

Atlas of Time-Temperature Diagrams for Irons and Steels

Edited by
George F. Vander Voort
Carpenter Technology Corporation
Reading PA



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Library of Congress Catalog Card Number: 91-072218

ISBN: 0-87170-415-3

SAN: 204-7586

*Production coordination by
Veronica Flint, ASM International*

PRINTED IN THE UNITED STATES OF AMERICA

About the Editor

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A member of ASM for more than 25 years, and active in the Lehigh Valley Chapter as well as nationally, he is presently chairman of ASM's Technical Book Committee and a member of its Publication Council. He has taught many ASM MEI courses since 1977 and made eight of the ten video lectures for "Principles of Metallography."

Also active in other societies, he is presently chairman of ASTM Committee E-4 on Metallography and is a past president of the International Metallographic Society and is a fellow of both ASTM and ASM International.

Mr. Vander Voort is the holder of four US patents, and has over 60 publications to his credit including *Metallography: Principles and Practice*, McGraw-Hill, 1984.

Preface

The 1930 publication of the epic paper by E.S. Davenport and E.C. Bain on the isothermal diagram concept had a profound influence on physical metallurgy, metallography and heat treatment. Prior to the development of this technique, heat treatment was truly an art - clothed in secrecy and often unpredictable. Metallurgists debated, theories were proposed and demolished. Even the basic constituents in steel microstructures were not well understood and firmly established. Indeed, the arguments over pearlite vs sorbite and troostite raged on for nearly another decade. However, the simple concept of the isothermal diagram brought order into this picture and paved the way for the current understanding of phase transformations and industrial control of heat treating processes. Indeed, they even showed the way for new processes, such as martempering and austempering.

Metallurgists began to develop isothermal transformation (IT) diagrams, also called time-temperature-transformation (TTT) diagrams or C-curves, for many steels. At the same time, the understanding of hardenability was being advanced through the use of experimental techniques, chiefly the Jominy end-quench test and several variants (for steels with either very low or very high hardenability), and by mathematical modeling of cooling conditions and the calculation of hardenability curves from chemical analysis and grain size information. These two developments were by nature interrelated because of their mutual influence on heat treatment. Hardenability techniques were primarily centered upon predicting the size of a bar of a known composition that would just "through harden" in a given quench medium. The "through harden" aspect related to the microstructure where this term means that the center of the bar contains a minimum of 50% martensite. In the early days of this work, the balance of the structure did not receive much attention. However, the ability to predict the Jominy curve and cross-sectional hardness patterns in heat treated bars was found to depend on knowing what else would form as the ability to produce martensite decreased.

While isothermal transformation diagrams were instrumental in providing an understanding of how austenite transforms, and in identifying the constituents that can form in a given steel, they were not developed under conditions similar to quenching where the specimen temperature decreased at some rate, generally variable, and the structures were formed over a wide range of temperatures. Attempts were made to utilize IT diagrams for continuous cooling situations but the results were never satisfactory. For simple alloys, such correlations were reasonably useful but as the hardenability increased, particularly bainitic hardenability, they became less useful. This spawned the development of continuous cooling transformation (CCT) diagrams.

Because the science of physical metallurgy was much better established by the time CCT diagrams became common, their development had much less of an impact on metallurgy than the 1930 introduction of the IT diagrams. However, this in no way detracts from the practical value of the CCT diagram. The first diagrams were made using metallographic observations of the microstructures produced at different test locations on Jominy bars that had been end quenched for different times before the entire bar was rapidly immersion quenched. Because the cooling rate varies as a function of the distance from the end-quenched face, a great deal of information could be obtained. A number of interrupted Jominy bars were heat treated with varying end-quench times. The cooling curves at each location on the Jominy bar had to be determined. Each bar was hardness tested and then polished along the side. Then, the metallographer determined the amounts of each constituent present at key locations along the bar. Tedious, yes, but useful. Metallurgists were quick to adopt use of the dilatometer for developing CCT diagrams. When a specimen is cooled at a specific constant rate, the phase transformation produces a change in length which can be measured by the dilatometer. A number of specimens would be run at a variety of cooling rates and the arrest points were plotted on the cooling curve for each specimen. The microstructure of each dilatometer pin was examined to be sure of the nature of the transformation. Then, the arrest points were connected together to map out the regions over which a given constituent formed from the austenite. Other techniques and other methods of plotting also evolved, for example, the

