32	29	-

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1600 °F
AUSTENITIZE 1550 °F
*For forged or rolled specimens only.

UNS H50401 Hardenability Band SAE/AISI 50B40H

C	Mn	Si		Cr		B
.37/.44	.65/1.10	0.15/0.35		.30/.70		*

*Contains 0.0005–0.003% boron.



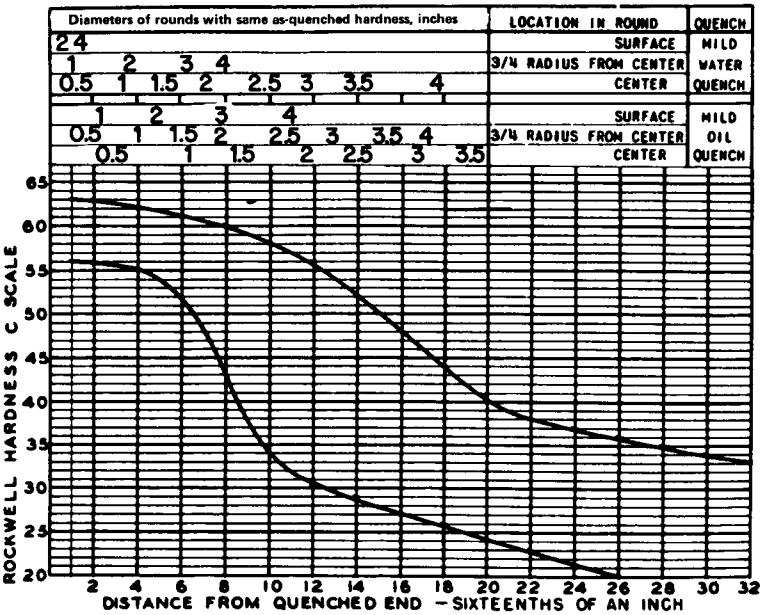
HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	50B44 H	
	MAX	MIN
1	63	56
2	63	56
3	62	55
4	62	55
5	61	54
6	61	52
7	60	48
8	60	43
9	59	38
10	58	34
11	57	31
12	56	30
13	54	29
14	52	29
15	50	28
16	48	27
18	44	26
20	40	24
22	38	23
24	37	21
26	36	20
28	35	-
30	34	-
32	33	-

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1600°F
AUSTENITIZE 1550°F
*For forged or rolled specimens only.

UNS H50441 Hardenability Band SAE/AISI 50B44H

C	Mn	Si		Cr		B
.42/.49	.65/1.10	0.15/0.35		.30/.70		*

*Contains 0.0005–0.003% boron.

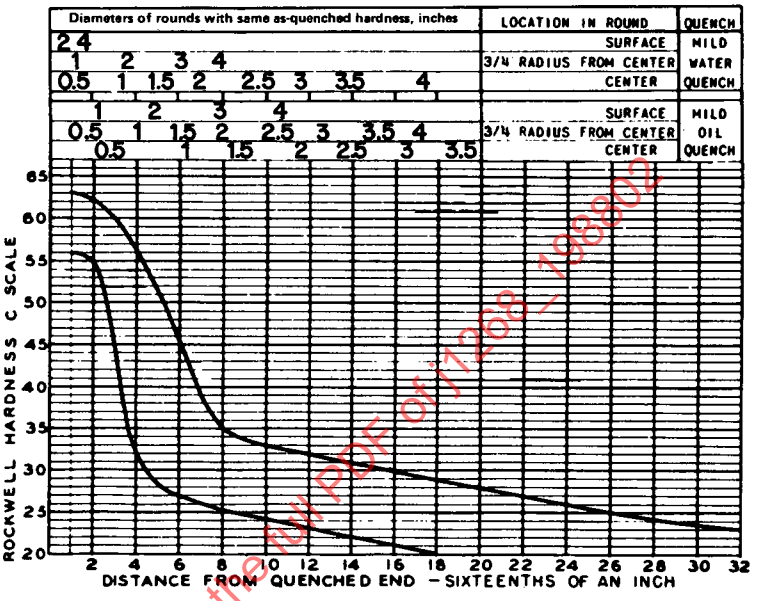


HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	5046 H	
	MAX	MIN
1	63	56
2	62	55
3	60	45
4	56	32
5	52	28
6	46	27
7	39	26
8	35	25
9	34	24
10	33	24
11	33	23
12	32	23
13	32	22
14	31	22
15	31	21
16	30	21
18	29	20
20	28	-
22	27	-
24	26	-
26	25	-
28	24	-
30	23	-
32	23	-

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1600 °F
AUSTENITIZE 1550 °F
*For forged or rolled specimens only.

UNS H50460 Hardenability Band SAE/AISI 5046H

C	Mn	Si		Cr		
.43/.50	.65/1.10	0.15/0.35		.13/.43		



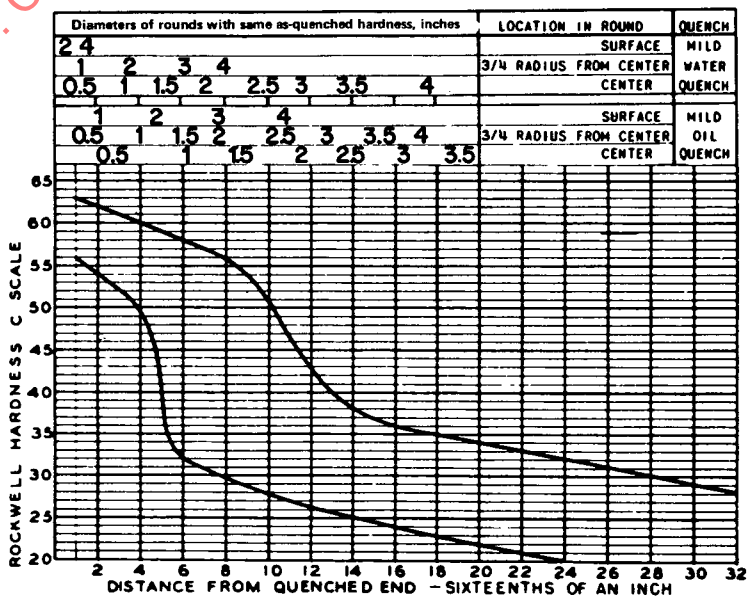
HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	50B46 H	
	MAX	MIN
1	63	56
2	62	54
3	61	52
4	60	50
5	59	41
6	58	32
7	57	31
8	56	30
9	54	29
10	51	28
11	47	27
12	43	26
13	40	26
14	38	25
15	37	25
16	36	24
18	35	23
20	34	22
22	33	21
24	32	20
26	31	-
28	30	-
30	29	-
32	28	-

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1600 °F
AUSTENITIZE 1550 °F
*For forged or rolled specimens only.

UNS H50461 Hardenability Band SAE/AISI 50B46H

C	Mn	Si		Cr		B
.43/.50	.65/1.10	0.15/0.35		.13/.43		*

*Contains 0.0005–0.003% boron.



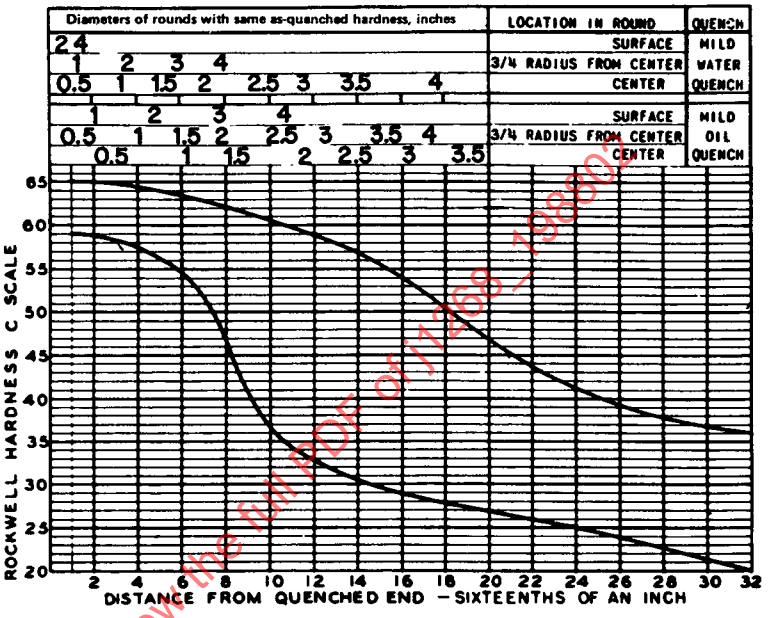
HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	50B50 H	
	MAX	MIN
1	65	59
2	65	59
3	64	58
4	64	57
5	63	56
6	63	55
7	62	52
8	62	47
9	61	42
10	60	37
11	60	35
12	59	33
13	58	32
14	57	31
15	56	30
16	54	29
18	50	28
20	47	27
22	44	26
24	41	25
26	39	24
28	38	22
30	37	21
32	36	20

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1600 °F
AUSTENITIZE 1550 °F
*For forged or rolled specimens only.

UNS H50501 Hardenability Band SAE/AISI 50B50H

C	Mn	Si		Cr		B
.47/.54	.65/1.10	0.15/0.35		.30/.70		*

*Contains 0.0005–0.003% boron.



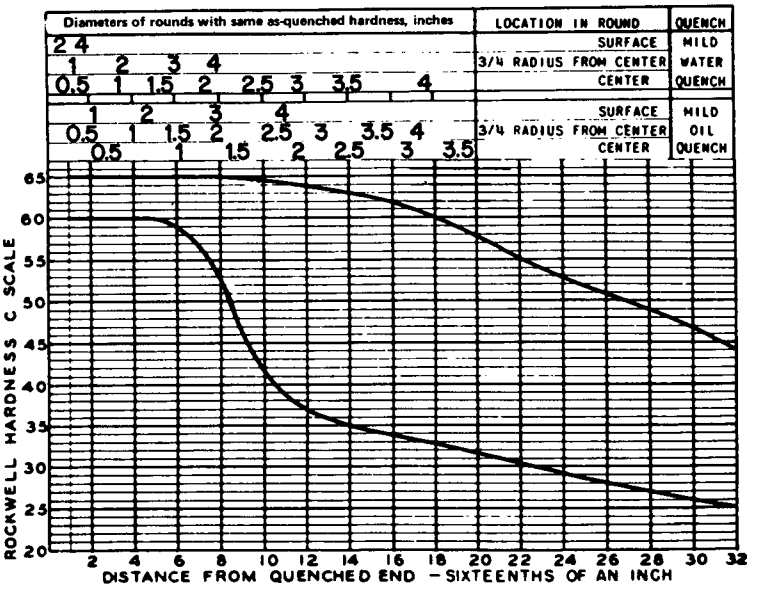
HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	50B60 H	
	MAX	MIN
1	-	60
2	-	60
3	-	60
4	-	60
5	-	60
6	-	59
7	-	57
8	65	53
9	65	47
10	64	42
11	64	39
12	64	37
13	63	36
14	63	35
15	63	34
16	62	34
18	60	33
20	58	31
22	55	30
24	53	29
26	51	28
28	49	27
30	47	26
32	44	25

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1600 °F
AUSTENITIZE 1550 °F
*For forged or rolled specimens only.

UNS H50601 Hardenability Band SAE/AISI 50B60H

C	Mn	Si		Cr		B
.55/.65	.65/1.10	0.15/0.35		.30/.70		*

*Contains 0.0005–0.003% boron.

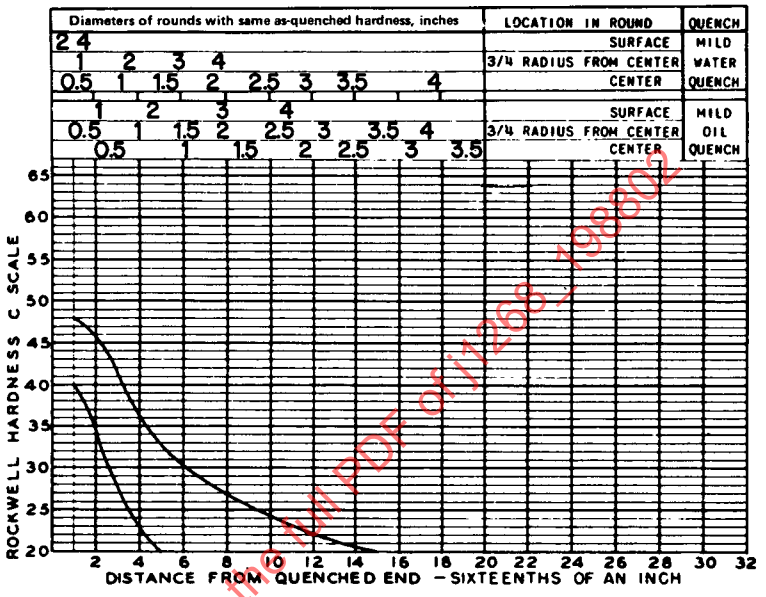


HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	5120H	
	MAX	MIN
1	48	40
2	46	34
3	41	28
4	36	23
5	33	20
6	30	-
7	28	-
8	27	-
9	25	-
10	24	-
11	23	-
12	22	-
13	21	-
14	21	-
15	20	-
16	-	-
18	-	-
20	-	-
22	-	-
24	-	-
26	-	-
28	-	-
30	-	-
32	-	-

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1700 °F
AUSTENITIZE 1700 °F
*For forged or rolled specimens only.

UNS H51200 Hardenability Band SAE/AISI 5120H

C	Mn	Si		Cr		
.17/.23	.60/1.00	0.15/0.35		.60/1.00		

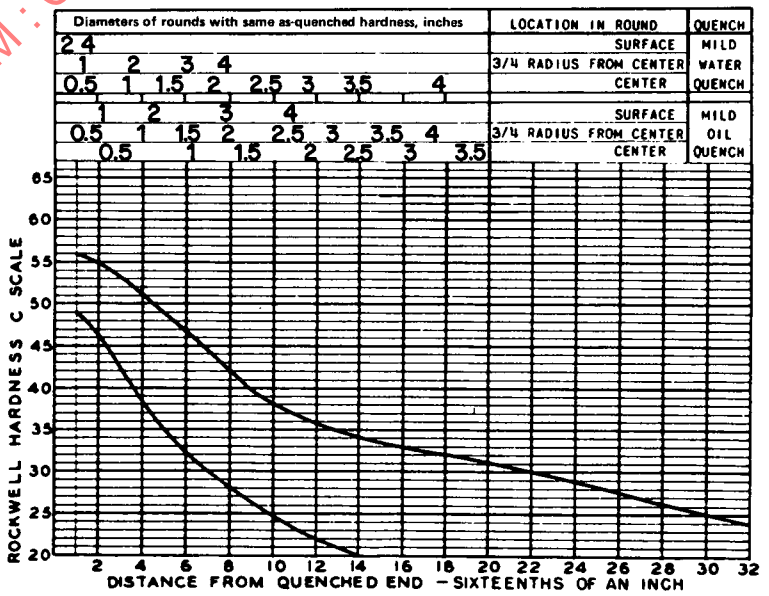


HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	5130H	
	MAX	MIN
1	56	49
2	55	46
3	53	42
4	51	39
5	49	35
6	47	32
7	45	30
8	42	28
9	40	26
10	38	25
11	37	23
12	36	22
13	35	21
14	34	20
15	34	-
16	33	-
18	32	-
20	31	-
22	30	-
24	29	-
26	27	-
28	26	-
30	25	-
32	24	-

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1650 °F
AUSTENITIZE 1600 °F
*For forged or rolled specimens only.

UNS H51300 Hardenability Band SAE/AISI 5130H

C	Mn	Si		Cr		
.27/.33	.60/1.00	0.15/0.35		.75/1.20		

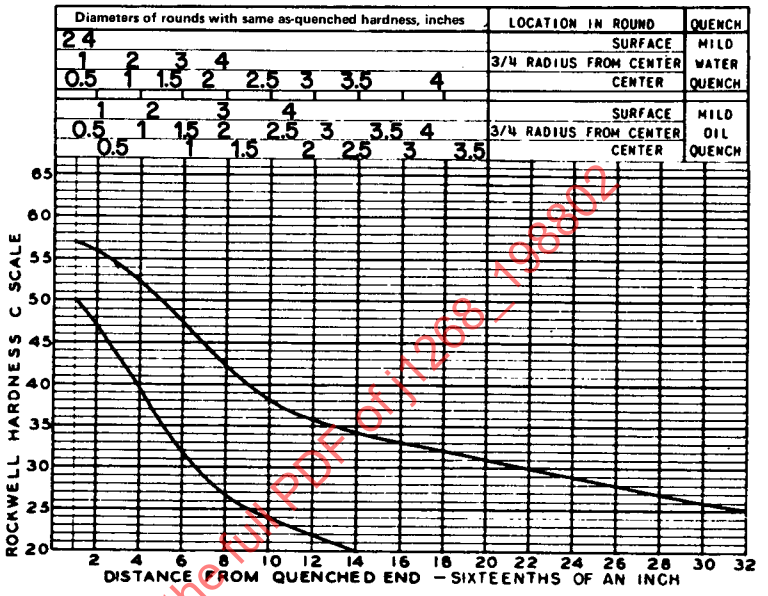


HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	5132H	
	MAX	MIN
1	57	50
2	56	47
3	54	43
4	52	40
5	50	35
6	48	32
7	45	29
8	42	27
9	40	25
10	38	24
11	37	23
12	36	22
13	35	21
14	34	20
15	34	-
16	33	-
18	32	-
20	31	-
22	30	-
24	29	-
26	28	-
28	27	-
30	26	-
32	25	-

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1650 °F
AUSTENITIZE 1600 °F
*For forged or rolled specimens only.

UNS H51320 Hardenability Band SAE/AISI 5132H

C	Mn	Si		Cr		
.29/.35	.50/.90	0.15/0.35		.65/1.10		

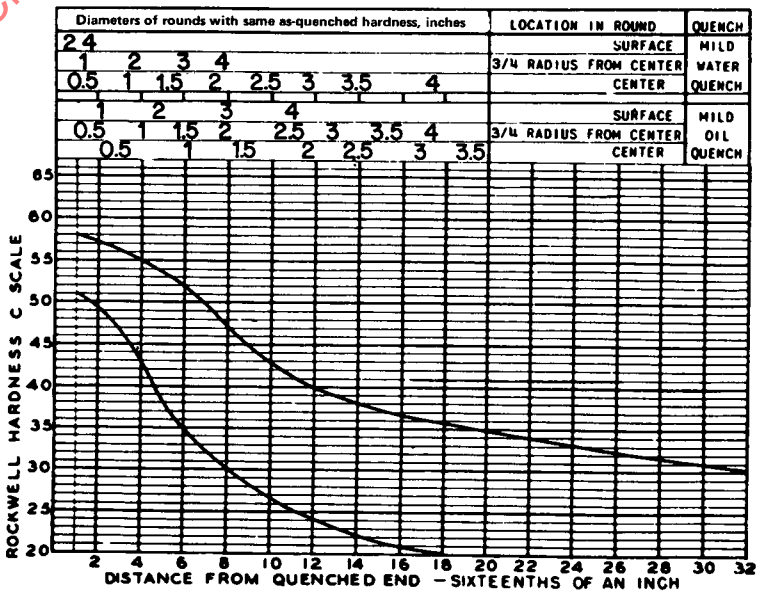


HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	5135H	
	MAX	MIN
1	58	51
2	57	49
3	56	47
4	55	43
5	54	38
6	52	35
7	50	32
8	47	30
9	45	28
10	43	27
11	41	25
12	40	24
13	39	23
14	38	22
15	37	21
16	37	21
18	36	20
20	35	-
22	34	-
24	33	-
26	32	-
28	32	-
30	31	-
32	30	-

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1650 °F
AUSTENITIZE 1600 °F
*For forged or rolled specimens only.

UNS H51350 Hardenability Band SAE/AISI 5135H

C	Mn	Si		Cr		
.32/.38	.50/.90	0.15/0.35		.70/1.15		



HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	5140H	
	MAX	MIN
1	60	53
2	59	52
3	58	50
4	57	48
5	56	43
6	54	38
7	52	35
8	50	33
9	48	31
10	46	30
11	45	29
12	43	28
13	42	27
14	40	27
15	39	26
16	38	25
18	37	24
20	36	23
22	35	21
24	34	20
26	34	-
28	33	-
30	33	-
32	32	-

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

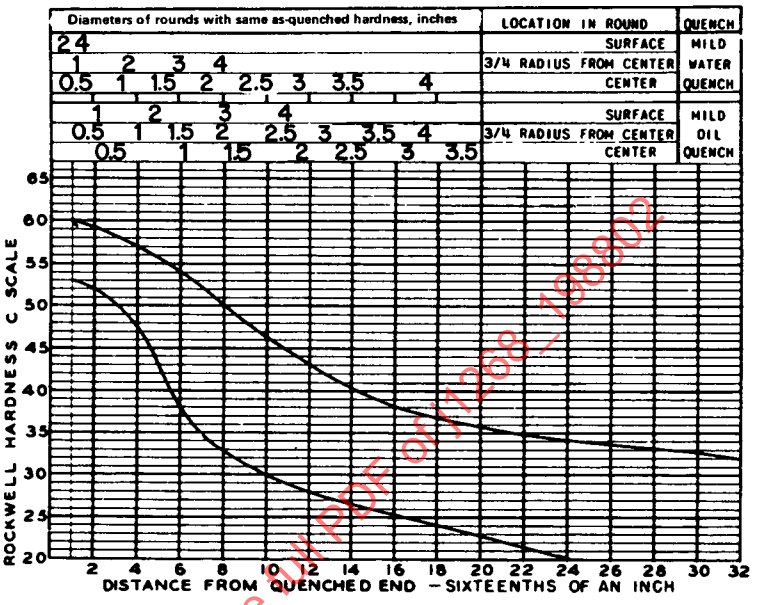
*NORMALIZE 1600 °F

AUSTENITIZE 1550 °F

*For forged or rolled specimens only.

UNS H51400 Hardenability Band SAE/AISI 5140H

C	Mn	Si		Cr		
.37/.44	.60/1.00	0.15/0.35		.60/1.00		



HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	5147H	
	MAX	MIN
1	64	57
2	64	56
3	63	55
4	62	54
5	62	53
6	61	52
7	61	49
8	60	45
9	60	40
10	59	37
11	59	35
12	58	34
13	58	33
14	57	32
15	57	32
16	56	31
18	55	30
20	54	29
22	53	27
24	52	26
26	51	25
28	50	24
30	49	22
32	48	21

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

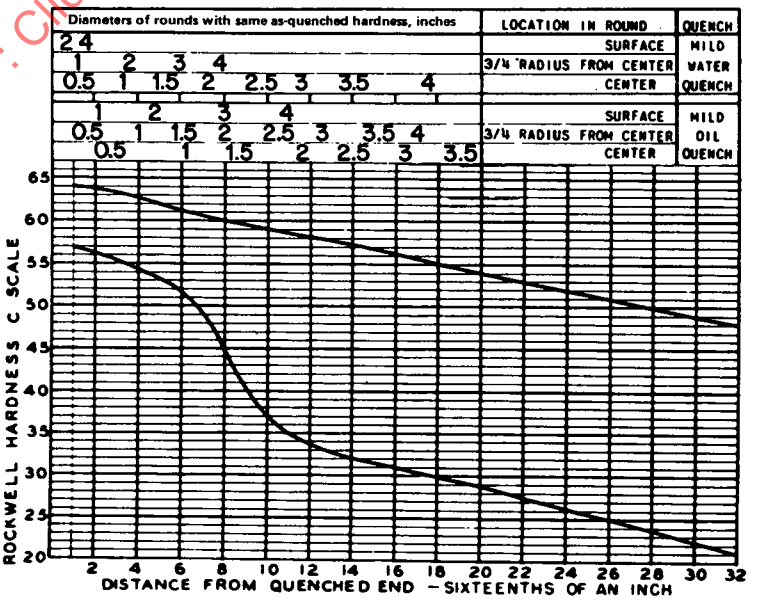
*NORMALIZE 1600 °F

AUSTENITIZE 1550 °F

*For forged or rolled specimens only.

UNS H51470 Hardenability Band SAE/AISI 5147H

C	Mn	Si		Cr		
.45/.52	.60/1.05	0.15/0.35		.80/1.25		

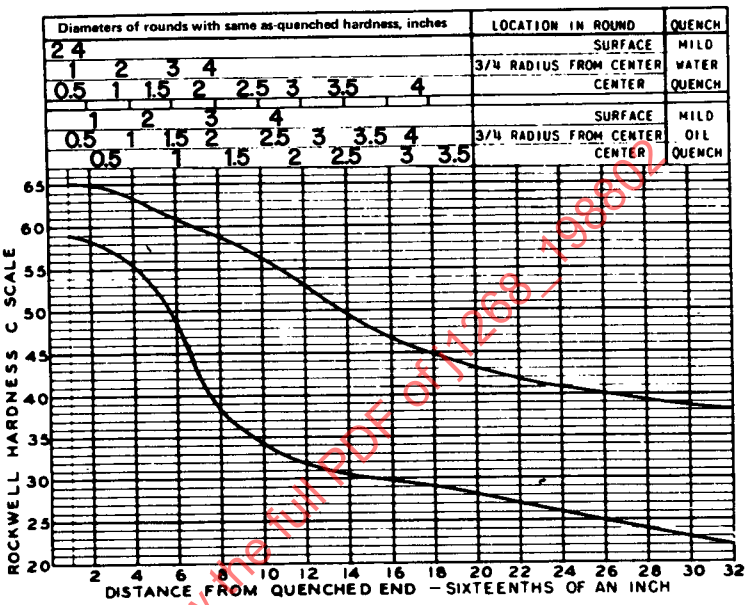


HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	5150H	
	MAX	MIN
1	65	59
2	65	58
3	64	57
4	63	56
5	62	53
6	61	49
7	60	42
8	59	38
9	58	36
10	56	34
11	55	33
12	53	32
13	51	31
14	50	31
15	48	30
16	47	30
18	45	29
20	43	28
22	42	27
24	41	26
26	40	25
28	39	24
30	39	23
32	38	22

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1600 °F
AUSTENITIZE 1550 °F
*For forged or rolled specimens only.

UNS H51500 Hardenability Band SAE/AISI 5150H

C	Mn	Si		Cr		
.47/.54	.60/1.00	0.15/0.35		.60/1.00		

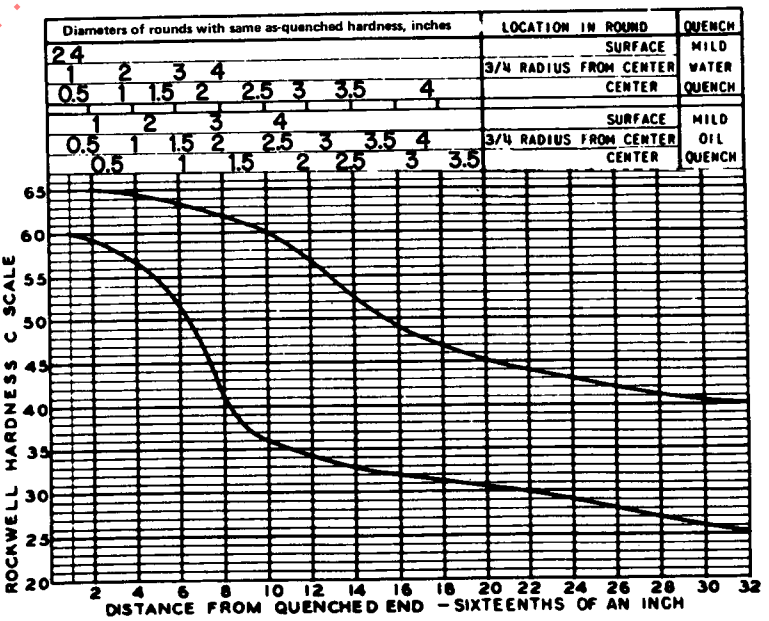


HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	5155H	
	MAX	MIN
1	-	60
2	65	59
3	64	58
4	64	57
5	63	55
6	63	52
7	62	47
8	62	41
9	61	37
10	60	36
11	59	35
12	57	34
13	55	34
14	52	33
15	51	33
16	49	32
18	47	31
20	45	31
22	44	30
24	43	29
26	42	28
28	41	27
30	41	26
32	40	25

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1600 °F
AUSTENITIZE 1550 °F
*For forged or rolled specimens only.

UNS H51550 Hardenability Band SAE/AISI 5155H

C	Mn	Si		Cr		
.50/.60	.60/1.00	0.15/0.35		.60/1.00		

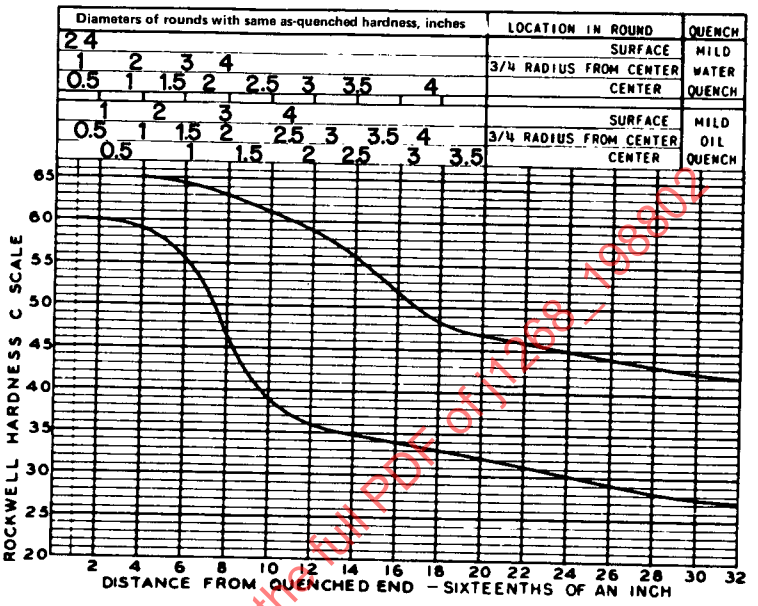


HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	5160H	
	MAX	MIN
1	-	60
2	-	60
3	-	60
4	65	59
5	65	58
6	64	56
7	64	52
8	63	47
9	62	42
10	61	39
11	60	37
12	59	36
13	58	35
14	56	35
15	54	34
16	52	34
18	48	33
20	47	32
22	46	31
24	45	30
26	44	29
28	43	28
30	43	28
32	42	27

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1600 °F
AUSTENITIZE 1550 °F
*For forged or rolled specimens only.

UNS H51600 Hardenability Band SAE/AISI 5160H

C	Mn	Si		Cr		
.55/.65	.65/1.10	0.15/0.35		.60/1.00		



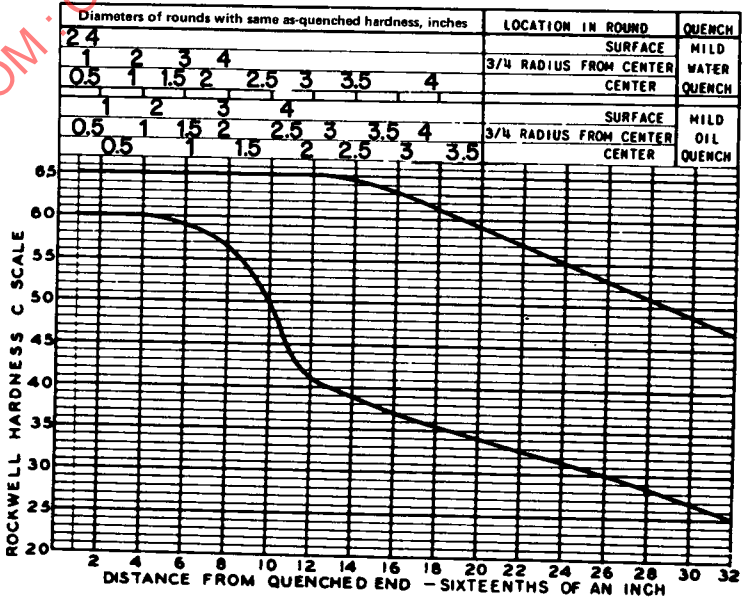
HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	51B60 H	
	MAX	MIN
1	-	60
2	-	60
3	-	60
4	-	60
5	-	60
6	-	59
7	-	58
8	-	57
9	-	54
10	-	50
11	-	44
12	65	41
13	65	40
14	64	39
15	64	38
16	63	37
18	61	36
20	59	34
22	57	33
24	55	31
26	53	30
28	51	28
30	49	27
32	47	25

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1600 °F
AUSTENITIZE 1550 °F
*For forged or rolled specimens only.

UNS H51601 Hardenability Band SAE/AISI 51B60H

C	Mn	Si		Cr		B
.55/.65	.65/1.10	0.15/0.35		.60/1.00		•

•Contains 0.0005–0.003% boron.

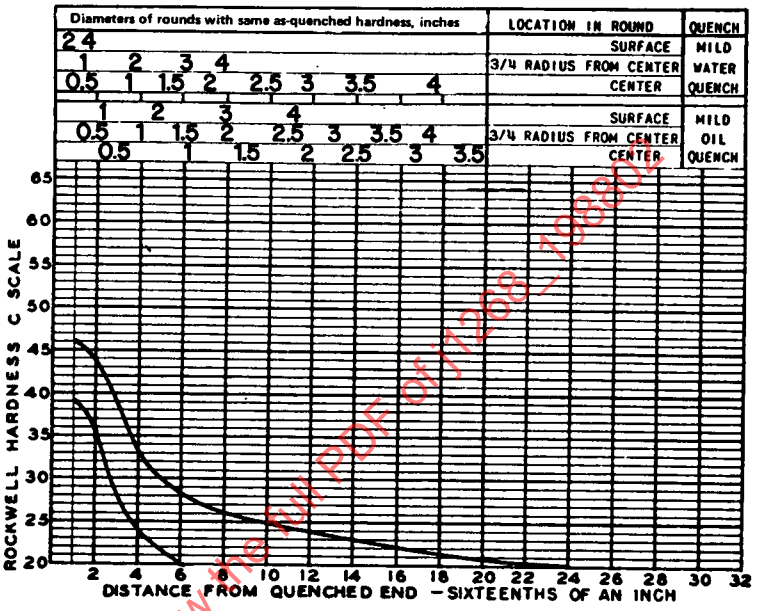


HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	6118 H	
	MAX.	MIN.
1	46	39
2	44	36
3	38	28
4	33	24
5	30	22
6	28	20
7	27	-
8	26	-
9	26	-
10	25	-
11	25	-
12	24	-
13	24	-
14	23	-
15	23	-
16	22	-
18	22	-
20	21	-
22	21	-
24	20	-
26	-	-
28	-	-
30	-	-
32	-	-

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1700 °F
AUSTENITIZE 1700 °F
*For forged or rolled specimens only.

UNS H61180 Hardenability Band SAE/AISI 6118H

C	Mn	Si		Cr		V
.15/.21	.40/.80	0.15/0.35		.40/.80		.10/.15

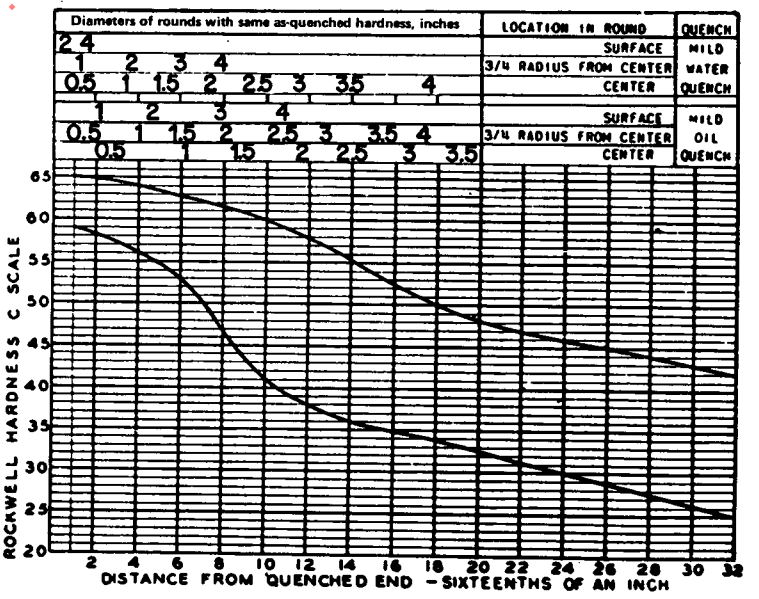


HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	6150H	
	MAX	MIN
1	65	60
2	65	58
3	64	57
4	64	56
5	63	55
6	63	53
7	62	50
8	61	47
9	61	43
10	60	41
11	59	39
12	58	38
13	57	37
14	55	36
15	54	35
16	52	35
18	50	34
20	48	32
22	47	31
24	46	30
26	45	29
28	44	27
30	43	26
32	42	25

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1650 °F
AUSTENITIZE 1600 °F
*For forged or rolled specimens only.

UNS H61500 Hardenability Band SAE/AISI 6150H

C	Mn	Si		Cr		V
.47/.54	.60/1.00	0.15/0.35		.75/1.20		.15 min.



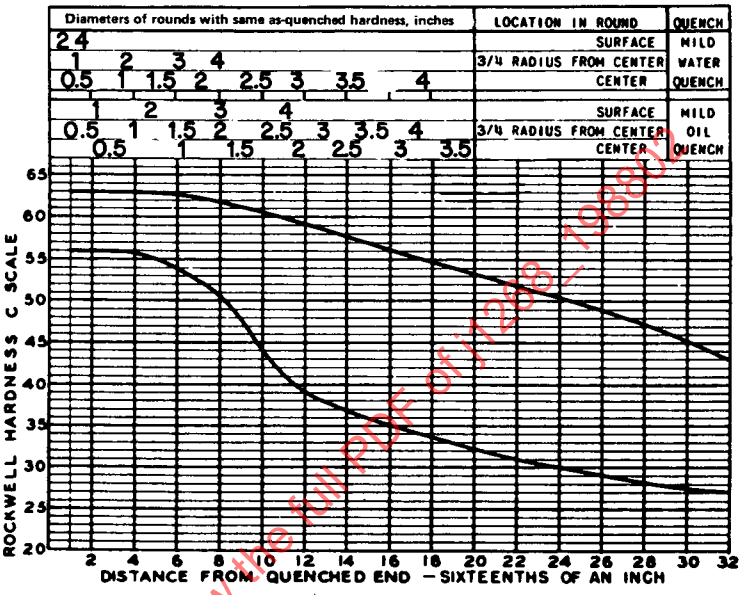
HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	81B45 H	
	MAX	MIN
1	63	56
2	63	56
3	63	56
4	63	56
5	63	55
6	63	54
7	62	53
8	62	51
9	61	48
10	60	44
11	60	41
12	59	39
13	58	38
14	57	37
15	57	36
16	56	35
18	55	34
20	53	32
22	52	31
24	50	30
26	49	29
28	47	28
30	45	28
32	43	27

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1600 °F
AUSTENITIZE 1550 °F
*For forged or rolled specimens only.

UNS H81451 Hardenability Band SAE/AISI 81B45H

C	Mn	Si	Ni	Cr	Mo	B
.42/.49	.70/1.05	0.15/0.35	.15/.45	.30/.60	.08/.15	*

*Contains 0.0005–0.003% boron.

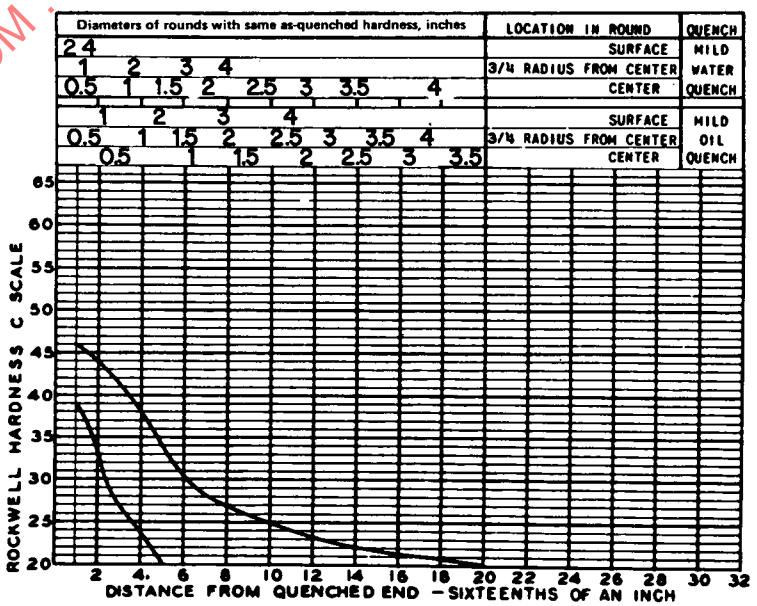


HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	8617H	
	MAX	MIN
1	46	39
2	44	33
3	41	27
4	38	24
5	34	20
6	31	-
7	28	-
8	27	-
9	26	-
10	25	-
11	24	-
12	23	-
13	23	-
14	22	-
15	22	-
16	21	-
18	21	-
20	20	-
22	-	-
24	-	-
26	-	-
28	-	-
30	-	-
32	-	-

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1700 °F
AUSTENITIZE 1700 °F
*For forged or rolled specimens only.

UNS H86170 Hardenability Band SAE/AISI 8617H

C	Mn	Si	Ni	Cr	Mo	
.14/.20	.60/.95	0.15/0.35	.35/.75	.35/.65	.15/.25	

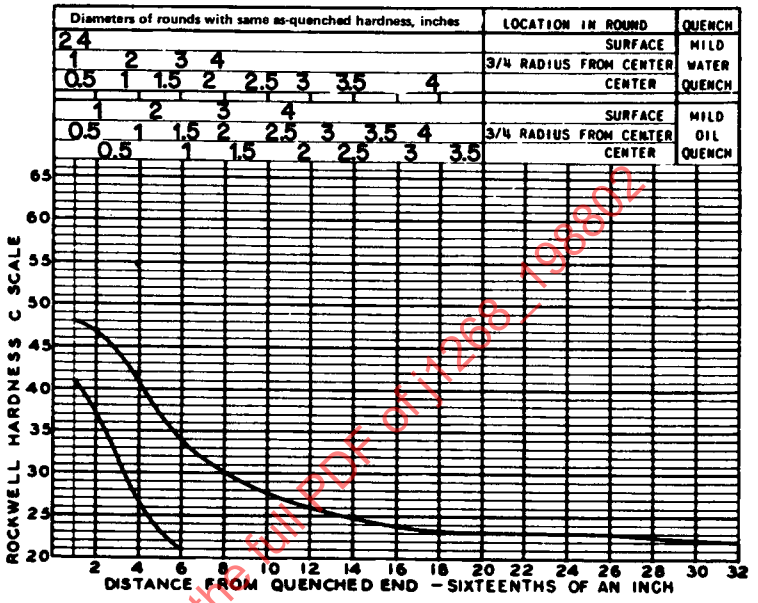


HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	8620H	
	MAX	MIN
1	48	41
2	47	37
3	44	32
4	41	27
5	37	23
6	34	21
7	32	-
8	30	-
9	29	-
10	28	-
11	27	-
12	26	-
13	25	-
14	25	-
15	24	-
16	24	-
18	23	-
20	23	-
22	23	-
24	23	-
26	23	-
28	22	-
30	22	-
32	22	-

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1700 °F
AUSTENITIZE 1700 °F
*For forged or rolled specimens only.

UNS H86200 Hardenability Band SAE/AISI 8620H

C	Mn	Si	Ni	Cr	Mo	
.17/.23	.60/.95	0.15/0.35	.35/.75	.35/.65	.15/.25	

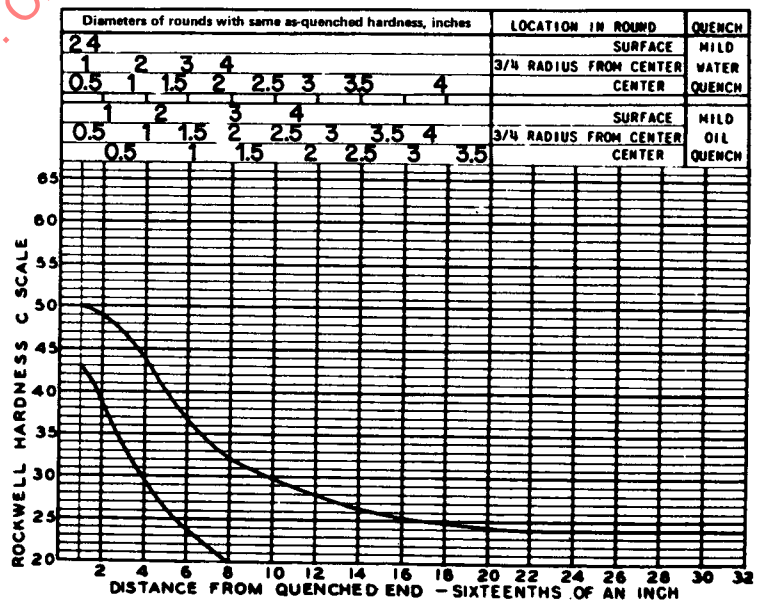


HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	8622H	
	MAX	MIN
1	50	43
2	49	39
3	47	34
4	44	30
5	40	26
6	37	24
7	34	22
8	32	20
9	31	-
10	30	-
11	29	-
12	28	-
13	27	-
14	26	-
15	26	-
16	25	-
18	25	-
20	24	-
22	24	-
24	24	-
26	24	-
28	24	-
30	24	-
32	24	-

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1700 °F
AUSTENITIZE 1700 °F
*For forged or rolled specimens only.

UNS H86220 Hardenability Band SAE/AISI 8622H

C	Mn	Si	Ni	Cr	Mo	
.19/.25	.60/.95	0.15/0.35	.35/.75	.35/.65	.15/.25	

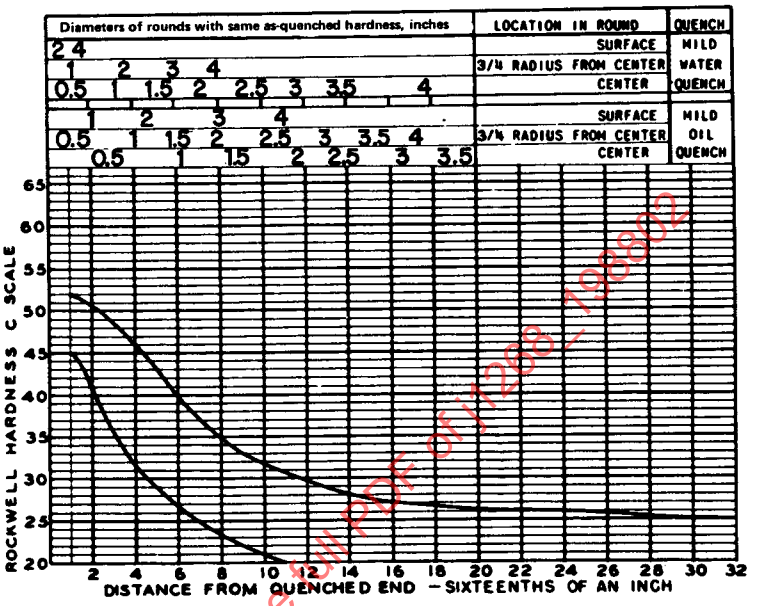


HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	8625H	
	MAX	MIN
1	52	45
2	51	41
3	48	36
4	46	32
5	43	29
6	40	27
7	37	25
8	35	23
9	33	22
10	32	21
11	31	20
12	30	-
13	29	-
14	28	-
15	28	-
16	27	-
18	27	-
20	26	-
22	26	-
24	26	-
26	26	-
28	25	-
30	25	-
32	25	-

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1650 °F
AUSTENITIZE 1600 °F
*For forged or rolled specimens only.

UNS H86250 Hardenability Band SAE/AISI 8625H

C	Mn	Si	Ni	Cr	Mo	
.22/.28	.60/.95	0.15/0.35	.35/.75	.35/.65	.15/.25	

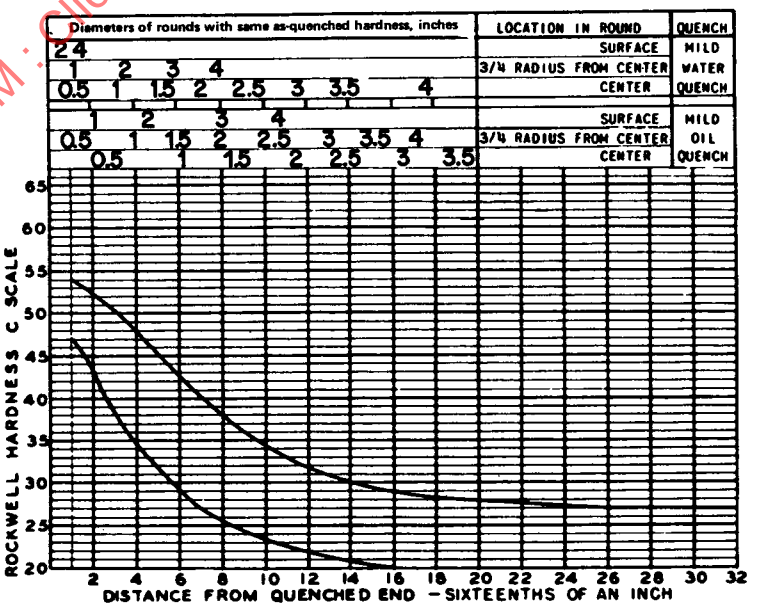


HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	86270	
	MAX	MIN
1	54	47
2	52	43
3	50	38
4	48	35
5	45	32
6	43	29
7	40	27
8	38	26
9	36	24
10	34	24
11	33	23
12	32	22
13	31	21
14	30	21
15	30	20
16	29	20
18	28	-
20	28	-
22	28	-
24	27	-
26	27	-
28	27	-
30	27	-
32	27	-

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1650 °F
AUSTENITIZE 1600 °F
*For forged or rolled specimens only.