British diagrams plot results as a function of different locations on bars of different diameter cooled at different quench rates. Instead of following a cooling curve from the upper left corner of the diagram towards the x-axis, their data are read vertically. The Benelux CCT diagrams also are plotted differently with the x-axis showing the time to cool from 800 to 500°C.

Irrespective of the way the continuous cooling data were plotted, CCT diagrams are very helpful for understanding or predicting heat treatment response, especially for those treatments that involve quenching baths. As with the IT diagrams, CCTs also have their limitations. Actually, the two diagrams are complementary, not competitive. IT diagrams are best suited for developing annealing, martempering or austempering practices, while CCT diagrams are best suited for developing quench hardening practices. Neither diagram, however, tells us anything about the effect of tempering. Dilatometrically derived CCT diagrams have been criticized because the device tries to suppress the recalescence effects associated with a phase transformation in its desire to maintain a constant cooling rate.

In the United States, IT diagram development progressed rapidly, mainly as a result of the initial and continued interest in them by researchers at the United States Steel Corporation. The US Steel collection of diagrams was republished by ASM in 1977 but has been out of print for some time. Not all of the diagrams in the 1977 collection were made by US Steel, however, and some CCT diagrams were included. Other American companies became involved in the development of both IT and CCT diagrams. Notable is the work by the Climax Molybdenum Corporation who published a number of books, articles and pamphlets, but no overall atlas. Other countries have also produced excellent collections of IT and/or CCT diagrams developed by their researchers; for example, the German, French and Benelux countries all produced excellent diagrams for their steels and published compendiums. In 1980, ASM republished CCT diagrams developed by M. Atkins of British Steel Corporation. Besides these, many diagrams can be found scattered throughout the literature. Vanitec recently published a collection of diagrams from all over the world of steels containing vanadium.

Besides IT and CCT diagrams, there are other time-temperature type diagrams that have never been collected together in one place. First, there are diagrams that show transformation after applied pressure or deformation or under natural cooling conditions. There are time-temperature-embrittlement (TTE) diagrams dealing with temper embrittlement. There are time-temperature-precipitation (TTP) diagrams that show the conditions, mainly isothermal, under which various nitrides, carbides or intermetallic phases precipitate in a wide variety of steels. There are time-temperature-sensitization (TTS) diagrams that show intergranular attack after sensitization treatments.

This atlas brings together many of the published IT and CCT diagrams from US, British, German, French and Benelux collections as well as previously non-collected published diagrams. Also, besides the traditional IT and CCT diagrams, other ITs and CCTs that show the influence of pressure or deformation have been included. For the first time, TTE, TTP and TTS diagrams for irons and steels have been brought together in one collection. Naturally, there are a number of ways in which these diagrams could be arranged. We have chosen to group them by published collections, except for those diagrams that were found scattered throughout the open literature. Because the large collections often have a unique style for plotting (or obtaining) the data, grouping them by the collections maintains coherence and should help the reader in interpreting the curves.

The editor would like to thank the many people who helped him gather diagrams from the many different publications. He also acknowledges the excellent support of the ASM staff, particularly Mrs. Veronica Flint who coordinated much of the acquisitions, all of the permissions to republish the diagrams, and the mechanics of publication of this book. Readers who are aware of other useful diagrams not included in this atlas are encouraged to send copies to the editor.