UNS H86270 Hardenability Band SAE/AISI 8627H

C	Mn	Si	Ni	Cr	Mo	
.24/.30	.60/.95	0.15/0.35	.35/.75	.35/.65	.15/.25	

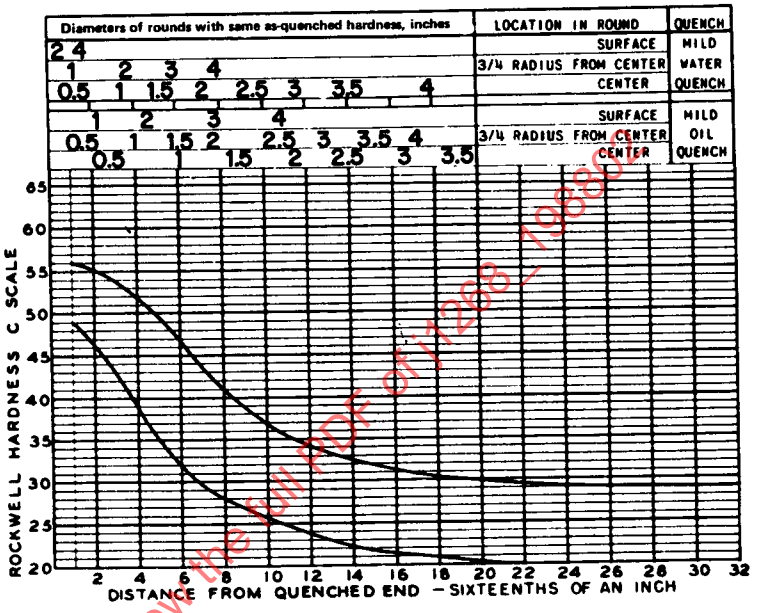


HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	8630H	
	MAX	MIN
1	56	49
2	55	46
3	54	43
4	52	39
5	50	35
6	47	32
7	44	29
8	41	28
9	39	27
10	37	26
11	35	25
12	34	24
13	33	23
14	33	22
15	32	22
16	31	21
18	30	21
20	30	20
22	29	20
24	29	-
26	29	-
28	29	-
30	29	-
32	29	-

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1650 °F
AUSTENITIZE 1600 °F
*For forged or rolled specimens only.

UNS H86300 Hardenability Band SAE/AISI 8630H

C	Mn	Si	Ni	Cr	Mo	
.27/.33	.60/.95	0.15/0.35	.35/.75	.35/.65	.15/.25	



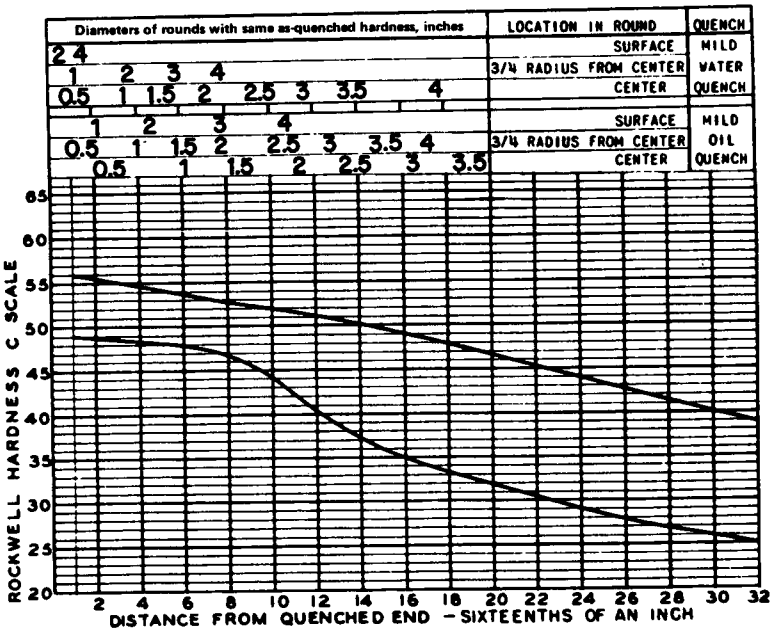
HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	H	
	MAX.	MIN.
1	56	49
2	55	49
3	55	48
4	55	48
5	54	48
6	54	48
7	53	48
8	53	47
9	52	46
10	52	44
11	52	42
12	51	40
13	51	39
14	50	38
15	50	36
16	49	35
18	48	34
20	47	32
22	45	31
24	44	29
26	43	28
28	41	27
30	40	26
32	39	25

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1650 °F
AUSTENITIZE 1600 °F
*For forged or rolled specimens only.

UNS H86301 Hardenability Band SAE/AISI 86B30H

C	Mn	Si	Ni	Cr	Mo	B
0.27/0.33	0.60/0.95	0.15/0.35	0.35/0.75	0.35/0.65	0.15/0.25	*

*Contains 0.0005–0.003% boron.

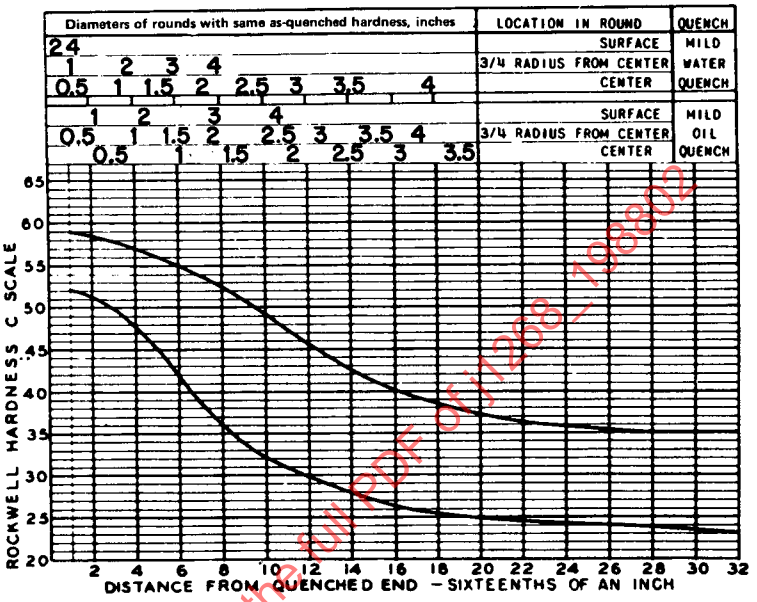


HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	8637H	
	MAX	MIN
1	59	52
2	58	51
3	58	50
4	57	48
5	56	45
6	55	42
7	54	39
8	53	36
9	51	34
10	49	32
11	47	31
12	46	30
13	44	29
14	43	28
15	41	27
16	40	26
18	39	25
20	37	25
22	36	24
24	36	24
26	35	24
28	35	24
30	35	23
32	35	23

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1600 °F
AUSTENITIZE 1550 °F
*For forged or rolled specimens only.

UNS H86370 Hardenability Band SAE/AISI 8637H

C	Mn	Si	Ni	Cr	Mo	
.34 / .41	.70 / 1.05	0.15 / 0.35	.35 / .75	.35 / .65	.15 / .25	

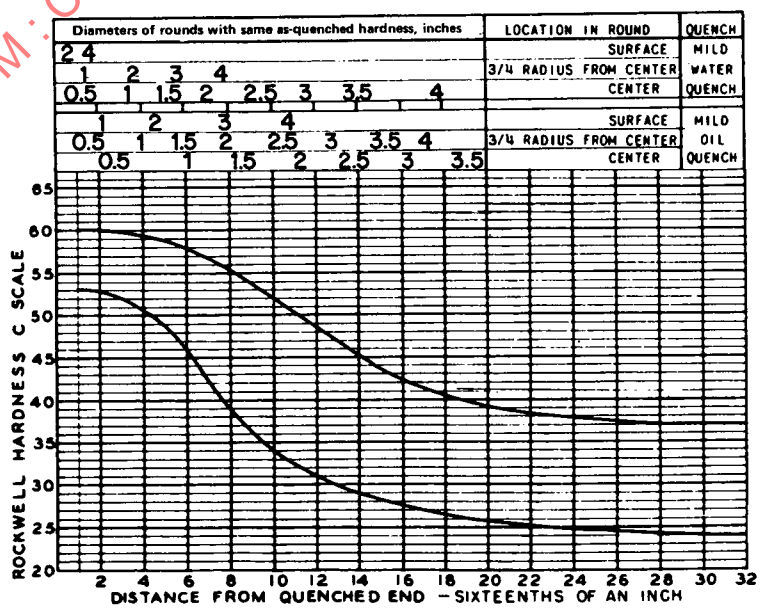


HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	8640H	
	MAX	MIN
1	60	53
2	60	53
3	60	52
4	59	51
5	59	49
6	58	46
7	57	42
8	55	39
9	54	36
10	52	34
11	50	32
12	49	31
13	47	30
14	45	29
15	44	28
16	42	28
18	41	26
20	39	26
22	38	25
24	38	25
26	37	24
28	37	24
30	37	24
32	37	24

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1600 °F
AUSTENITIZE 1550 °F
*For forged or rolled specimens only.

UNS H86400 Hardenability Band SAE/AISI 8640H

C	Mn	Si	Ni	Cr	Mo	
.37 / .44	.70 / 1.05	0.15 / 0.35	.35 / .75	.35 / .65	.15 / .25	

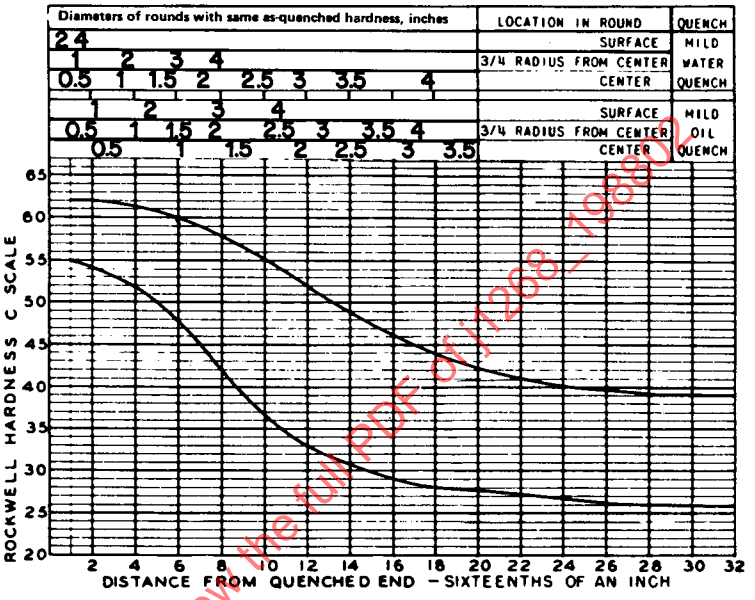


HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	8642H	
	MAX	MIN
1	62	55
2	62	54
3	62	53
4	61	52
5	61	50
6	60	48
7	59	45
8	58	42
9	57	39
10	55	37
11	54	34
12	52	33
13	50	32
14	49	31
15	48	30
16	46	29
18	44	28
20	42	28
22	41	27
24	40	27
26	40	26
28	39	26
30	39	26
32	39	26

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1600 °F
AUSTENITIZE 1550 °F
*For forged or rolled specimens only.

UNS H86420 Hardenability Band SAE/AISI 8642H

C	Mn	Si	Ni	Cr	Mo	
.39/.46	.70/1.05	0.15/0.35	.35/.75	.35/.65	.15/.25	

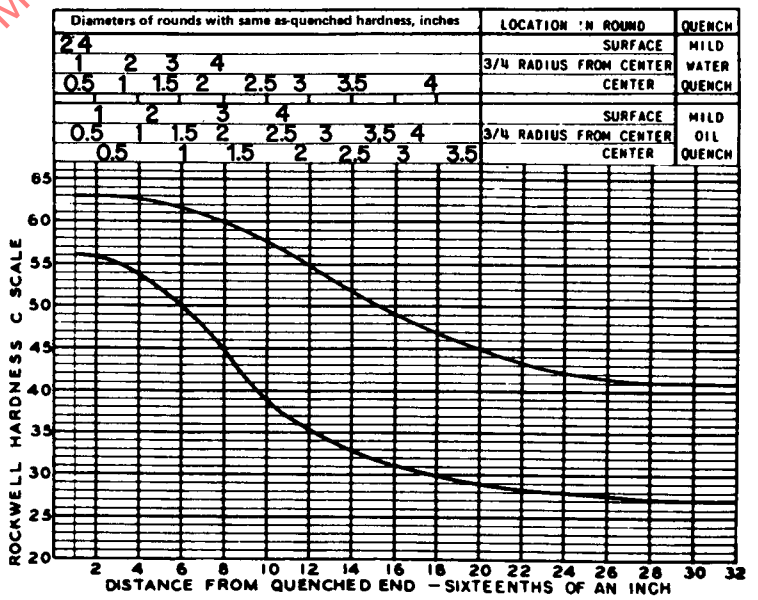


HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	8645H	
	MAX	MIN
1	63	56
2	63	56
3	63	55
4	63	54
5	62	52
6	61	50
7	61	48
8	60	45
9	59	41
10	58	39
11	56	37
12	55	35
13	54	34
14	52	33
15	51	32
16	49	31
18	47	30
20	45	29
22	43	28
24	42	28
26	42	27
28	41	27
30	41	27
32	41	27

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1600 °F
AUSTENITIZE 1550 °F
*For forged or rolled specimens only.

UNS H86450 Hardenability Band SAE/AISI 8645H

C	Mn	Si	Ni	Cr	Mo	
.42/.49	.70/1.05	0.15/0.35	.35/.75	.35/.65	.15/.25	



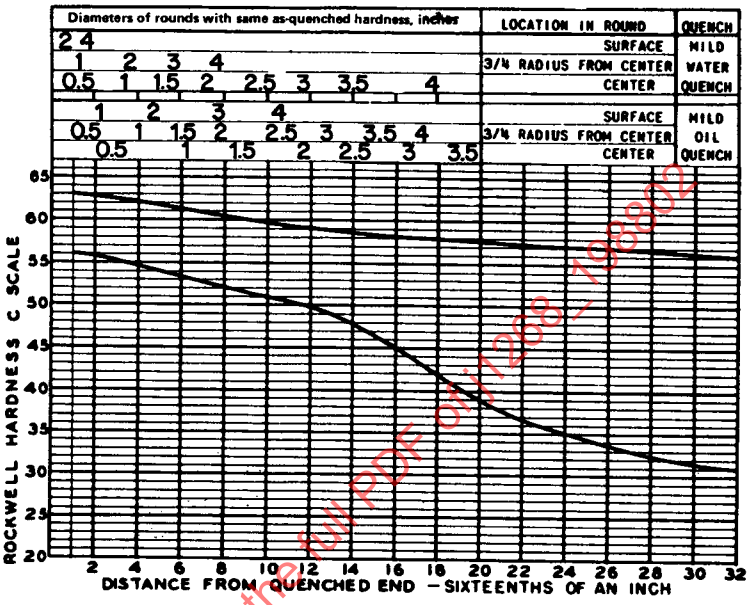
HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	86B45 H	
	MAX	MIN
1	63	56
2	63	56
3	62	55
4	62	54
5	62	54
6	61	53
7	61	52
8	60	52
9	60	51
10	60	51
11	59	50
12	59	50
13	59	49
14	59	48
15	58	46
16	58	45
18	58	42
20	58	39
22	57	37
24	57	35
26	57	34
28	57	32
30	56	32
32	56	31

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1600 °F
AUSTENITIZE 1550 °F
*For forged or rolled specimens only.

UNS H86451 Hardenability Band SAE/AISI 86B45H

C	Mn	Si	Ni	Cr	Mo	B
.42/.49	.70/1.05	0.15/0.35	.35/.75	.35/.65	.15/.25	*

*Contains 0.0005—0.003% boron.

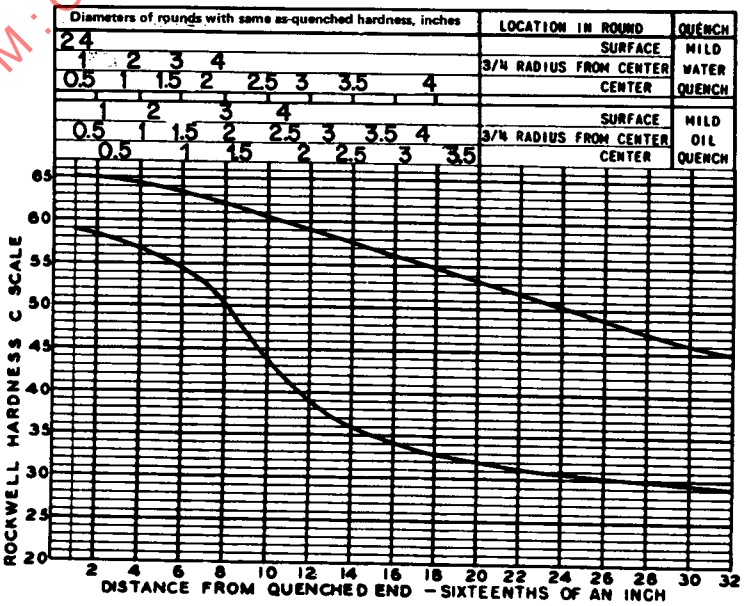


HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	8650H	
	MAX	MIN
1	65	59
2	65	58
3	65	57
4	64	57
5	64	56
6	63	54
7	63	53
8	62	50
9	61	47
10	60	44
11	60	41
12	59	39
13	58	37
14	58	36
15	57	35
16	56	34
18	55	33
20	53	32
22	52	31
24	50	31
26	49	30
28	47	30
30	46	29
32	45	29

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1600 °F
AUSTENITIZE 1550 °F
*For forged or rolled specimens only.

UNS H86500 Hardenability Band SAE/AISI 8650H

C	Mn	Si	Ni	Cr	Mo	
.47/.54	.70/1.05	0.15/0.35	.35/.75	.35/.65	.15/.25	

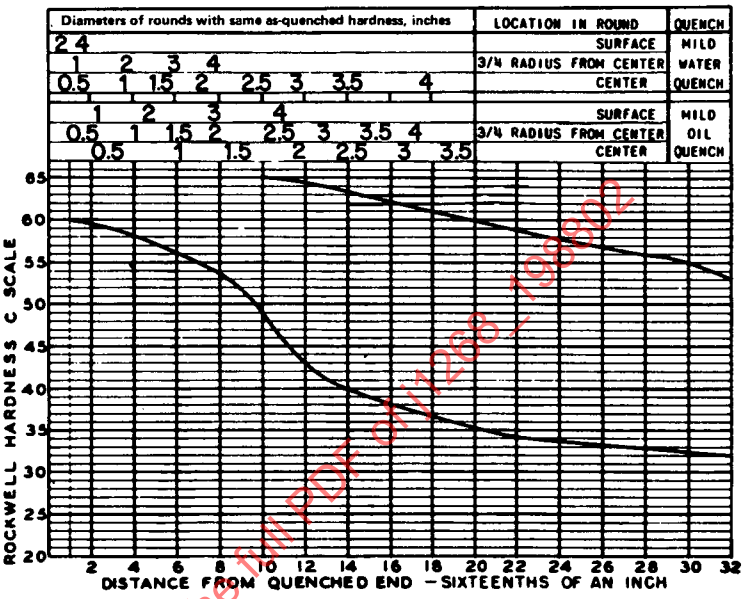


HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	8655H	
	MAX	MIN
1	-	60
2	-	59
3	-	59
4	-	58
5	-	57
6	-	56
7	-	55
8	-	54
9	-	52
10	65	49
11	65	46
12	64	43
13	64	41
14	63	40
15	63	39
16	62	38
18	61	37
20	60	35
22	59	34
24	58	34
26	57	33
28	56	33
30	55	32
32	53	32

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1600 °F
AUSTENITIZE 1550 °F
*For forged or rolled specimens only.

UNS H86550 Hardenability Band SAE/AISI 8655H

C	Mn	Si	Ni	Cr	Mo	
.50/.60	.70/1.05	0.15/0.35	.35/.75	.35/.65	.15/.25	

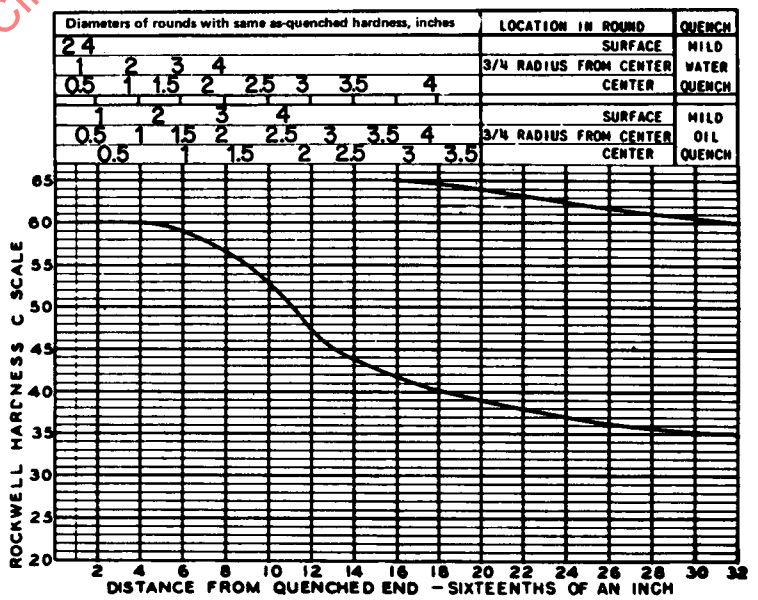


HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	8660H	
	MAX	MIN
1	-	60
2	-	60
3	-	60
4	-	60
5	-	60
6	-	59
7	-	58
8	-	57
9	-	55
10	-	53
11	-	50
12	-	47
13	-	45
14	-	44
15	-	43
16	65	42
18	64	40
20	64	39
22	63	38
24	62	37
26	62	36
28	61	36
30	60	35
32	60	35

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1600 °F
AUSTENITIZE 1550 °F
*For forged or rolled specimens only.

UNS H86600 Hardenability Band SAE/AISI 8660H

C	Mn	Si	Ni	Cr	Mo	
.55/.65	.70/1.05	0.15/0.35	.35/.75	.35/.65	.15/.25	



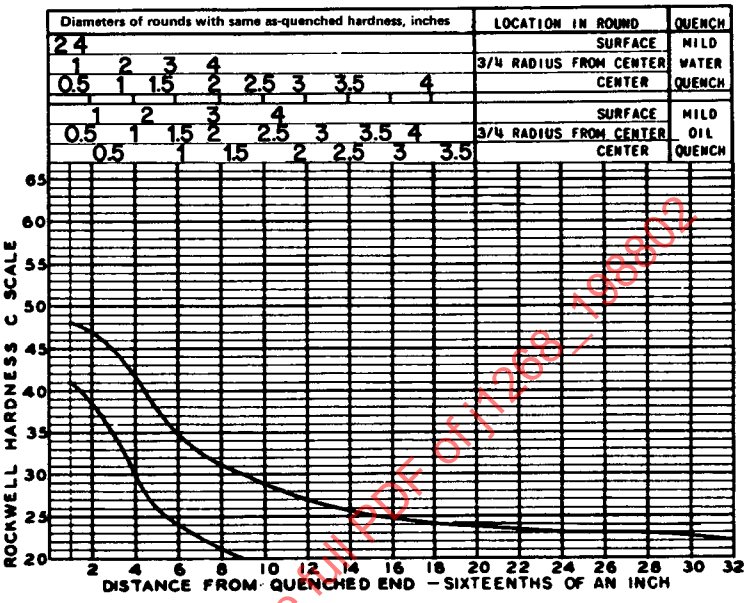
UNS H87200 Hardenability Band SAE/AISI 8720H

C	Mn	Si	Ni	Cr	Mo	
.17/.23	.60/.95	0.15/0.35	.35/.75	.35/.65	.20/.30	

"J" DISTANCE SIXTEENTHS OF AN INCH	8720H MAX	8720H MIN
1	48	41
2	47	38
3	45	35
4	42	30
5	38	26
6	35	24
7	33	22
8	31	21
9	30	20
10	29	-
11	28	-
12	27	-
13	26	-
14	26	-
15	25	-
16	25	-
18	24	-
20	24	-
22	23	-
24	23	-
26	23	-
28	23	-
30	22	-
32	22	-

HARDNESS LIMITS FOR SPECIFICATION PURPOSES

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1700 °F
AUSTENITIZE 1700 °F
*For forged or rolled specimens only.



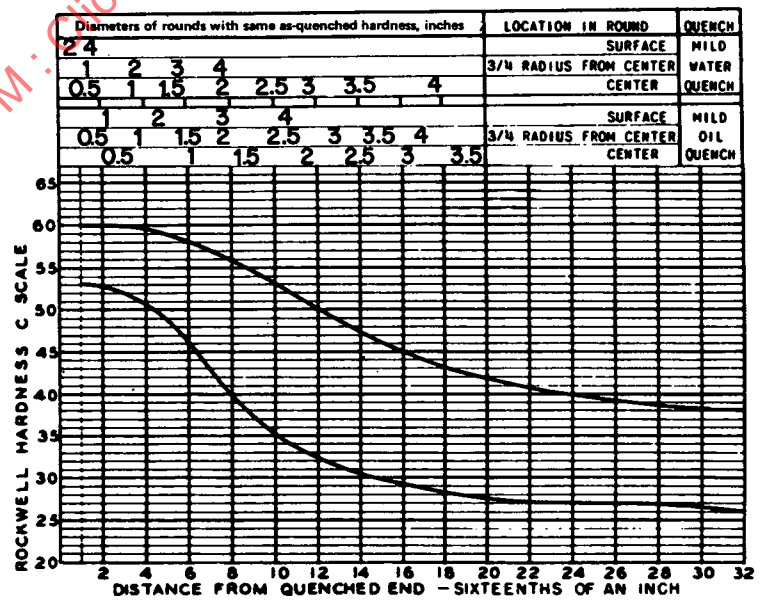
UNS H87400 Hardenability Band SAE/AISI 8740H

C	Mn	Si	Ni	Cr	Mo	
.37/.44	.70/1.05	0.15/0.35	.35/.75	.35/.65	.20/.30	

"J" DISTANCE SIXTEENTHS OF AN INCH	8740H MAX	8740H MIN
1	60	53
2	60	53
3	60	52
4	60	51
5	59	49
6	58	46
7	57	43
8	56	40
9	55	37
10	53	35
11	52	34
12	50	32
13	49	31
14	48	31
15	48	30
16	48	29
18	43	28
20	42	28
22	41	27
24	40	27
26	39	27
28	39	27
30	38	26
32	38	26

HARDNESS LIMITS FOR SPECIFICATION PURPOSES

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1600 °F
AUSTENITIZE 1550 °F
*For forged or rolled specimens only.

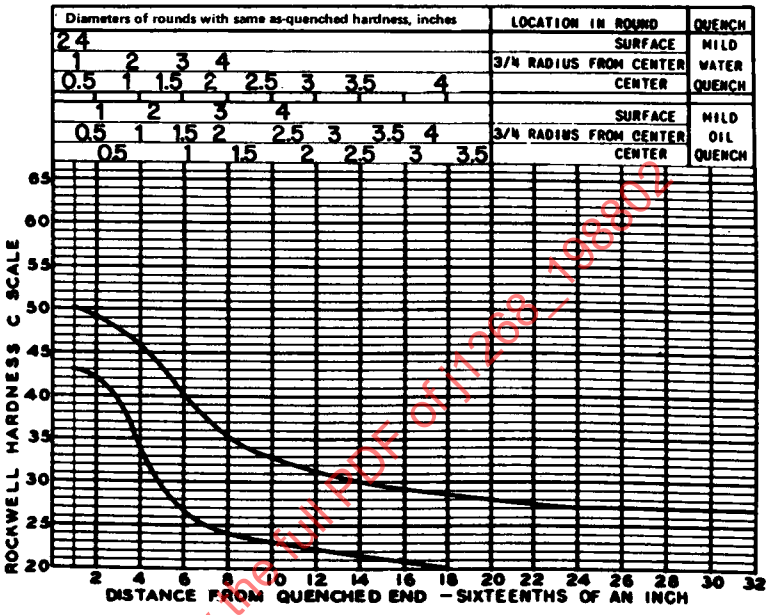


HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	8822 H	
	MAX	MIN
1	50	43
2	49	42
3	48	39
4	46	33
5	43	29
6	40	27
7	37	25
8	35	24
9	34	24
10	33	23
11	32	23
12	31	22
13	31	22
14	30	22
15	30	21
16	29	21
18	29	20
20	28	-
22	27	-
24	27	-
26	27	-
28	27	-
30	27	-
32	27	-

HEAT TREATING TEMPERATURES
RECOMMENDED BY SAE
*NORMALIZE 1700 °F
AUSTENITIZE 1700 °F
*For forged or rolled specimens only.

UNS H88220 Hardenability Band SAE/AISI 8822H

C	Mn	Si	Ni	Cr	Mo	
.19/.25	.70/1.05	0.15/0.35	.35/.75	.35/.65	.30/.40	

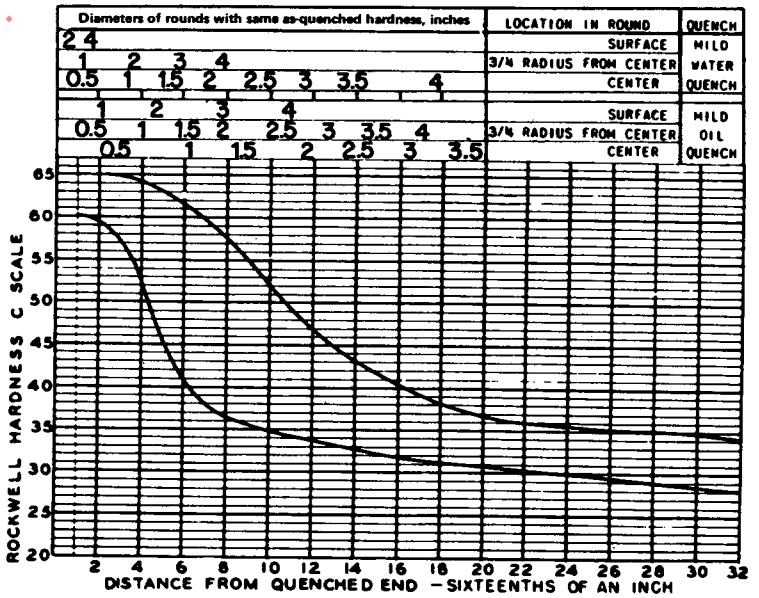


HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	9260H	
	MAX	MIN
1	-	60
2	-	60
3	65	57
4	64	53
5	63	46
6	62	41
7	60	38
8	58	36
9	55	36
10	52	35
11	49	34
12	47	34
13	45	33
14	43	33
15	42	32
16	40	32
18	38	31
20	37	31
22	36	30
24	36	30
26	35	29
28	35	29
30	35	28
32	34	28

HEAT TREATING TEMPERATURES
RECOMMENDED BY SAE
*NORMALIZE 1650 °F
AUSTENITIZE 1600 °F
*For forged or rolled specimens only.

UNS H92600 Hardenability Band SAE/AISI 9260H

C	Mn	Si				
.55/.65	.65/1.10	1.70/2.20				

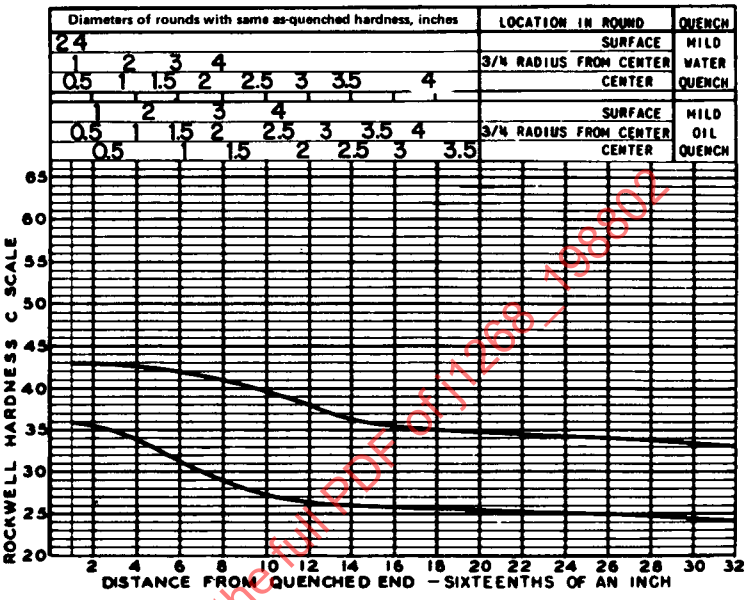


HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	9310H	
	MAX	MIN
1	43	36
2	43	35
3	43	35
4	42	34
5	42	32
6	42	31
7	42	30
8	41	29
9	40	28
10	40	27
11	39	27
12	38	26
13	37	26
14	36	26
15	36	26
16	35	26
18	35	26
20	35	25
22	34	25
24	34	25
26	34	25
28	34	25
30	33	24
32	33	24

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1700 °F
AUSTENITIZE 1550 °F
*For forged or rolled specimens only.

UNS H93100 Hardenability Band SAE/AISI 9310H

C	Mn	Si	Ni	Cr	Mo	
.07 / .13	.40 / .70	0.15/0.35	2.95 / 3.55	1.00 / 1.45	.08 / .15	



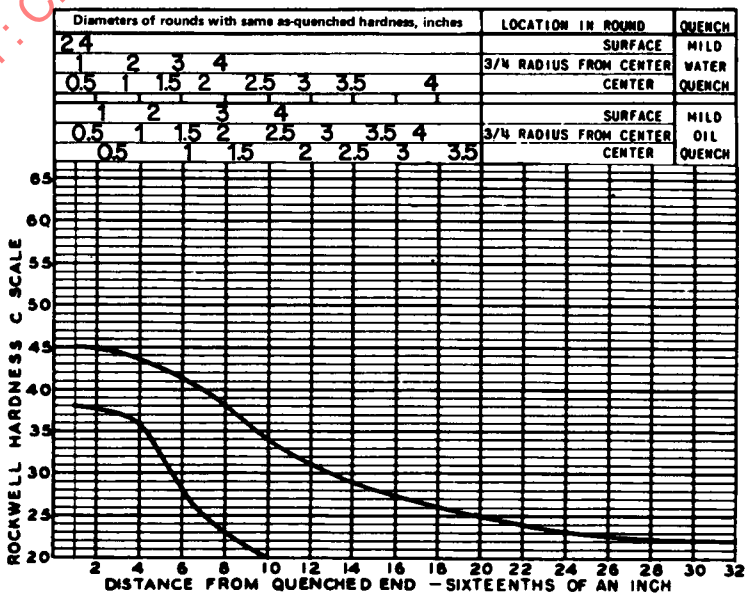
HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	94B15H	
	MAX	MIN
1	45	38
2	45	38
3	44	37
4	44	36
5	43	32
6	42	28
7	40	25
8	38	23
9	36	21
10	34	20
11	33	-
12	31	-
13	30	-
14	29	-
15	28	-
16	27	-
18	26	-
20	25	-
22	24	-
24	23	-
26	23	-
28	22	-
30	22	-
32	22	-

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE
*NORMALIZE 1700 °F
AUSTENITIZE 1700 °F
*For forged or rolled specimens only.

UNS H94151 Hardenability Band SAE/AISI 94B15H

C	Mn	Si	Ni	Cr	Mo	B
.12 / .18	.70 / 1.05	0.15/0.35	.25 / .65	.25 / .55	.08 / .15	*

*Contains 0.0005—0.003% boron.



HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	94B17H	
	MAX	MIN
1	46	39
2	46	39
3	45	38
4	45	37
5	44	34
6	43	29
7	42	26
8	41	24
9	40	23
10	38	21
11	36	20
12	34	-
13	33	-
14	32	-
15	31	-
16	30	-
18	28	-
20	27	-
22	26	-
24	25	-
26	24	-
28	24	-
30	23	-
32	23	-

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

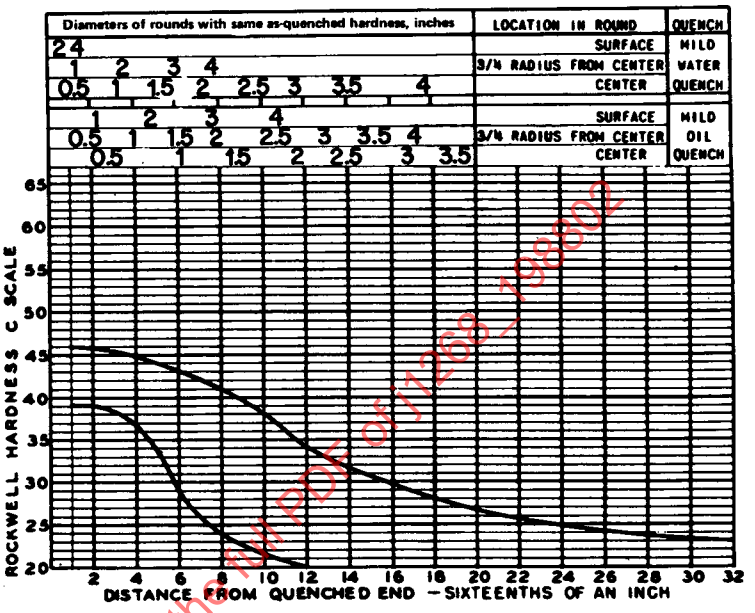
*NORMALIZE	1700 °F
AUSTENITIZE	1700 °F

*For forged or rolled specimens only.

UNS H94171 Hardenability Band SAE/AISI 94B17H

C	Mn	Si	Ni	Cr	Mo	B
.14 / .20	.70 / 1.05	0.15/0.35	.25 / .65	.25 / .55	.08 / .15	*

*Contains 0.0005–0.003% boron.



HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE SIXTEENTHS OF AN INCH	94B30 H	
	MAX	MIN
1	56	49
2	56	49
3	55	48
4	55	48
5	54	47
6	54	46
7	53	44
8	53	42
9	52	39
10	52	37
11	51	34
12	51	32
13	50	30
14	49	29
15	48	28
16	48	27
18	44	25
20	42	24
22	40	23
24	38	23
26	37	22
28	35	21
30	34	21
32	34	20

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

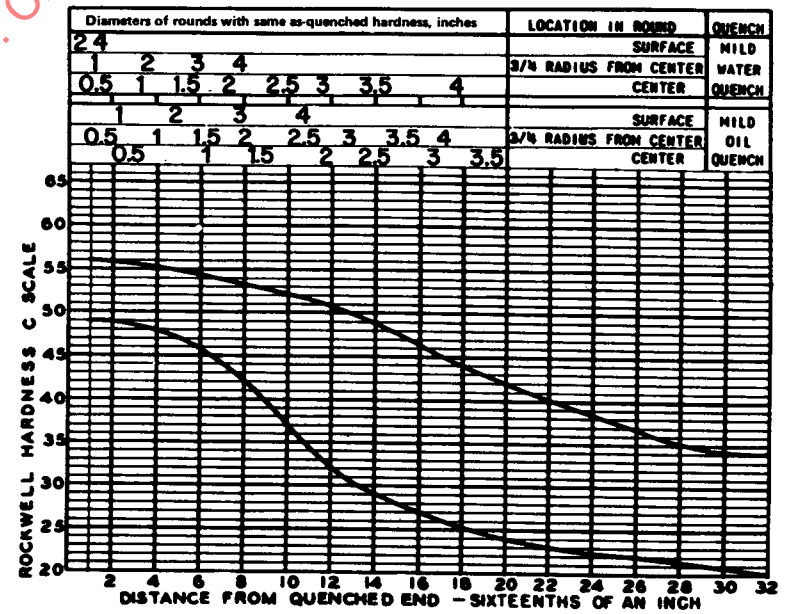
*NORMALIZE	1650 °F
AUSTENITIZE	1600 °F

*For forged or rolled specimens only.

UNS H94301 Hardenability Band SAE/AISI 94B30H

C	Mn	Si	Ni	Cr	Mo	B
.27 / .33	.70 / 1.05	0.15/0.35	.25 / .65	.25 / .55	.08 / .15	*

*Contains 0.0005–0.003% boron.



UNS H10380

HARDENABILITY BAND

SAE/AISI 1038H

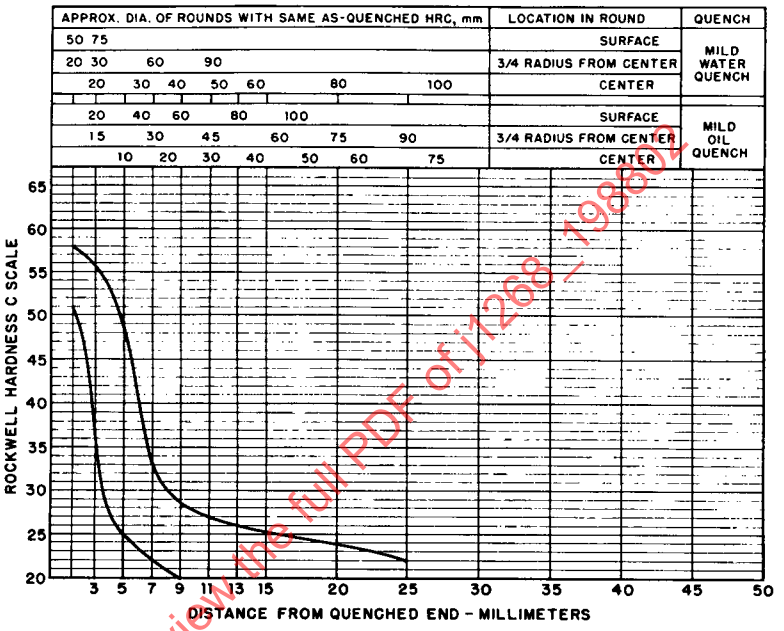
%C	%Mn	%Si	%Ni	%Cr	%Mo	
0.34/0.38	0.50/1.00	0.15/0.35				

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE MILLIMETERS	HRC MAX.	HRC MIN.
1.5	58	51
3	56	37
5	49	25
7	33	22
9	29	20
11	27	--
13	26	--
15	25	--
20	24	--
25	22	--
30	--	--
35		
40		
45		
50		

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE	870 °C
AUSTENITIZE	845 °C

*For forged or rolled specimens only



UNS H10450

HARDENABILITY BAND

SAE/AISI 1045H

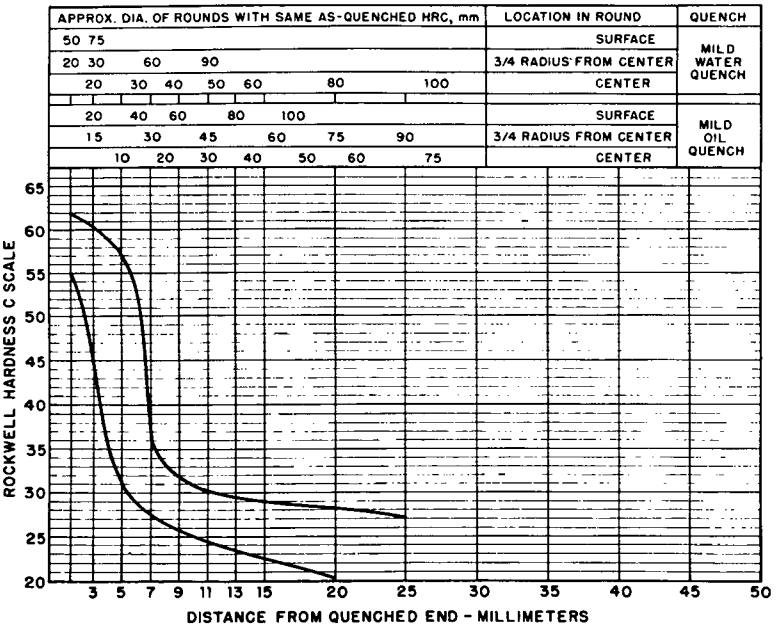
%C	%Mn	%Si	%Ni	%Cr	%Mo	
0.42/0.51	0.50/1.00	0.15/0.35				

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE MILLIMETERS	HRC MAX.	HRC MIN.
1.5	62	55
3	60	45
5	53	31
7	36	27
9	32	25
11	31	24
13	30	23
15	29	22
20	28	20
25	27	--
30	--	--
35		
40		
45		
50		

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE	870 °C
AUSTENITIZE	845 °C

*For forged or rolled specimens only



UNS H15220

HARDENABILITY BAND

SAE/AISI 1522H

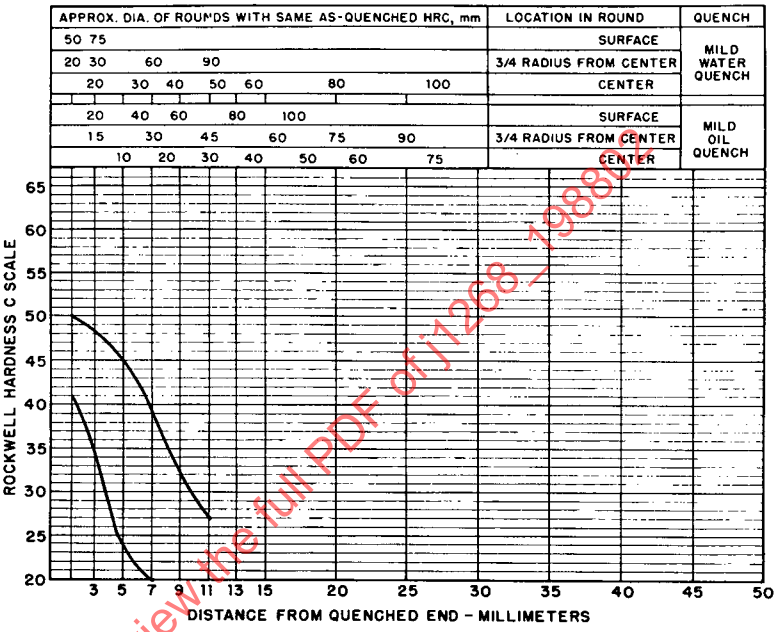
%C	%Mn	%Si	%Ni	%Cr	%Mo	
0.17/0.25	1.00/1.50	0.15/0.35				

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE MILLIMETERS	HRC MAX.	HRC MIN.
1.5	50	41
3	48	35
5	45	23
7	39	20
9	32	--
11	27	--
13	--	--
15		
20		
25		
30		
35		
40		
45		
50		

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE	925 °C
AUSTENITIZE	925 °C

*For forged or rolled specimens only



UNS H15240

HARDENABILITY BAND

SAE/AISI 1524H

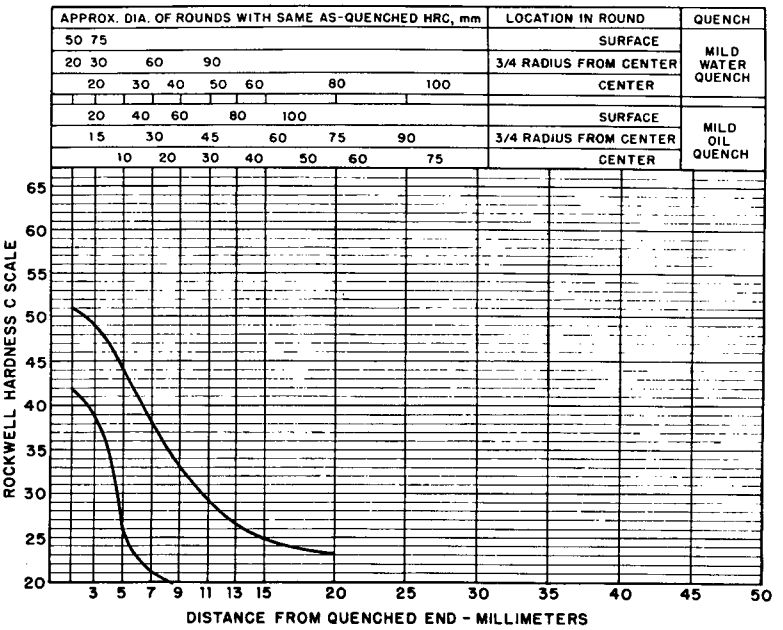
%C	%Mn	%Si	%Ni	%Cr	%Mo	
0.18/0.26	1.25/1.75	0.15/0.35				

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE MILLIMETERS	HRC MAX.	HRC MIN
1.5	51	42
3	49	39
5	44	26
7	38	21
9	34	--
11	30	--
13	27	--
15	25	--
20	23	--
25	--	--
30		
35		
40		
45		
50		

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE	900 °C
AUSTENITIZE	870 °C

*For forged or rolled specimens only



UNS H15260

HARDENABILITY BAND

SAE/AISI 1526H

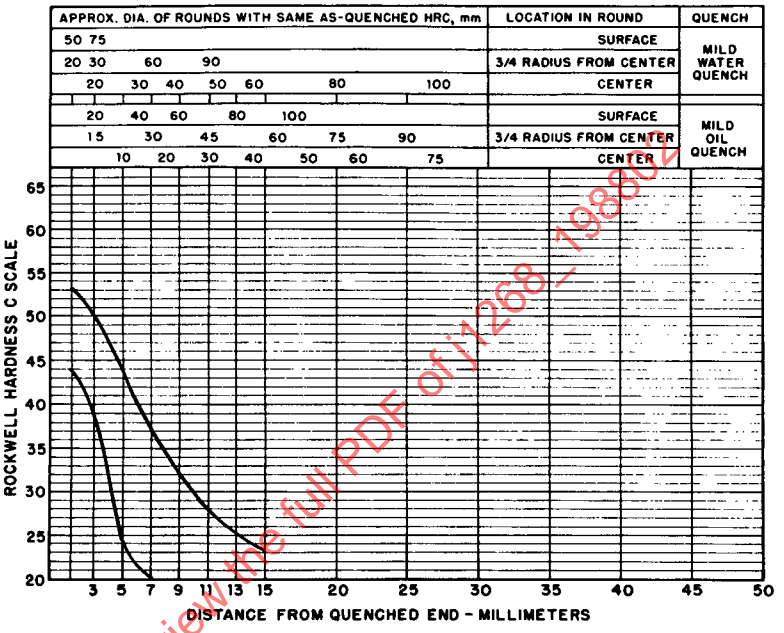
%C	%Mn	%Si	%Ni	%Cr	%Mo	
0.21/0.30	1.00/1.50	0.15/0.35				

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE MILLIMETERS	HRC MAX.	HRC MIN.
1.5	53	44
3	50	39
5	44	24
7	37	20
9	32	--
11	28	--
13	25	--
15	24	--
20	--	--
25		
30		
35		
40		
45		
50		

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE	900 °C
AUSTENITIZE	870 °C

*For forged or rolled specimens only



UNS H15410

HARDENABILITY BAND

SAE/AISI 1541H

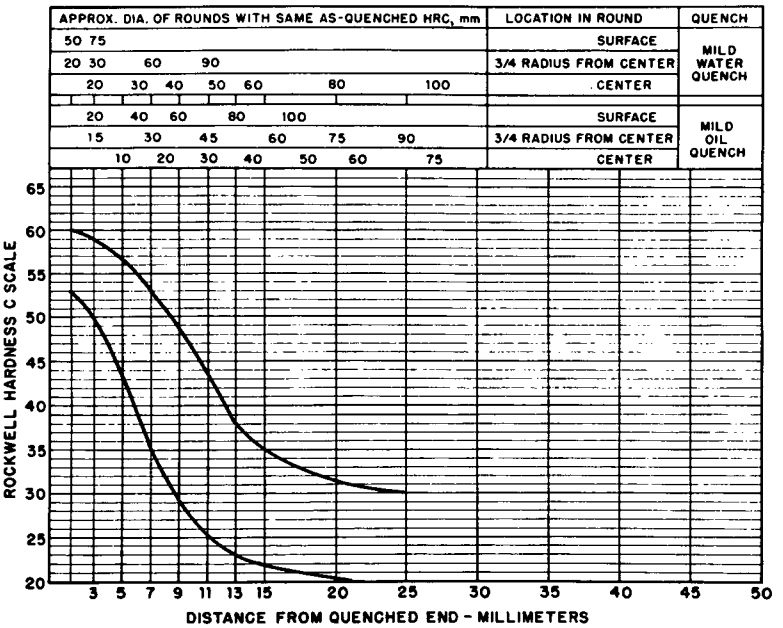
%C	%Mn	%Si	%Ni	%Cr	%Mo	
0.35/0.45	1.25/1.75	0.15/0.35				

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE MILLIMETERS	HRC MAX.	HRC MIN.
1.5	60	53
3	59	50
5	57	43
7	53	36
9	49	29
11	44	25
13	38	23
15	35	22
20	32	20
25	30	--
30	--	--
35		
40		
45		
50		

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE	870 °C
AUSTENITIZE	845 °C

*For forged or rolled specimens only



UNS H15211

HARDENABILITY BAND

SAE/AISI 15B21H

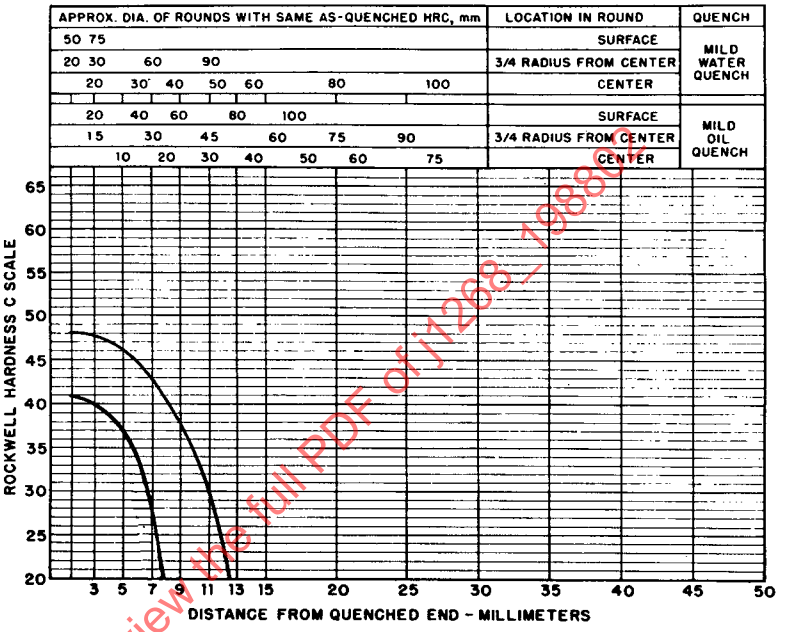
%C	%Mn	%Si	%Ni	%Cr	%Mo	% B
0.17/0.24	0.70/1.20	0.15/0.35	--	--	--	0.0005/ 0.003

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE MILLIMETERS	HRC MAX.	HRC MIN.
1.5	48	41
3	48	40
5	46	36
7	43	27
9	38	--
11	30	--
13	--	--
15		
20		
25		
30		
35		
40		
45		
50		

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE	925 °C
AUSTENITIZE	925 °C

*For forged or rolled specimens only



UNS H15281

HARDENABILITY BAND

SAE/AISI 15B28H

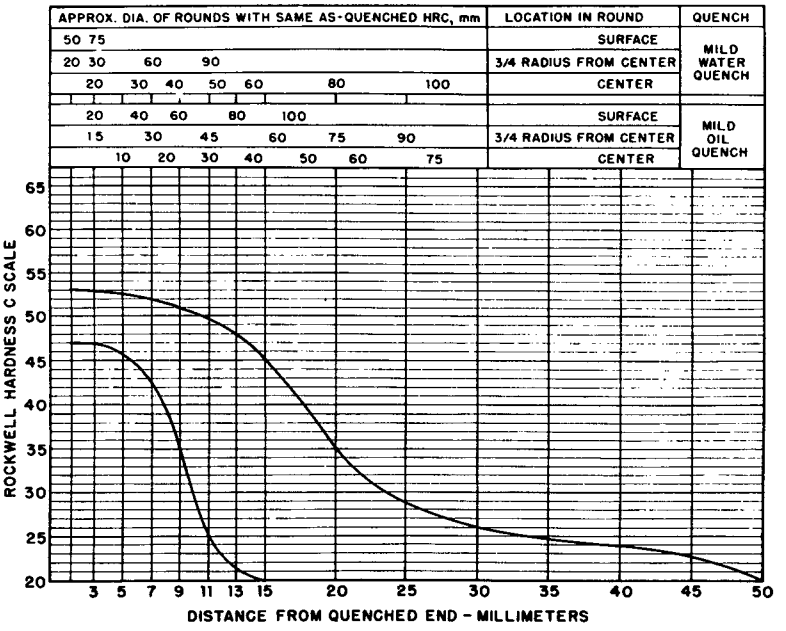
%C	%Mn	%Si	%Ni	%Cr	%Mo	% B
0.25/0.34	1.00/1.50	0.15/0.35	--	--	--	0.0005/ 0.003

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE MILLIMETERS	HRC MAX.	HRC MIN.
1.5	53	47
3	53	47
5	53	46
7	52	43
9	51	35
11	50	24
13	48	21
15	45	20
20	35	--
25	29	--
30	26	--
35	25	--
40	24	--
45	23	--
50	20	--

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE	900 °C
AUSTENITIZE	870 °C

*For forged or rolled specimens only



UNS H15301

HARDENABILITY BAND

SAE/AISI 15B30H

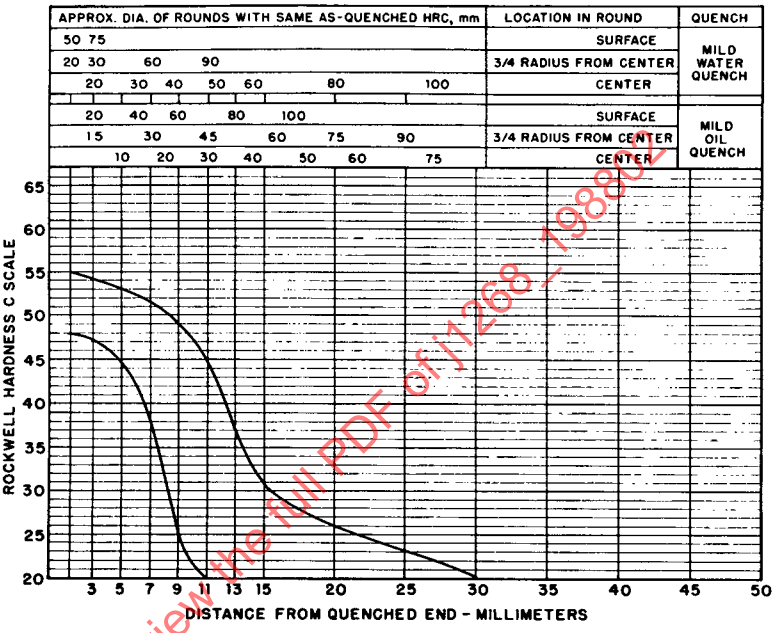
%C	%Mn	%Si	%Ni	%Cr	%Mo	% B
0.27/0.35	0.70/1.20	0.15/0.35	--	--	--	0.0005/ 0.003

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE MILLIMETERS	HRC MAX.	HRC MIN.
1.5	55	48
3	54	47
5	53	45
7	52	38
9	49	25
11	45	20
13	38	--
15	31	--
20	26	--
25	23	--
30	20	--
35	--	--
40		
45		
50		

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE	900	°C
AUSTENITIZE	870	°C

*For forged or rolled specimens only



UNS H15351

HARDENABILITY BAND

SAE/AISI 15B35H

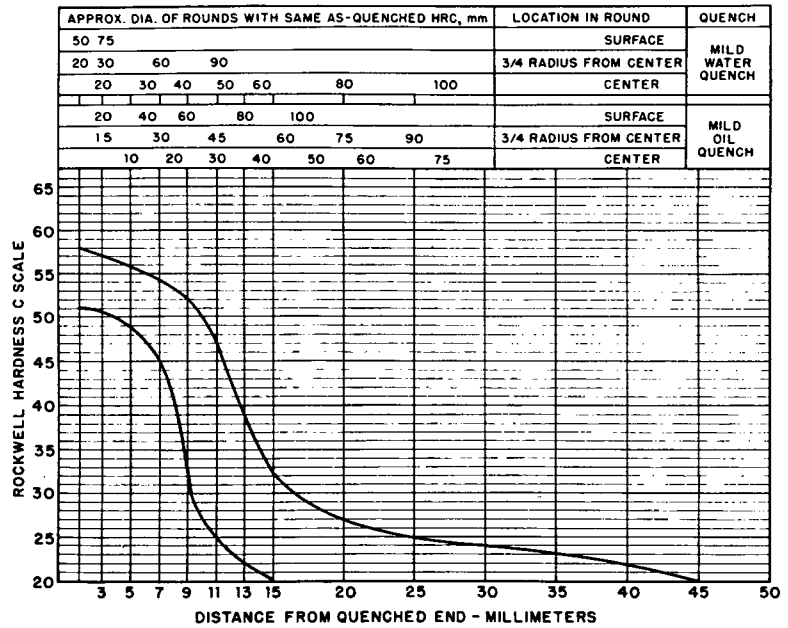
%C	%Mn	%Si	%Ni	%Cr	%Mo	% B
0.31/0.39	0.70/1.20	0.15/0.35	--	--	--	0.0005/ 0.003

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE MILLIMETERS	HRC MAX.	HRC MIN.
1.5	58	51
3	57	50
5	56	49
7	54	45
9	52	32
11	47	24
13	39	21
15	32	20
20	27	--
25	25	--
30	24	--
35	23	--
40	22	--
45	20	--
50	--	--

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE	870	°C
AUSTENITIZE	845	°C

*For forged or rolled specimens only



UNS H15371

HARDENABILITY BAND

SAE/AISI 15B37H

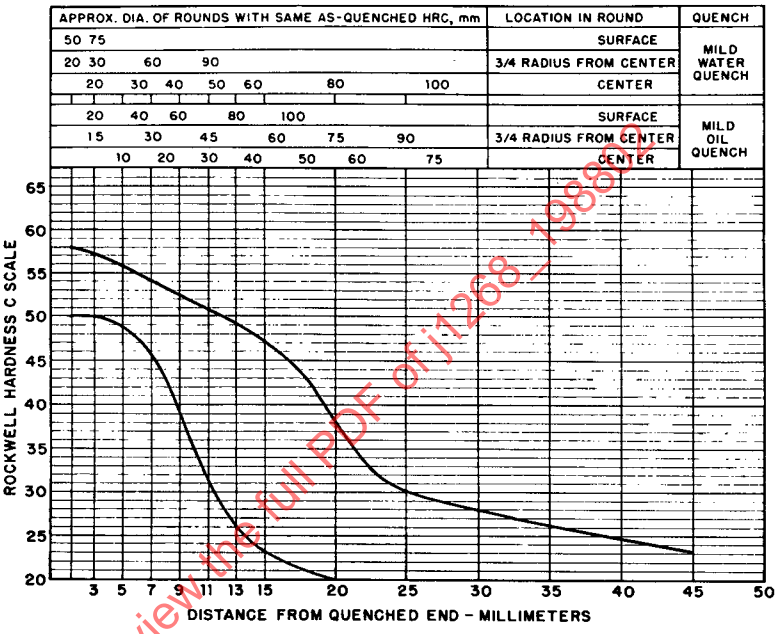
%C	%Mn	%Si	%Ni	%Cr	%Mo	% B
0.30/0.39	1.00/1.50	0.15/0.35	--	--	--	0.0005/ 0.003

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE MILLIMETERS	HRC MAX.	HRC MIN.
1.5	58	50
3	57	50
5	56	49
7	54	46
9	53	39
11	51	31
13	50	26
15	47	23
20	38	20
25	30	--
30	28	--
35	26	--
40	25	--
45	23	--
50	--	--

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE	870 °C
AUSTENITIZE	845 °C

*For forged or rolled specimens only



UNS H15411

HARDENABILITY BAND

SAE/AISI 15B41H

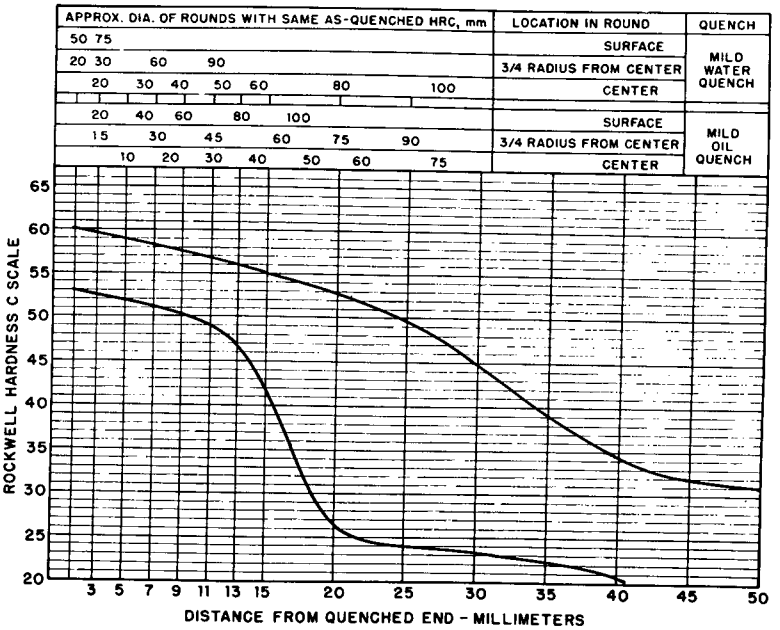
%C	%Mn	%Si	%Ni	%Cr	%Mo	% B
0.35/0.45	1.25/1.75	0.15/0.35	--	--	--	0.0005/ 0.003

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE MILLIMETERS	HRC MAX.	HRC MIN.
1.5	60	53
3	60	52
5	59	52
7	58	51
9	58	50
11	57	49
13	56	47
15	55	41
20	53	26
25	50	24
30	45	23
35	39	21
40	35	20
45	32	--
50	31	--

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE	870 °C
AUSTENITIZE	845 °C

*For forged or rolled specimens only



UNS H15481

HARDENABILITY BAND

SAE/AISI 15B48H

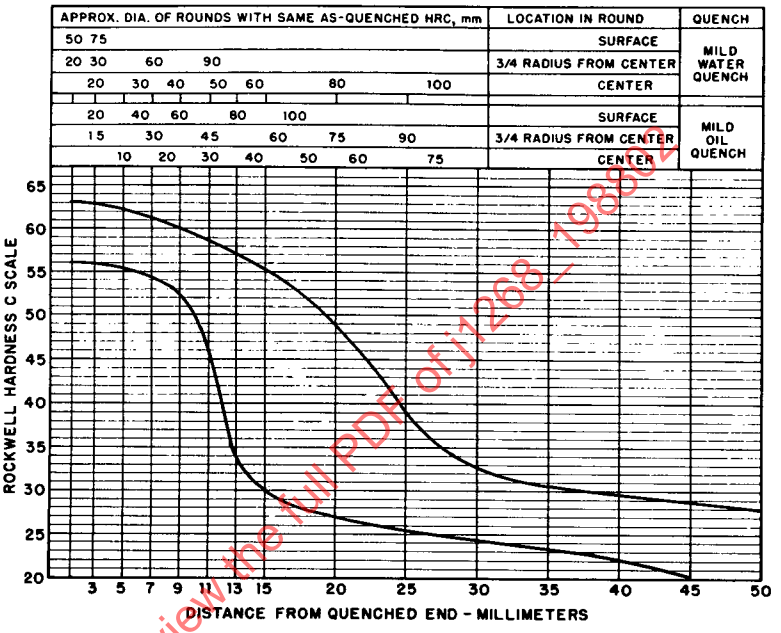
%C	%Mn	%Si	%Ni	%Cr	%Mo	% B
0.43/0.53	1.00/1.50	0.15/0.35	--	--	--	0.0005/ 0.003

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE MILLIMETERS	HRC MAX.	HRC MIN.
1.5	63	56
3	63	55
5	62	55
7	61	54
9	60	53
11	59	45
13	57	33
15	56	30
20	49	27
25	39	25
30	33	24
35	31	23
40	30	22
45	29	--
50	28	--

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE	870 °C
AUSTENITIZE	845 °C

*For forged or rolled specimens only



UNS H15621

HARDENABILITY BAND

SAE/AISI 15B62H

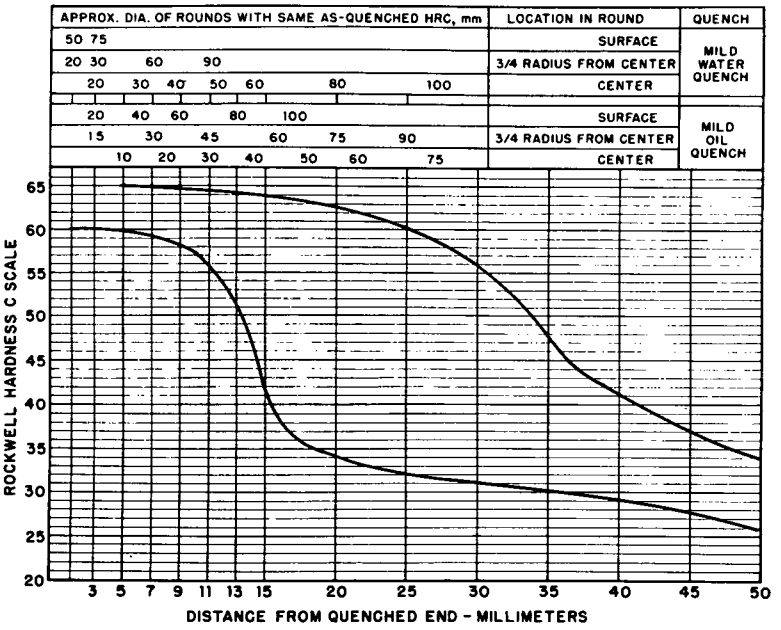
%C	%Mn	%Si	%Ni	%Cr	%Mo	% B
0.54/0.67	1.00/1.50	0.40/0.60	--	--	--	0.0005/ 0.003

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE MILLIMETERS	HRC MAX.	HRC MIN.
1.5	--	60
3	--	60
5	65	60
7	65	59
9	65	58
11	65	56
13	64	50
15	64	42
20	63	34
25	60	32
30	56	31
35	48	30
40	42	29
45	37	27
50	34	26

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE	870 °C
AUSTENITIZE	845 °C

*For forged or rolled specimens only



UNS 13300

HARDENABILITY BAND

SAE/AISI 1330H

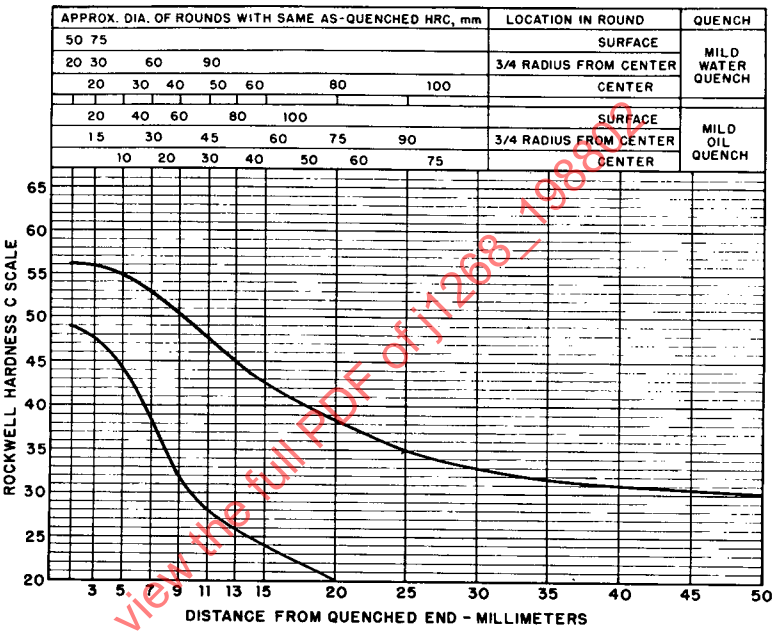
%C	%Mn	%Si	%Ni	%Cr	%Mo	
0.27/0.33	1.45/2.05	0.15/0.35				

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE MILLIMETERS	HRC MAX.	HRC MIN.
1.5	56	49
3	56	47
5	55	44
7	53	38
9	51	32
11	48	28
13	45	25
15	43	24
20	39	20
25	35	--
30	33	--
35	32	--
40	31	--
45	31	--
50	30	--

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE	900 °C
AUSTENITIZE	870 °C

*For forged or rolled specimens only



UNS H13350

HARDENABILITY BAND

SAE/AISI 1335H

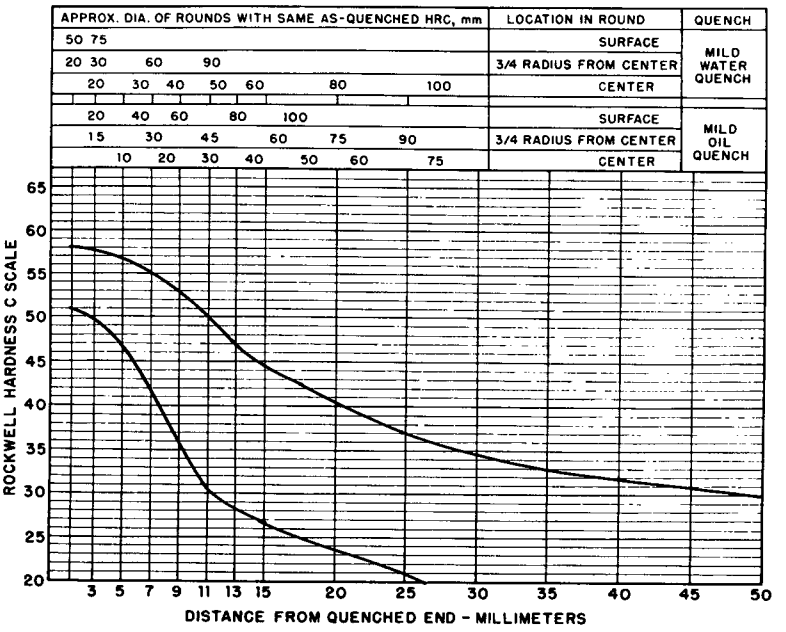
%C	%Mn	%Si	%Ni	%Cr	%Mo	
0.32/0.38	1.45/2.05	0.15/0.35				

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE MILLIMETERS	HRC MAX.	HRC MIN.
1.5	58	51
3	58	49
5	57	46
7	55	42
9	53	36
11	50	31
13	47	28
15	45	27
20	41	23
25	37	21
30	35	--
35	33	--
40	32	--
45	31	--
50	30	--

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE	870 °C
AUSTENITIZE	845 °C

*For forged or rolled specimens only



UNS H13400

HARDENABILITY BAND

SAE/AISI 1340H

%C	%Mn	%Si	%Ni	%Cr	%Mo	
0.37/0.44	1.45/2.05	0.15/0.35				

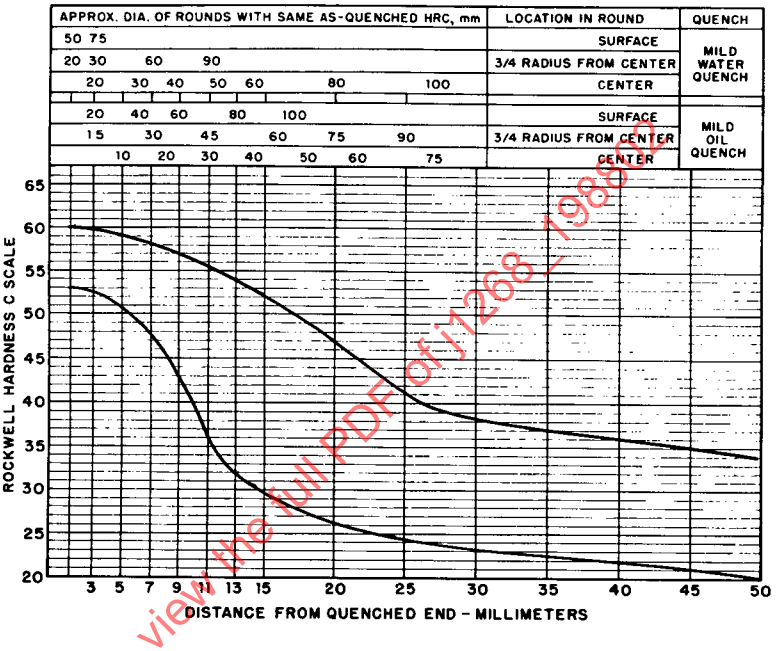
HARDNESS LIMITS FOR SPECIFICATION PURPOSES

"J" DISTANCE MILLIMETERS	HRC MAX.	HRC MIN.
1.5	60	53
3	60	52
5	59	50
7	58	48
9	57	42
11	56	36
13	54	32
15	52	30
20	47	26
25	41	24
30	39	23
35	37	22
40	36	21
45	35	20
50	34	20

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE	870 °C
AUSTENITIZE	845 °C

*For forged or rolled specimens only



UNS H13450

HARDENABILITY BAND

SAE/AISI 1345H

%C	%Mn	%Si	%Ni	%Cr	%Mo	
0.42/0.49	1.45/2.05	0.15/0.35				

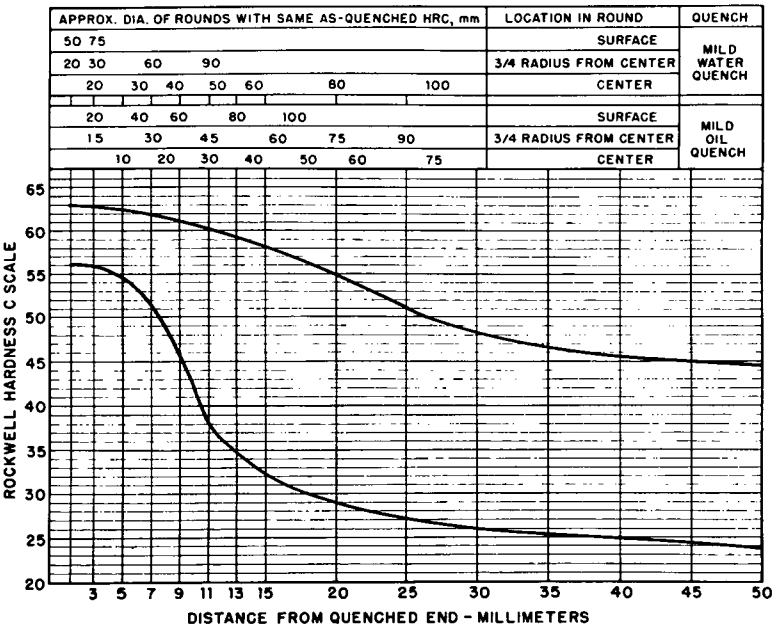
HARDNESS LIMITS FOR SPECIFICATION PURPOSES

"J" DISTANCE MILLIMETERS	HRC MAX.	HRC MIN.
1.5	63	56
3	63	56
5	63	54
7	62	52
9	61	46
11	60	38
13	59	35
15	58	31
20	55	29
25	51	27
30	48	26
35	47	25
40	46	24
45	45	24
50	45	24

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE	870 °C
AUSTENITIZE	845 °C

*For forged or rolled specimens only



UNS H40270
UNS H40280

HARDENABILITY BAND

SAE/AISI 4027H
SAE/AISI 4028H

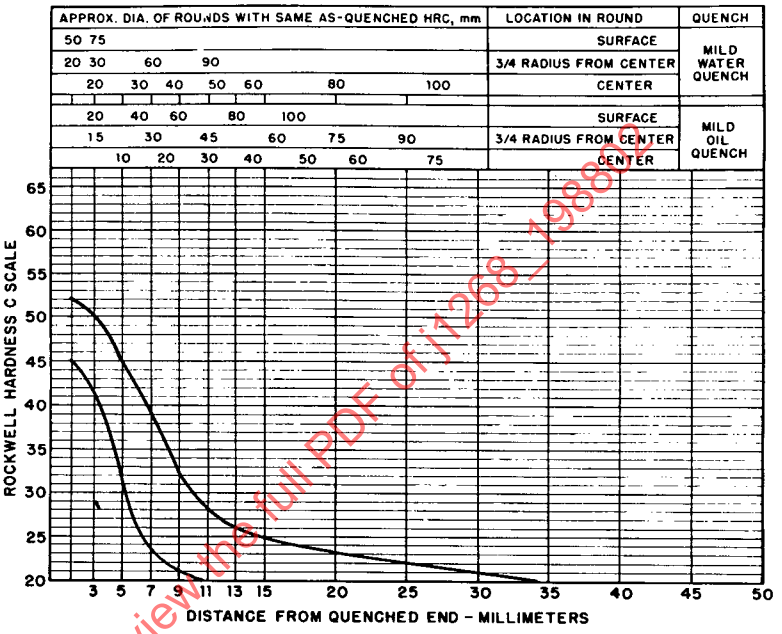
%C	%Mn	%Si	%Ni	%Cr	%Mo	
0.24/0.30	0.60/1.00	0.15/0.35	--	--	0.20/0.30	

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE MILLIMETERS	HRC MAX.	HRC MIN.
1.5	52	45
3	51	41
5	45	32
7	40	23
9	32	20
11	29	--
13	26	--
15	25	--
20	23	--
25	22	--
30	21	--
35	--	--
40		
45		
50		

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE	900 °C
AUSTENITIZE	870 °C

*For forged or rolled specimens only



UNS H40320

HARDENABILITY BAND

SAE/AISI 4032H

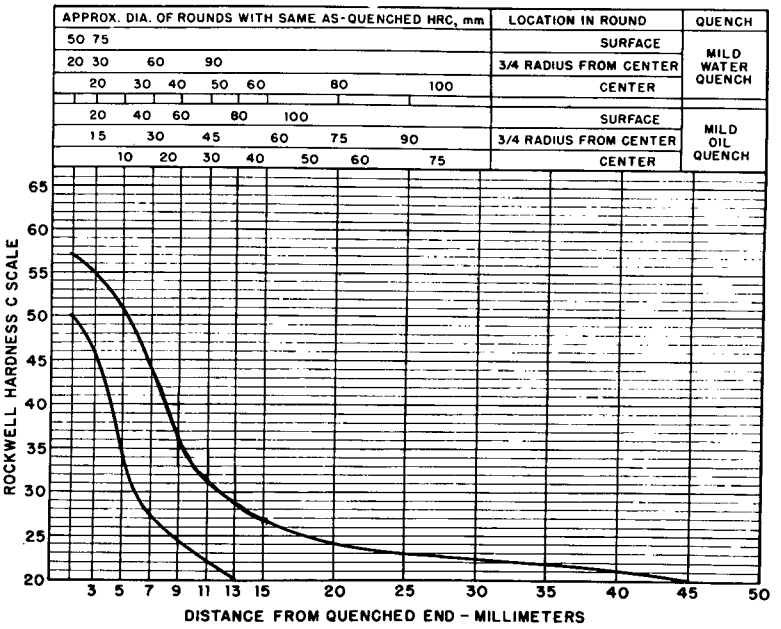
%C	%Mn	%Si	%Ni	%Cr	%Mo	
0.29/0.35	0.60/1.00	0.15/0.35	--	--	0.20/0.30	

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE MILLIMETERS	HRC MAX.	HRC MIN.
1.5	57	50
3	55	46
5	51	34
7	44	27
9	36	24
11	32	22
13	29	20
15	27	--
20	24	--
25	23	--
30	23	--
35	22	--
40	21	--
45	20	--
50	--	--

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE	900 °C
AUSTENITIZE	870 °C

*For forged or rolled specimens only



UNS H40370

HARDENABILITY BAND

SAE/AISI 4037H

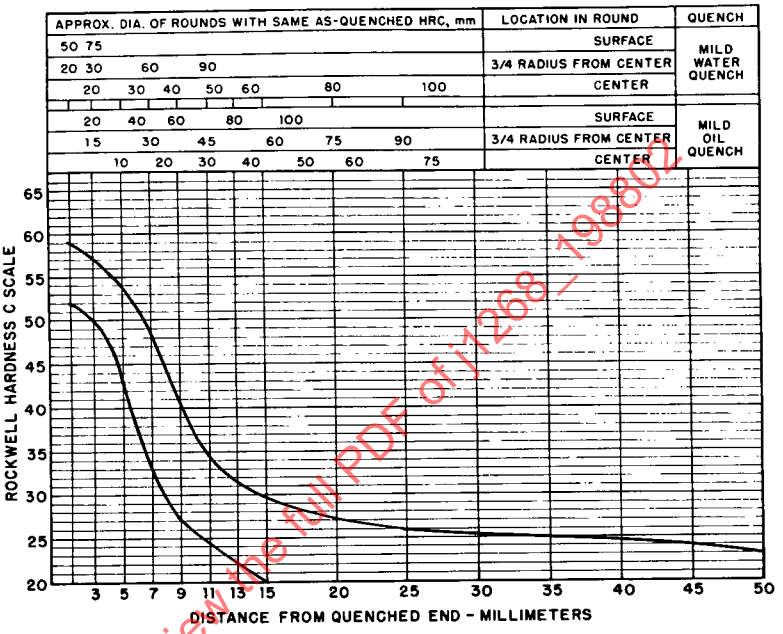
%C	%Mn	%Si	%Ni	%Cr	%Mo	
0.34/0.41	0.60/1.00	0.15/0.35	--	--	0.20/0.30	

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE MILLIMETERS	HRC MAX.	HRC MIN.
1.5	59	52
3	57	50
5	54	42
7	49	32
9	41	27
11	35	24
13	32	21
15	30	20
20	27	--
25	26	--
30	25	--
35	25	--
40	25	--
45	24	--
50	23	--

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE 870 °C
AUSTENITIZE 845 °C

*For forged or rolled specimens only



UNS H40420

HARDENABILITY BAND

SAE/AISI 4042H

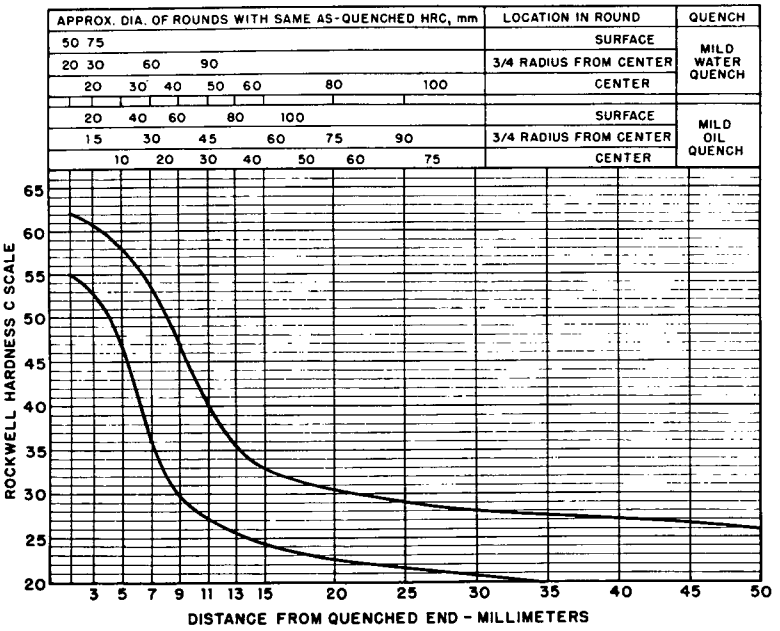
%C	%Mn	%Si	%Ni	%Cr	%Mo	
0.39/0.46	0.60/1.00	0.15/0.35	--	--	0.20/0.30	

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE MILLIMETERS	HRC MAX.	HRC MIN.
1.5	62	55
3	61	53
5	58	47
7	54	36
9	48	30
11	40	27
13	36	25
15	33	24
20	31	23
25	29	22
30	28	21
35	28	20
40	27	--
45	27	--
50	26	--

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE 870 °C
AUSTENITIZE 845 °C

*For forged or rolled specimens only



UNS H40470

HARDENABILITY BAND

SAE/AISI 4047H

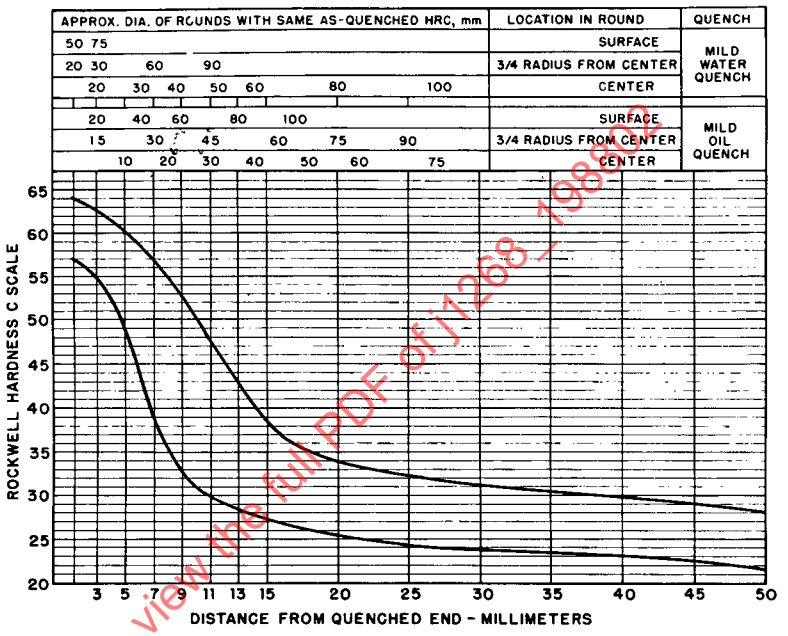
%C	%Mn	%Si	%Ni	%Cr	%Mo	
0.44/0.51	0.60/1.00	0.15/0.35	--	--	0.20/0.30	

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE MILLIMETERS	HRC MAX.	HRC MIN.
1.5	64	57
3	63	55
5	60	49
7	57	39
9	53	33
11	48	30
13	43	28
15	39	27
20	34	25
25	33	24
30	31	24
35	30	23
40	30	23
45	29	22
50	29	21

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE	870 °C
AUSTENITIZE	845 °C

*For forged or rolled specimens only



UNS H41180

HARDENABILITY BAND

SAE/AISI 4118H

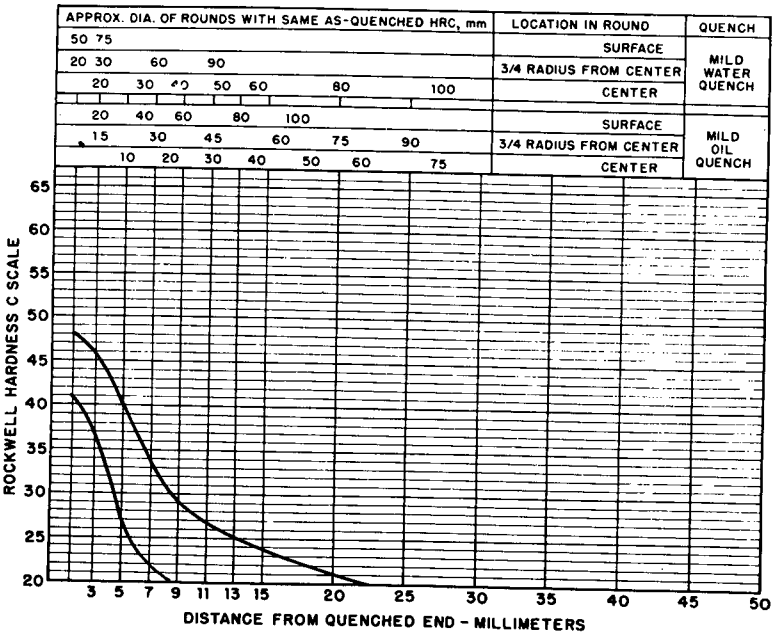
%C	%Mn	%Si	%Ni	%Cr	%Mo	
0.17/0.23	0.60/1.00	0.15/0.35	--	0.30/0.70	0.08/0.15	

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE MILLIMETERS	HRC MAX.	HRC MIN.
1.5	48	41
3	46	37
5	40	27
7	34	22
9	29	--
11	27	--
13	25	--
15	24	--
20	21	--
25	--	--
30		
35		
40		
45		
50		

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE	925 °C
AUSTENITIZE	925 °C

*For forged or rolled specimens only



UNS H41300

HARDENABILITY BAND

SAE/AISI 4130H

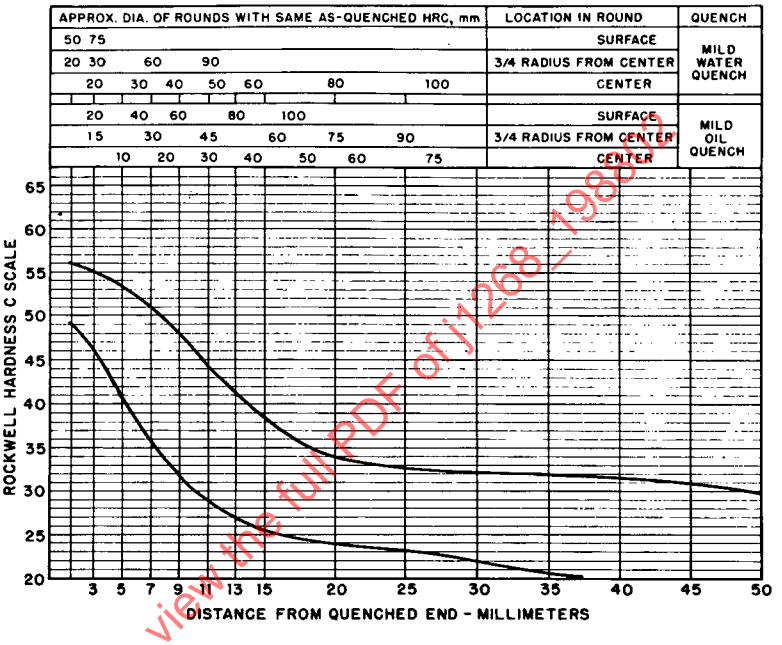
%C	%Mn	%Si	%Ni	%Cr	%Mo	
0.27/0.33	0.30/0.70	0.15/0.35	--	0.75/1.20	0.15/0.25	

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE MILLIMETERS	HRC MAX.	HRC MIN.
1.5	56	49
3	55	46
5	53	40
7	51	36
9	48	32
11	44	28
13	41	26
15	39	25
20	34	24
25	33	23
30	33	22
35	32	20
40	31	--
45	31	--
50	30	--

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE	900 °C
AUSTENITIZE	870 °C

*For forged or rolled specimens only



UNS H41350

HARDENABILITY BAND

SAE/AISI 4135H

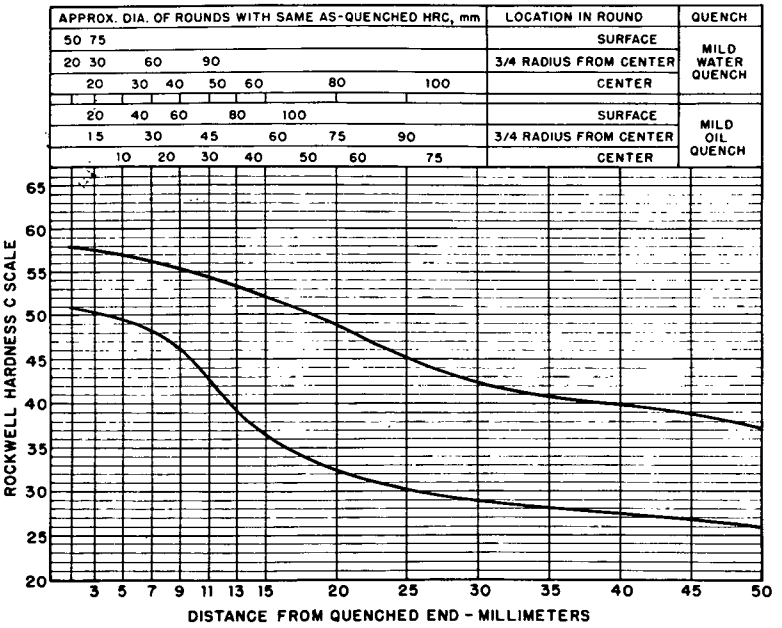
%C	%Mn	%Si	%Ni	%Cr	%Mo	
0.32/0.38	0.60/1.00	0.15/0.35	--	0.75/1.20	0.15/0.25	

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE MILLIMETERS	HRC MAX.	HRC MIN.
1.5	58	51
3	58	50
5	57	49
7	56	48
9	56	46
11	55	42
13	53	39
15	52	37
20	49	32
25	45	30
30	43	28
35	41	27
40	40	27
45	39	26
50	37	26

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE	870 °C
AUSTENITIZE	845 °C

*For forged or rolled specimens only



UNS H41370

HARDENABILITY BAND

SAE/AISI 4137H

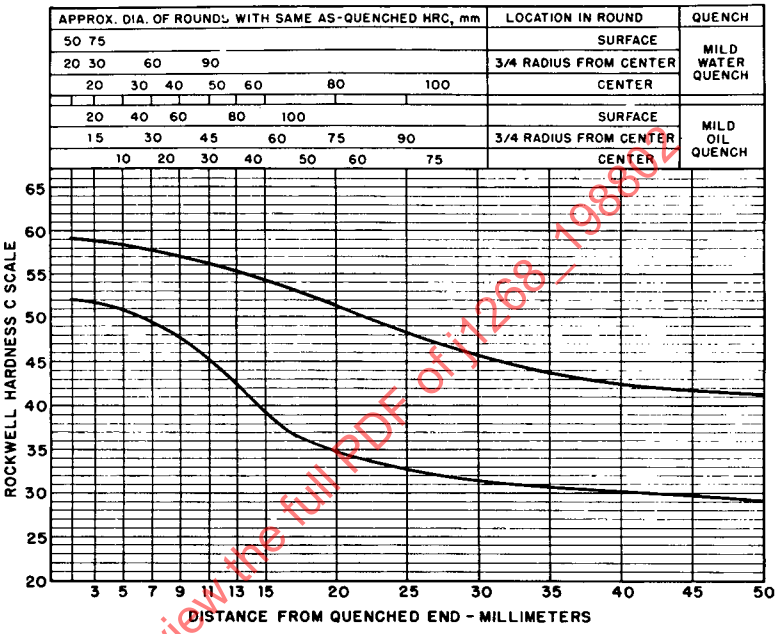
%C	%Mn	%Si	%Ni	%Cr	%Mo	
0.34/0.41	0.60/1.00	0.15/0.35	--	0.75/1.20	0.15/0.25	

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE MILLIMETERS	HRC MAX.	HRC MIN.
1.5	59	52
3	59	51
5	58	50
7	58	49
9	57	48
11	56	45
13	55	42
15	55	39
20	52	35
25	48	33
30	46	31
35	44	30
40	43	29
45	42	29
50	41	29

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE 870 °C
AUSTENITIZE 845 °C

*For forged or rolled specimens only



UNS H41400

HARDENABILITY BAND

SAE/AISI 4140H

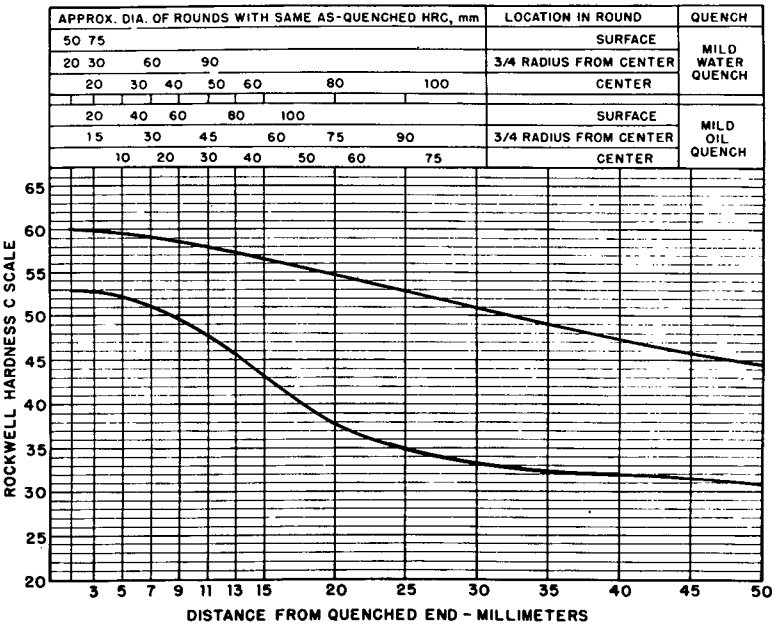
%C	%Mn	%Si	%Ni	%Cr	%Mo	
0.37/0.44	0.65/1.10	0.15/0.35	--	0.75/1.20	0.15/0.25	

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE MILLIMETERS	HRC MAX.	HRC MIN.
1.5	60	53
3	60	52
5	60	52
7	59	51
9	59	50
11	58	48
13	57	46
15	57	43
20	55	38
25	53	35
30	51	33
35	49	32
40	48	32
45	46	31
50	45	30

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE 870 °C
AUSTENITIZE 845 °C

*For forged or rolled specimens only



UNS H41420

HARDENABILITY BAND

SAE/AISI 4142H

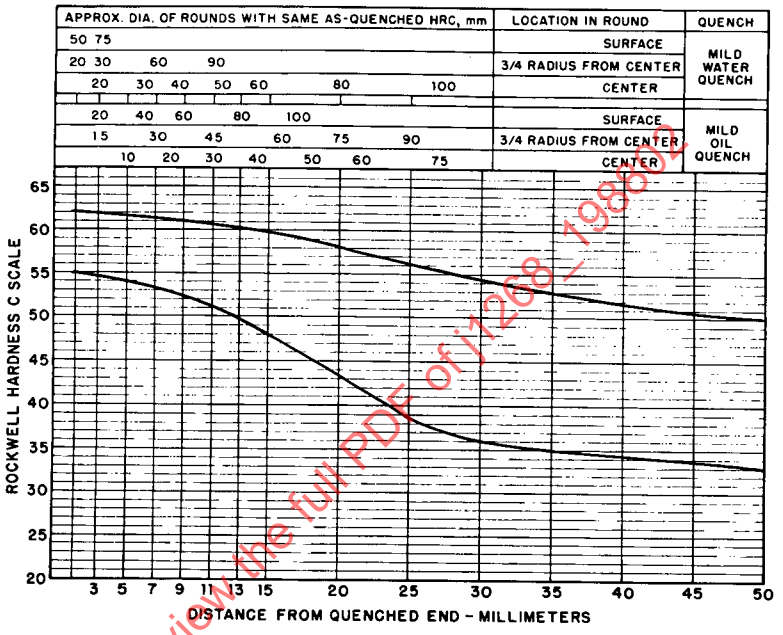
%C	%Mn	%Si	%Ni	%Cr	%Mo	
0.39/0.46	0.65/1.10	0.15/0.35	--	0.75/1.20	0.15/0.35	

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE MILLIMETERS	HRC MAX.	HRC MIN.
1.5	62	55
3	62	54
5	62	54
7	62	53
9	61	52
11	61	51
13	60	49
15	60	48
20	58	43
25	56	39
30	55	36
35	53	35
40	52	34
45	51	33
50	50	33

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE	870 °C
AUSTENITIZE	845 °C

*For forged or rolled specimens only



UNS H41450

HARDENABILITY BAND

SAE/AISI 4145H

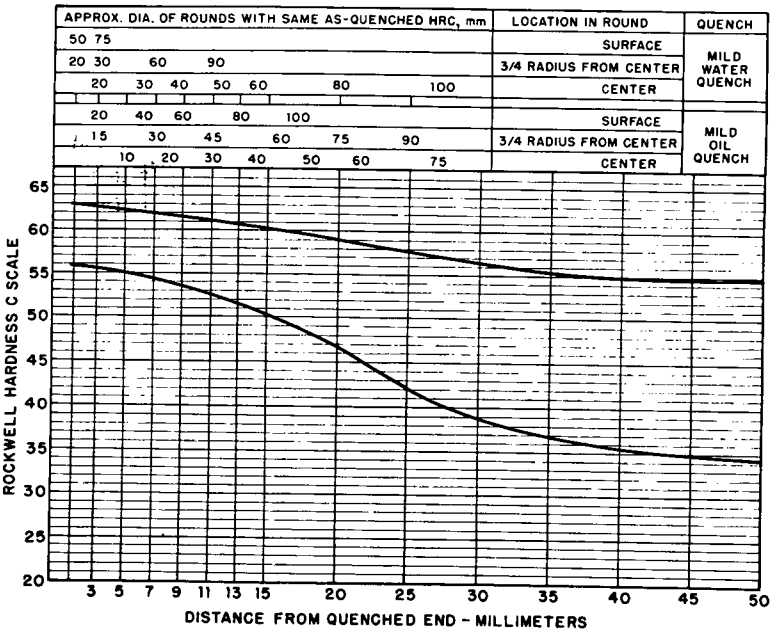
%C	%Mn	%Si	%Ni	%Cr	%Mo	
0.42/0.49	0.65/1.10	0.15/0.35	--	0.75/1.20	0.15/0.25	

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE MILLIMETERS	HRC MAX.	HRC MIN.
1.5	63	56
3	63	55
5	63	55
7	62	54
9	62	53
11	61	52
13	61	51
15	60	50
20	59	47
25	58	42
30	57	39
35	56	37
40	55	35
45	55	34
50	55	34

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE	870 °C
AUSTENITIZE	845 °C

*For forged or rolled specimens only



UNS H41470

HARDENABILITY BAND

SAE/AISI 4147H

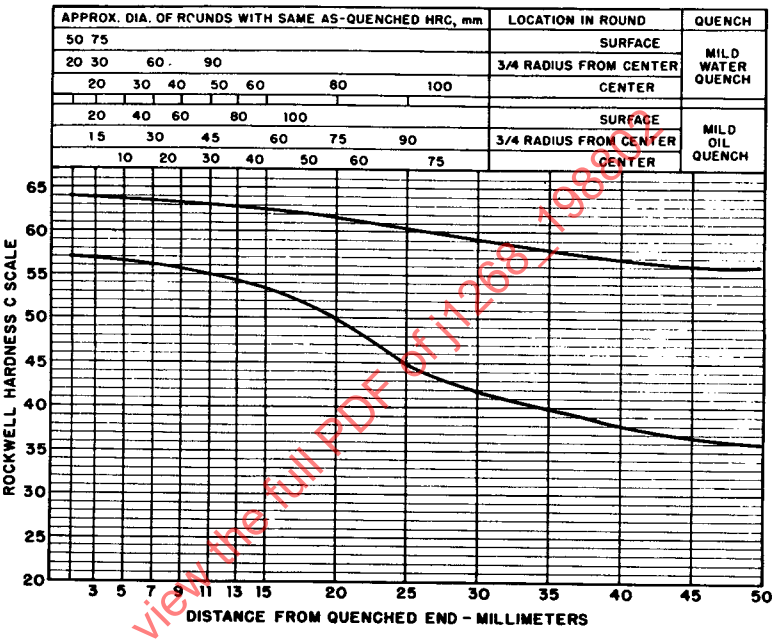
%C	%Mn	%Si	%Ni	%Cr	%Mo	
0.44/0.51	0.65/1.10	0.15/0.35	--	0.75/1.20	0.15/0.25	

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE MILLIMETERS	HRC MAX.	HRC MIN.
1.5	64	57
3	64	57
5	64	56
7	64	55
9	63	55
11	63	55
13	63	54
15	63	53
20	62	50
25	60	45
30	59	42
35	58	39
40	57	37
45	57	36
50	56	36

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE	870 °C
AUSTENITIZE	845 °C

*For forged or rolled specimens only



UNS H41500

HARDENABILITY BAND

SAE/AISI 4150H

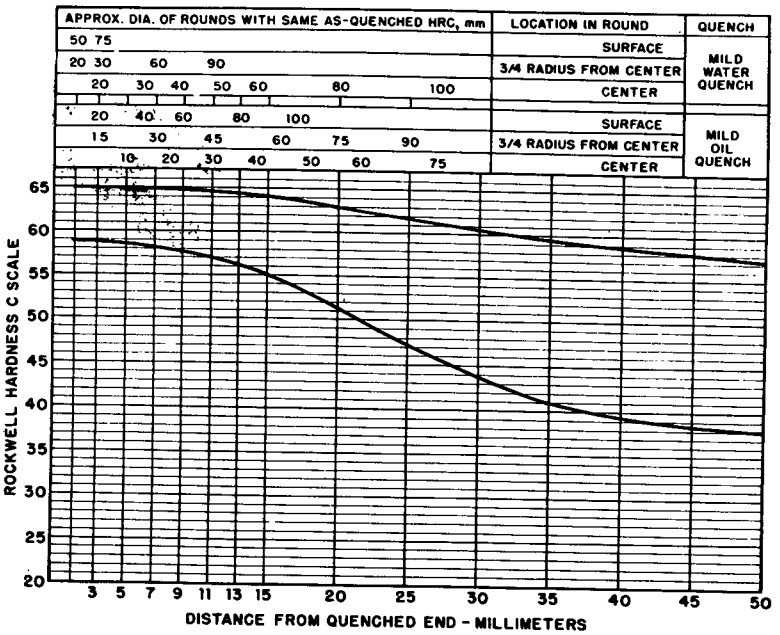
%C	%Mn	%Si	%Ni	%Cr	%Mo	
0.47/0.54	0.65/1.10	0.15/0.35	--	0.75/1.20	0.15/0.25	

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE MILLIMETERS	HRC MAX.	HRC MIN.
1.5	65	59
3	65	59
5	65	58
7	65	58
9	65	57
11	65	57
13	65	56
15	64	55
20	63	51
25	62	47
30	61	44
35	60	41
40	59	39
45	58	38
50	58	38

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE	870 °C
AUSTENITIZE	845 °C

*For forged or rolled specimens only



UNS H41610

HARDENABILITY BAND

SAE/AISI 4161H

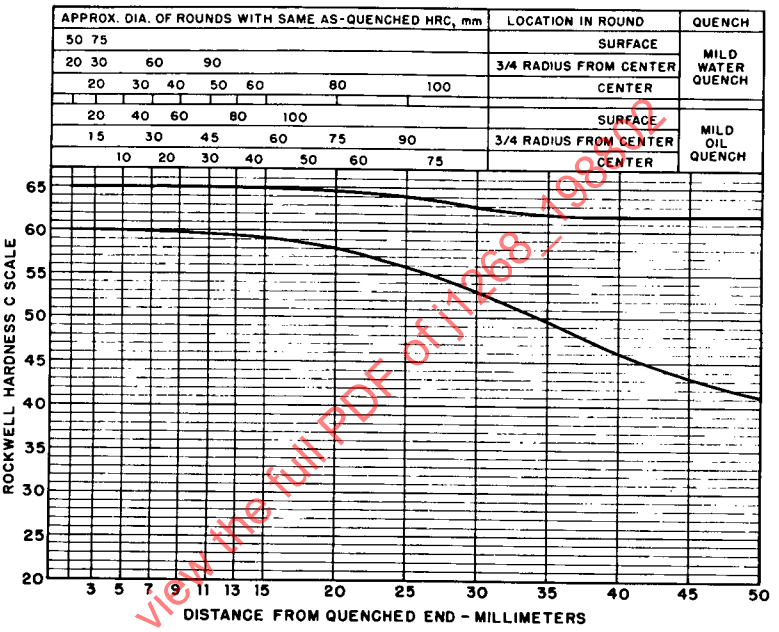
%C	%Mn	%Si	%Ni	%Cr	%Mo	
0.55/0.65	0.65/1.10	0.15/0.35	--	0.65/0.95	0.25/0.35	

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE MILLIMETERS	HRC MAX.	HRC MIN.
1.5	65	60
3	65	60
5	65	60
7	65	60
9	65	60
11	65	60
13	65	60
15	65	60
20	65	58
25	64	56
30	63	53
35	63	50
40	63	46
45	63	43
50	63	41

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE	870	°C
AUSTENITIZE	845	°C

*For forged or rolled specimens only



UNS H43200

HARDENABILITY BAND

SAE/AISI 4320H

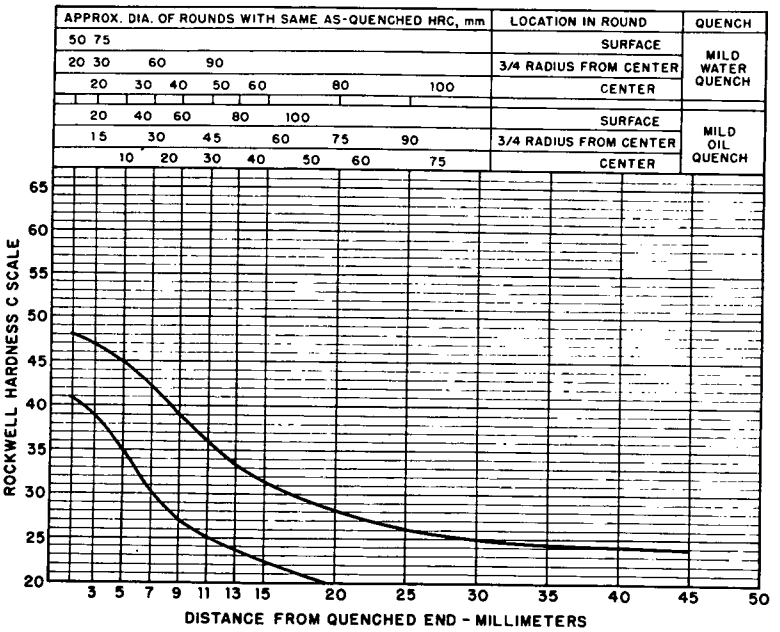
%C	%Mn	%Si	%Ni	%Cr	%Mo	
0.17/0.23	0.40/0.70	0.15/0.35	1.55/2.00	0.35/0.65	0.20/0.30	

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE MILLIMETERS	HRC MAX.	HRC MIN.
1.5	48	41
3	47	39
5	45	35
7	42	30
9	39	27
11	36	25
13	34	23
15	32	22
20	28	--
25	26	--
30	25	--
35	25	--
40	24	--
45	24	--
50	24	--

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE	925	°C
AUSTENITIZE	925	°C

*For forged or rolled specimens only



UNS H43400

HARDENABILITY BAND

SAE/AISI 4340H

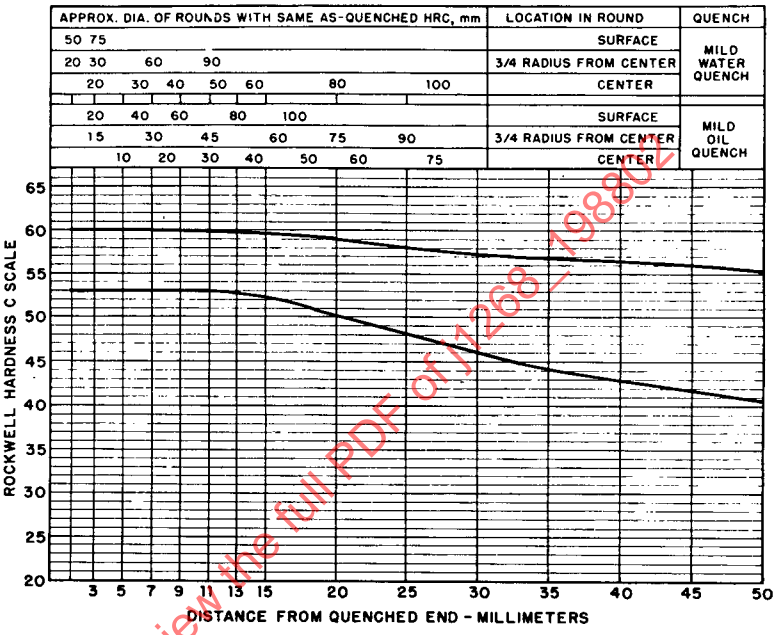
%C	%Mn	%Si	%Ni	%Cr	%Mo	
0.37/0.44	0.55/0.90	0.15/0.35	1.55/2.00	0.65/0.95	0.20/0.30	

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE MILLIMETERS	HRC MAX.	HRC MIN.
1.5	60	53
3	60	53
5	60	53
7	60	53
9	60	53
11	60	53
13	60	52
15	60	52
20	59	50
25	58	48
30	58	46
35	57	44
40	57	43
45	56	42
50	56	40

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE 870 °C
AUSTENITIZE 845 °C

*For forged or rolled specimens only



UNS H43406

HARDENABILITY BAND

SAE/AISI E4340H

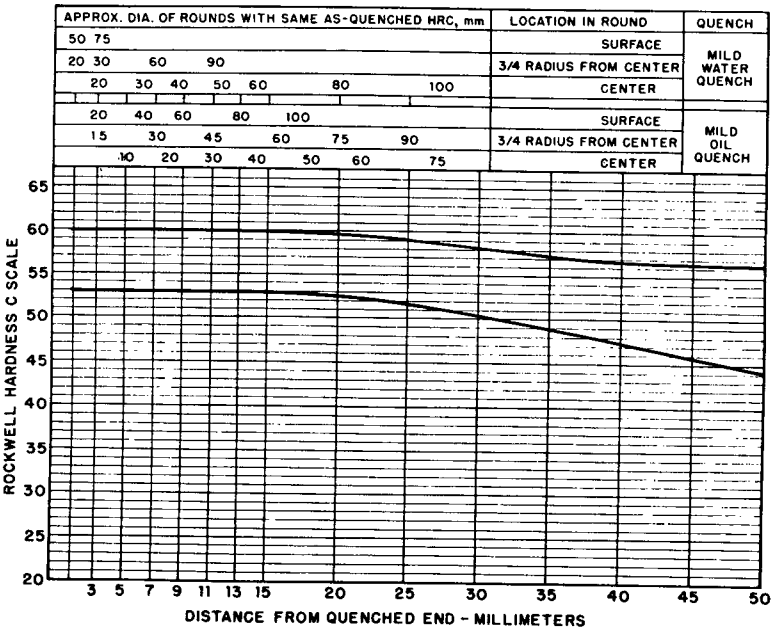
%C	%Mn	%Si	%Ni	%Cr	%Mo	
0.37/0.44	0.60/0.95	0.15/0.35	1.55/2.00	0.65/0.95	0.20/0.30	

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE MILLIMETERS	HRC MAX.	HRC MIN.
1.5	60	53
3	60	53
5	60	53
7	60	53
9	60	53
11	60	53
13	60	53
15	60	53
20	60	52
25	59	51
30	58	50
35	58	49
40	57	47
45	57	46
50	57	44

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE 870 °C
AUSTENITIZE 845 °C

*For forged or rolled specimens only



UNS H46200

HARDENABILITY BAND

SAE/AISI 4620H

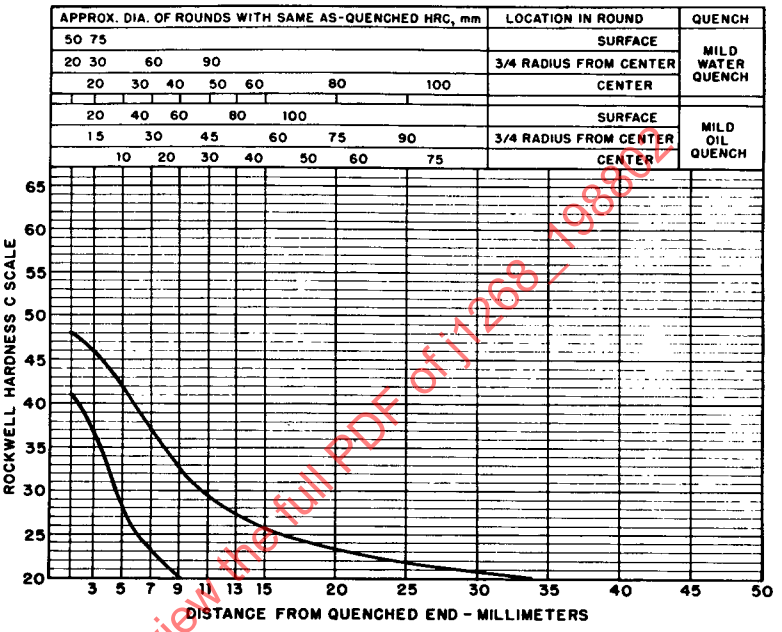
%C	%Mn	%Si	%Ni	%Cr	%Mo	
0.17/0.23	0.35/0.75	0.15/0.35	1.55/2.00	--	0.20/0.30	

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE MILLIMETERS	HRC MAX.	HRC MIN.
1.5	48	41
3	46	37
5	42	28
7	37	23
9	33	--
11	30	--
13	27	--
15	26	--
20	23	--
25	22	--
30	21	--
35	--	--
40		
45		
50		

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE	925	°C
AUSTENITIZE	925	°C

*For forged or rolled specimens only



UNS H47180

HARDENABILITY BAND

SAE/AISI 4718H

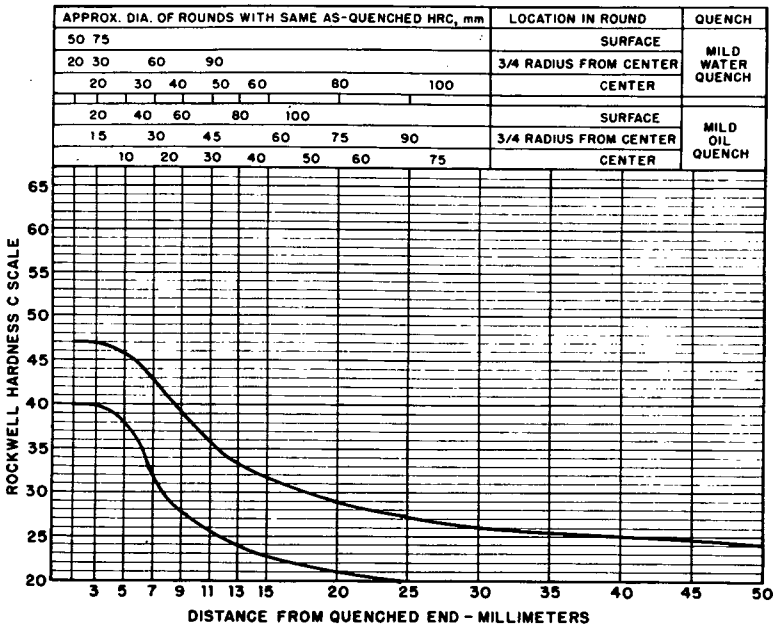
%C	%Mn	%Si	%Ni	%Cr	%Mo	
0.15/0.21	0.60/0.95	0.15/0.35	0.85/1.25	0.30/0.60	0.30/0.40	

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE MILLIMETERS	HRC MAX.	HRC MIN.
1.5	47	40
3	47	40
5	46	38
7	43	31
9	39	28
11	36	25
13	34	23
15	32	22
20	29	21
25	27	20
30	26	--
35	26	--
40	25	--
45	25	--
50	24	--

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE	925	°C
AUSTENITIZE	925	°C

*For forged or rolled specimens only



UNS H47200

HARDENABILITY BAND

SAE/AISI 4720H

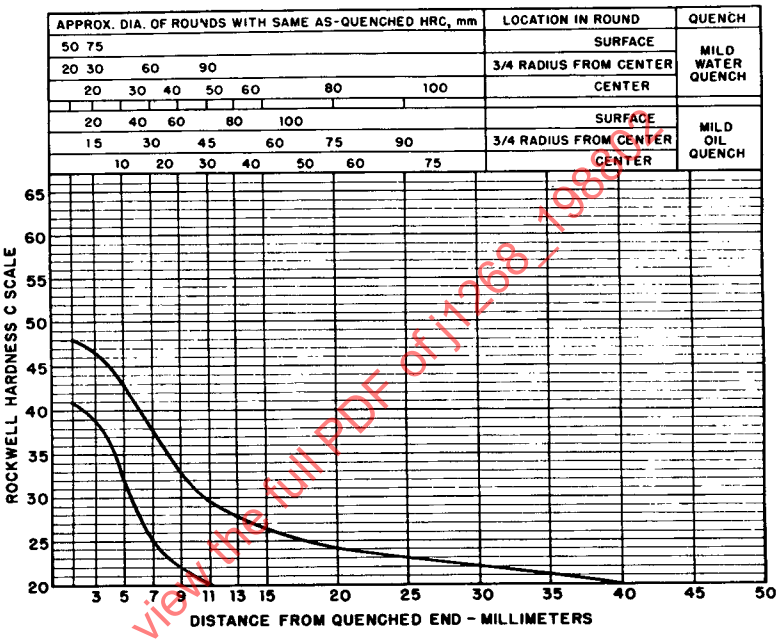
%C	%Mn	%Si	%Ni	%Cr	%Mo	
0.17/0.23	0.45/0.75	0.15/0.35	0.85/1.25	0.30/0.60	0.15/0.25	

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE MILLIMETERS	HRC MAX.	HRC MIN.
1.5	48	41
3	47	39
5	43	32
7	38	25
9	33	22
11	30	20
13	28	--
15	27	--
20	24	--
25	23	--
30	22	--
35	21	--
40	20	--
45	--	--
50		

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE	925	°C
AUSTENITIZE	925	°C

*For forged or rolled specimens only



UNS H48150

HARDENABILITY BAND

SAE/AISI 4815H

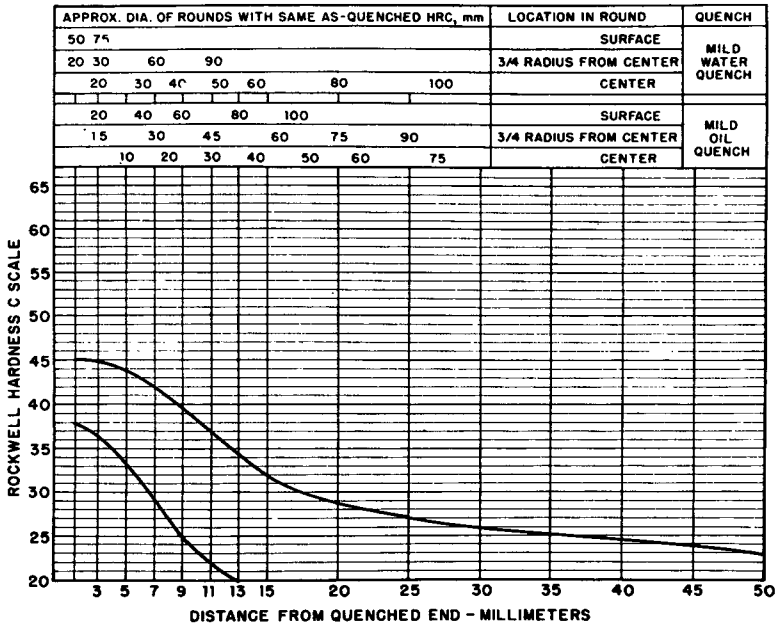
%C	%Mn	%Si	%Ni	%Cr	%Mo	
0.12/0.18	0.30/0.70	0.15/0.35	3.20/3.80	--	0.20/0.30	

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE MILLIMETERS	HRC MAX.	HRC MIN.
1.5	45	38
3	45	36
5	44	33
7	42	28
9	40	25
11	37	22
13	35	20
15	32	--
20	29	--
25	27	--
30	26	--
35	25	--
40	24	--
45	24	--
50	23	--

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE	925	°C
AUSTENITIZE	845	°C

*For forged or rolled specimens only



UNS H48170

HARDENABILITY BAND

SAE/AISI 4817H

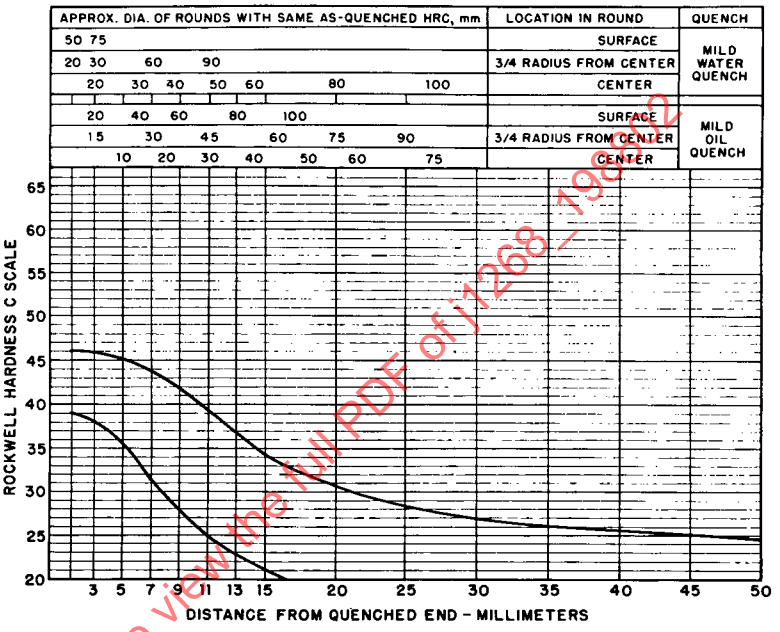
%C	%Mn	%Si	%Ni	%Cr	%Mo	
0.14/0.20	0.30/0.70	0.15/0.35	3.20/3.80	--	0.20/0.30	

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE MILLIMETERS	HRC MAX.	HRC MIN.
1.5	46	39
3	46	38
5	45	35
7	44	31
9	42	28
11	39	25
13	37	23
15	34	21
20	31	--
25	28	--
30	27	--
35	26	--
40	25	--
45	25	--
50	25	--

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE	925	°C
AUSTENITIZE	845	°C

*For forged or rolled specimens only



UNS H48200

HARDENABILITY BAND

SAE/AISI 4820H

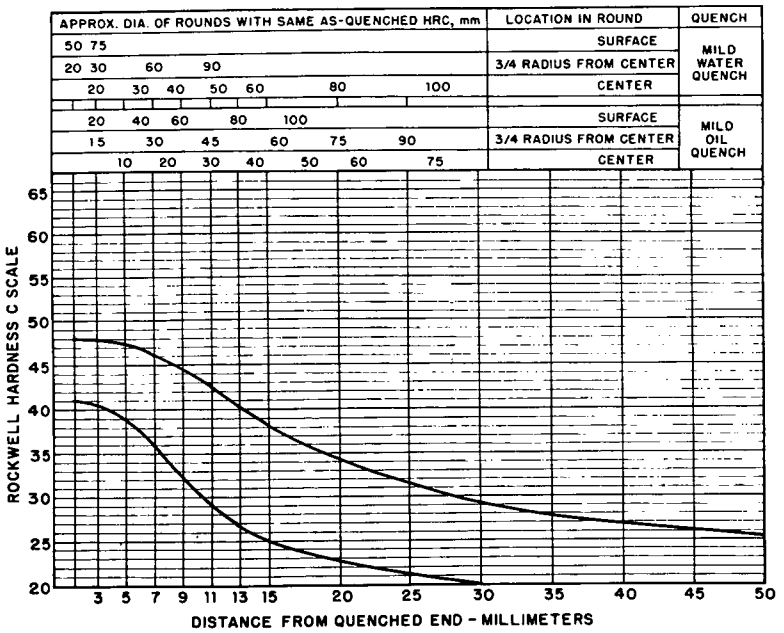
%C	%Mn	%Si	%Ni	%Cr	%Mo	
0.17/0.23	0.40/0.80	0.15/0.35	3.20/3.80	--	0.20/0.30	

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE MILLIMETERS	HRC MAX.	HRC MIN.
1.5	48	41
3	48	40
5	48	39
7	46	36
9	45	32
11	43	29
13	40	27
15	39	25
20	35	22
25	32	21
30	29	20
35	28	--
40	27	--
45	26	--
50	26	--

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE	925	°C
AUSTENITIZE	845	°C

*For forged or rolled specimens only



UNS H50401

HARDENABILITY BAND

SAE/AISI 50B40H

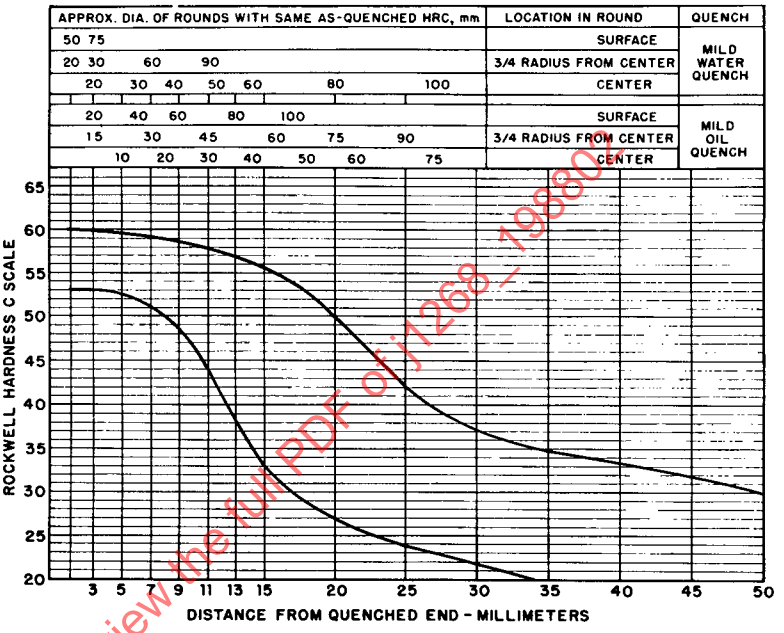
%C	%Mn	%Si	%Ni	%Cr	%Mo	% B
0.37/0.44	0.65/1.10	0.15/0.35	--	0.30/0.70	--	0.0005/ 0.003

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE MILLIMETERS	HRC MAX.	HRC MIN.
1.5	60	53
3	60	53
5	60	52
7	59	51
9	59	49
11	58	44
13	57	38
15	56	33
20	50	27
25	43	24
30	37	22
35	35	--
40	34	--
45	32	--
50	30	--

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE	870 °C
AUSTENITIZE	845 °C

*For forged or rolled specimens only



UNS H50441

HARDENABILITY BAND

SAE/AISI 50B44H

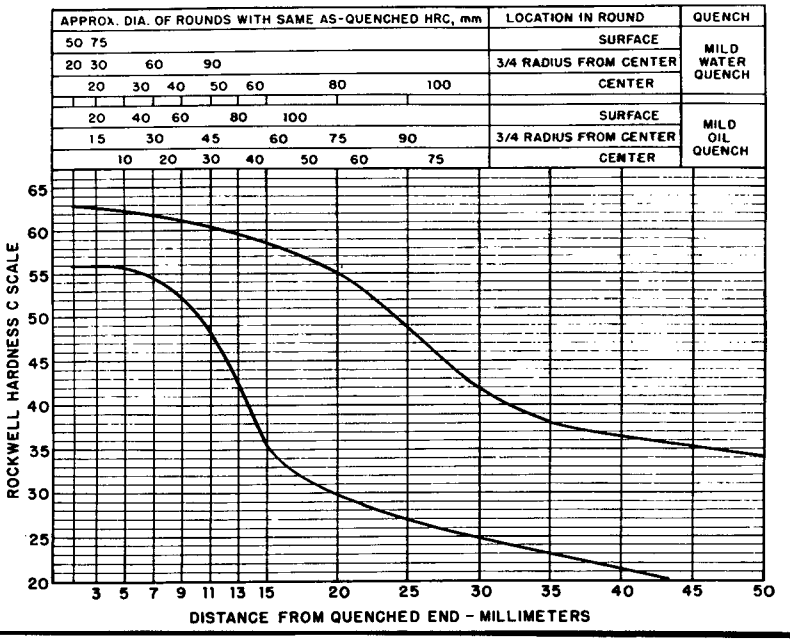
%C	%Mn	%Si	%Ni	%Cr	%Mo	% B
0.42/0.49	0.65/1.10	0.15/0.35	--	0.30/0.70	--	0.0005/ 0.003

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE MILLIMETERS	HRC MAX.	HRC MIN.
1.5	63	56
3	63	56
5	63	55
7	62	54
9	61	52
11	61	49
13	60	42
15	59	36
20	55	30
25	49	27
30	42	25
35	38	23
40	37	21
45	35	--
50	34	--

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE	870 °C
AUSTENITIZE	845 °C

*For forged or rolled specimens only



UNS H50460

HARDENABILITY BAND

SAE/AISI 5046H

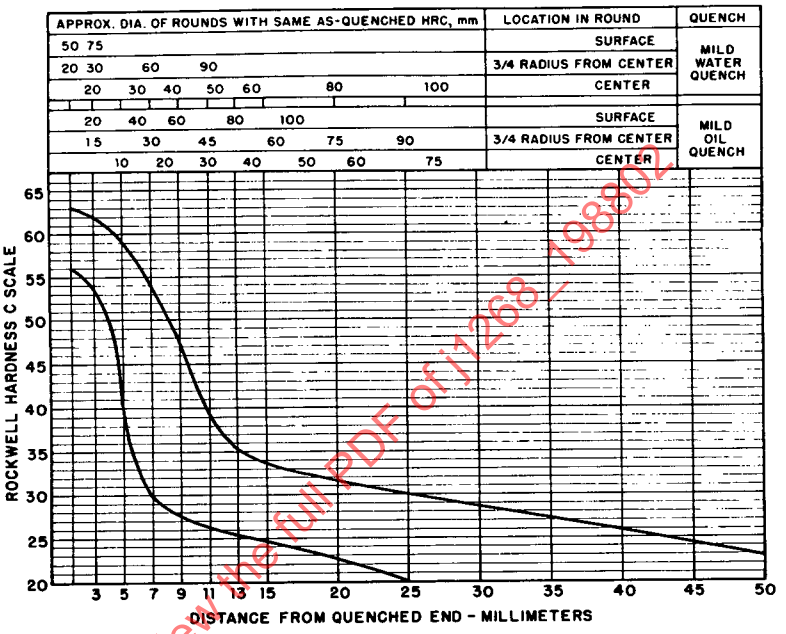
%C	%Mn	%Si	%Ni	%Cr	%Mo	
0.43/0.50	0.65/1.10	0.15/0.35	--	0.13/0.43	--	

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE MILLIMETERS	HRC MAX.	HRC MIN.
1.5	63	56
3	62	54
5	59	40
7	54	30
9	48	27
11	39	26
13	35	25
15	34	25
20	32	22
25	30	20
30	29	--
35	27	--
40	26	--
45	24	--
50	23	--

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE	870	°C
AUSTENITIZE	845	°C

*For forged or rolled specimens only



UNS H50461

HARDENABILITY BAND

SAE/AISI 50B46H

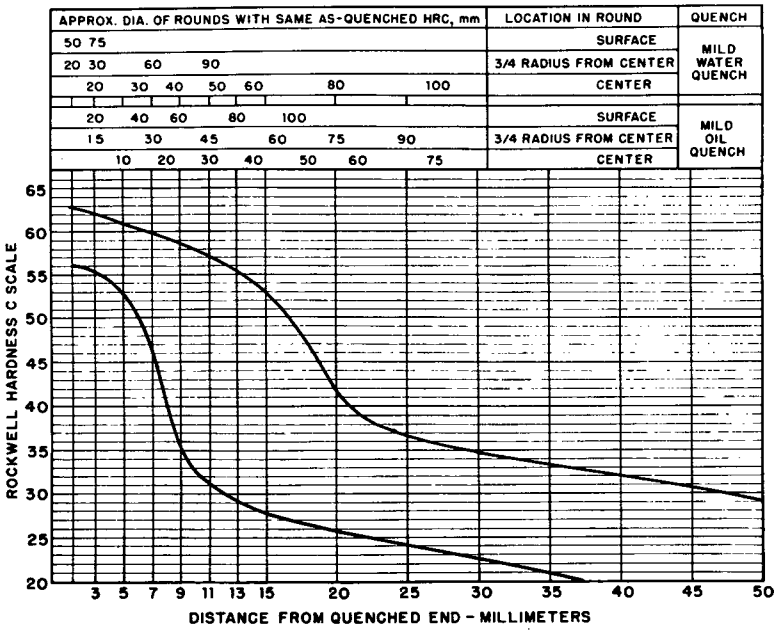
%C	%Mn	%Si	%Ni	%Cr	%Mo	% B
0.43/0.50	0.65/1.10	0.15/0.35	--	0.13/0.43	--	0.0005/ 0.003

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE MILLIMETERS	HRC MAX.	HRC MIN.
1.5	63	56
3	62	55
5	61	53
7	60	47
9	59	35
11	58	31
13	56	29
15	53	28
20	42	26
25	37	24
30	35	22
35	34	21
40	32	--
45	31	--
50	29	--

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE	870	°C
AUSTENITIZE	845	°C

*For forged or rolled specimens only



UNS H50501

HARDENABILITY BAND

SAE/AISI 50B50H

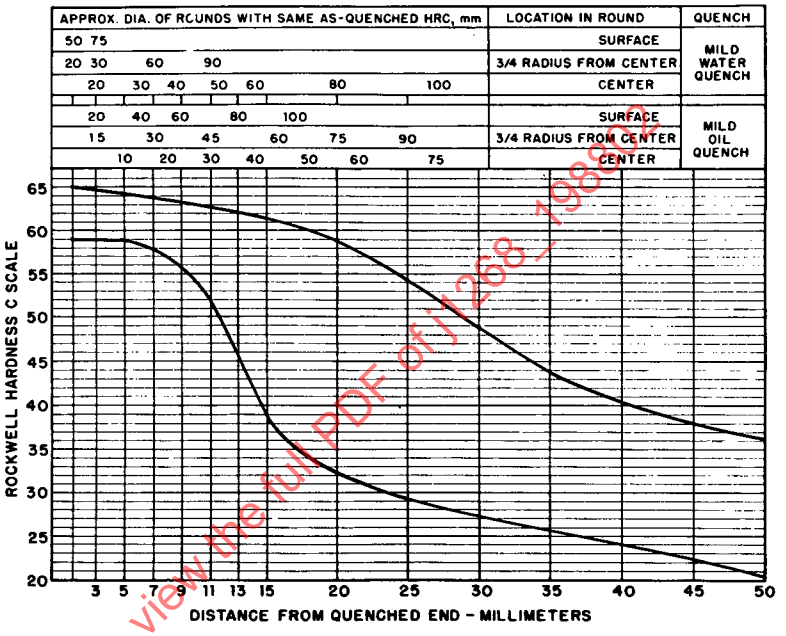
%C	%Mn	%Si	%Ni	%Cr	%Mo	% B
0.47/0.54	0.65/1.10	0.15/0.35	--	0.30/0.70	--	0.0005/ 0.003

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE MILLIMETERS	HRC MAX.	HRC MIN.
1.5	65	59
3	65	59
5	65	59
7	64	57
9	63	55
11	63	52
13	62	46
15	62	39
20	59	32
25	54	29
30	49	27
35	44	26
40	40	24
45	38	22
50	37	20

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE	870 °C
AUSTENITIZE	845 °C

*For forged or rolled specimens only



UNS H50601

HARDENABILITY BAND

SAE/AISI 50B60H

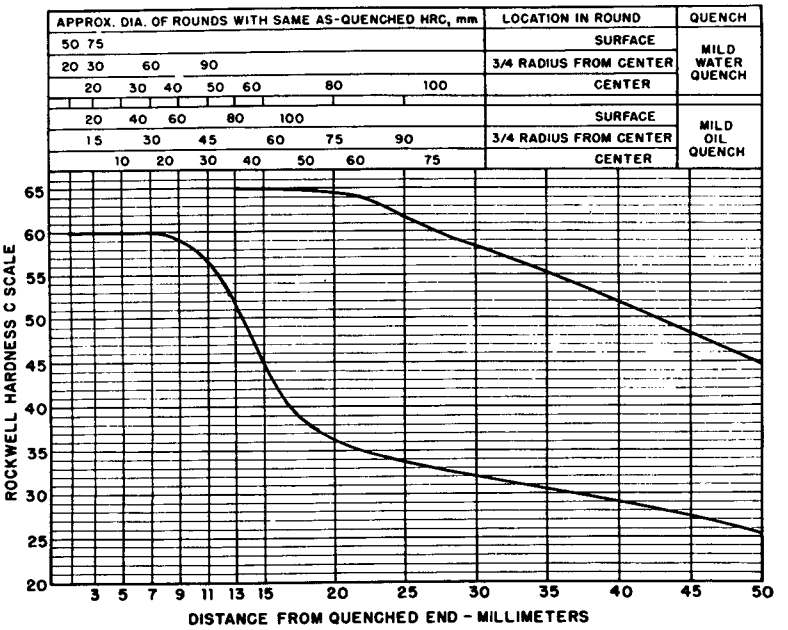
%C	%Mn	%Si	%Ni	%Cr	%Mo	% B
0.55/0.65	0.65/1.10	0.15/0.35	--	0.30/0.70	--	0.0005/ 0.003

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE MILLIMETERS	HRC MAX.	HRC MIN.
1.5	--	60
3	--	60
5	--	60
7	--	60
9	--	59
11	--	57
13	65	51
15	65	44
20	65	36
25	62	34
30	59	32
35	56	30
40	52	28
45	48	27
50	45	25

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE	870 °C
AUSTENITIZE	845 °C

*For forged or rolled specimens only



UNS H51200

HARDENABILITY BAND

SAE/AISI 5120H

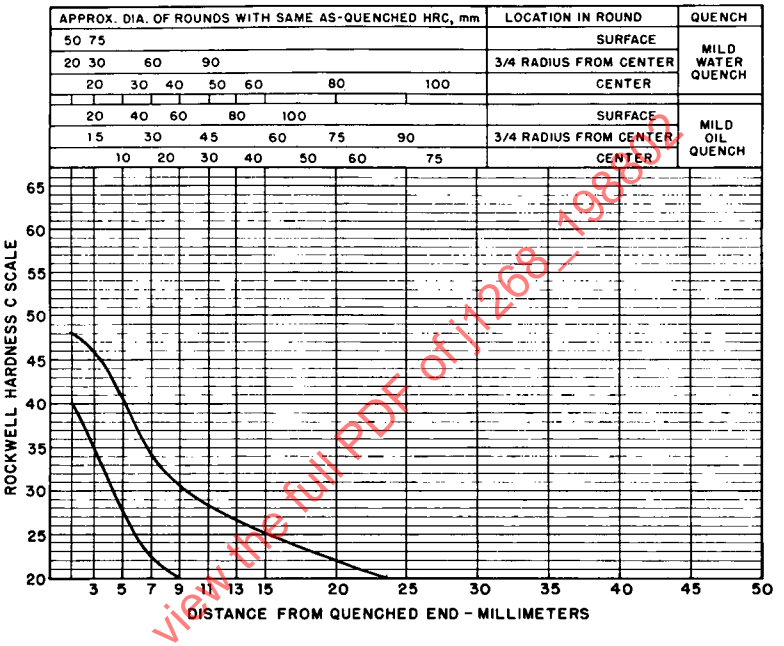
%C	%Mn	%Si	%Ni	%Cr	%Mo	
0.17/0.23	0.60/1.00	0.15/0.35	--	0.60/1.00	--	

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE MILLIMETERS	HRC MAX.	HRC MIN.
1.5	48	40
3	46	34
5	41	27
7	34	22
9	31	20
11	29	--
13	27	--
15	25	--
20	22	--
25	--	--
30		
35		
40		
45		
50		

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE	925	°C
AUSTENITIZE	925	°C

*For forged or rolled specimens only



UNS H51300

HARDENABILITY BAND

SAE/AISI 5130H

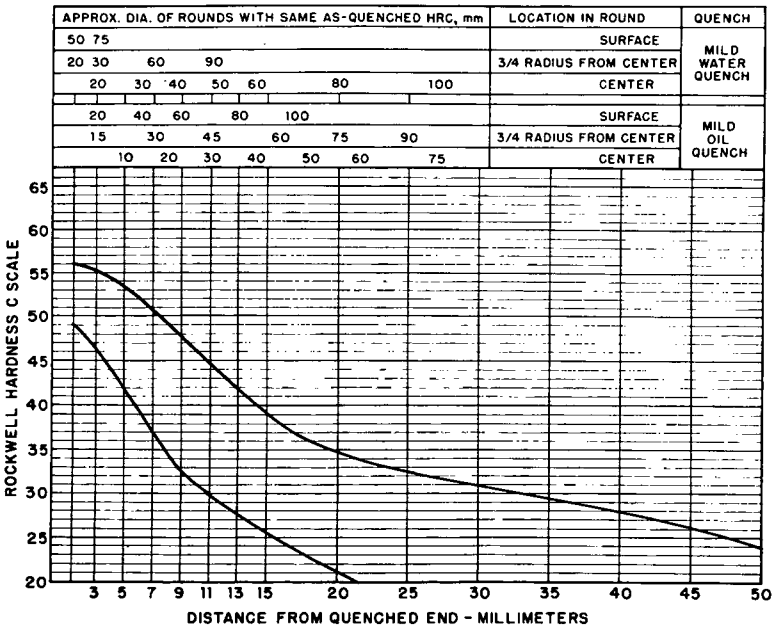
%C	%Mn	%Si	%Ni	%Cr	%Mo	
0.27/0.33	0.60/1.00	0.15/0.35	--	0.75/1.20	--	

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE MILLIMETERS	HRC MAX.	HRC MIN.
1.5	56	49
3	55	46
5	53	42
7	51	37
9	48	33
11	45	30
13	42	27
15	39	25
20	35	21
25	33	--
30	31	--
35	30	--
40	28	--
45	26	--
50	24	--

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE	900	°C
AUSTENITIZE	870	°C

*For forged or rolled specimens only



UNS H51320

HARDENABILITY BAND

SAE/AISI 5132H

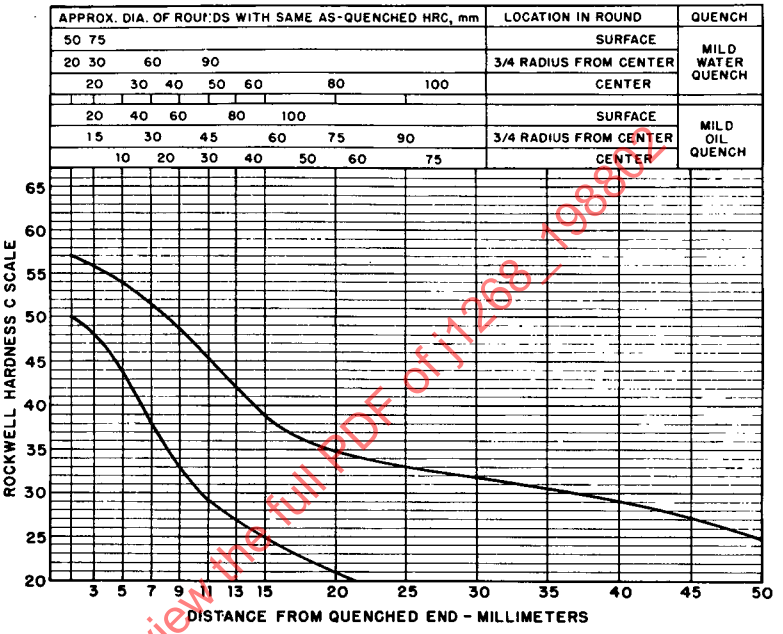
%C	%Mn	%Si	%Ni	%Cr	%Mo	
0.29/0.35	0.50/0.90	0.15/0.35	--	0.65/1.10	--	

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE MILLIMETERS	HRC MAX.	HRC MIN.
1.5	57	50
3	56	47
5	54	43
7	52	38
9	49	33
11	45	29
13	42	26
15	39	25
20	35	21
25	33	--
30	32	--
35	31	--
40	29	--
45	27	--
50	25	--

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE	900 °C
AUSTENITIZE	870 °C

*For forged or rolled specimens only



UNS H51350

HARDENABILITY BAND

SAE/AISI 5135H

%C	%Mn	%Si	%Ni	%Cr	%Mo	
0.32/0.38	0.50/0.90	0.15/0.35	--	0.70/1.15	--	

HARDNESS LIMITS FOR SPECIFICATION PURPOSES		
"J" DISTANCE MILLIMETERS	HRC MAX.	HRC MIN.
1.5	58	51
3	58	49
5	56	46
7	54	41
9	53	36
11	50	32
13	47	30
15	44	27
20	40	23
25	37	21
30	35	--
35	34	--
40	33	--
45	32	--
50	31	--

HEAT TREATING TEMPERATURES RECOMMENDED BY SAE

*NORMALIZE	870 °C
AUSTENITIZE	845 °C

*For forged or rolled specimens only