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Type: 1006/1008, 13

Composition: Fe - 0.06% C - 0.43% Mn

Type: 1019, 13

Composition: Fe - 0.17% C - 0.92% Mn

Type: 1021, 13

Composition: Fe - 0.20% C - 0.81% Mn

Type: 1035 Mod., 13

Composition: Fe - 0.35% C - 0.37% Mn

Type: 1045/1050, 14

Composition: Fe - 0.47% C - 0.57% Mn - 0.06% Cu

Type: 1045/1050 + Cu, 14

Composition: Fe - 0.48% C - 0.57% Mn - 0.20% Si - 0.46% Cu

Composition: Fe - 0.49% C - 0.57% Mn - 0.97% Cu

Composition: Fe - 0.49% C - 0.54% Mn - 0.20% Si - 1.49% Cu

Type: 1050, 15

Composition: Fe - 0.50% C - 0.91% Mn

Type: 1055 Mod. 15

Composition: Fe - 0.54% C - 0.46% Mn

Type: 1060, 15

Composition: Fe - 0.63% C - 0.87% Mn

Type: 1060 Mod./1065 Mod., 15

Composition: Fe - 0.64% C - 1.13% Mn

Type: 1080, 16

Composition: Fe - 0.79% C - 0.76% Mn

Type: 1086/1095, 16

Composition: Fe - 0.89% C - 0.29% Mn

Type: W1 Tool Steel, 16

Composition: Fe - 1.13% C - 0.30% Mn

Type: 1320, 16

Composition: Fe - 0.20% C - 1.88% Mn

Type: Carburized 1320 (0.4% C), 17

Composition: Fe - 0.4% C - 1.88% Mn

Type: Carburized 1320 (0.6% C), 17

Composition: Fe - 0.6% C - 1.88% Mn

Type: Carburized 1320 (0.8% C), 17

Composition: Fe - 0.8% C - 1.88% Mn

Type: Carburized 1320 (1.0% C), 18

Composition: Fe - 1.0% C - 1.88% Mn

Type: Carburized 1320 (1.2% C), 18

Composition: Fe - 1.2% C - 1.88% Mn

Type: 1335, 19

Composition: Fe - 0.35% C - 1.85% Mn

Type: 1340, 19

Composition: Fe - 0.43% C - 1.58% Mn (low Mn)

Type: Fe-Ni-C, 19

Composition: Fe - 0.56% C - 0.26% Mn - 1.97% Ni

Type: 2340, 19

Composition: Fe - 0.37% C - 0.68% Mn - 3.41% Ni

Type: Fe-Ni-C, 20

Composition: Fe - 0.59% C - 0.25% Mn - 3.90% Ni

Type: 2512, 20

Composition: Fe - 0.10% C - 0.52% Mn - 5.00% Ni

Type: Carburized 2512 (0.4% C), 20

Composition: Fe - 0.4% C - 0.52% Mn - 5.00% Ni

Type: Carburized 2512 (0.6% C), 20

Composition: Fe - 0.6% C - 0.52% Mn - 5.00% Ni

Type: Carburized 2512 (0.8% C), 21

Composition: Fe - 0.8% C - 0.52% Mn - 5.00% Ni

Type: Carburized 2512 (1.0% C), 21

Composition: Fe - 1.0% C - 0.52% Mn - 5.00% Ni

Type: Carburized 2512 (1.2% C), 21

Composition: Fe - 1.2% C - 0.52% Mn - 5.00% Ni

Type: 2910, 22

Composition: Fe - 0.08% C - 0.49% Mn - 8.94% Ni

Type: 5140, 22

Composition: Fe - 0.42% C - 0.68% Mn - 0.93% Cr

Type: 5160, 22

Composition: Fe - 0.61% C - 0.94% Mn - 0.88% Cr

Type: 52100, 22

Composition: Fe - 1.02% C - 0.36% Mn - 0.20% Ni - 1.41% Cr

Type: Fe-C-Cr, 23

Composition: Fe - 0.33% C - 0.45% Mn - 1.97% Cr

Type: Fe-C-Cr-Mo, 23

Composition: Fe - 0.11% C - 0.38% Mn - 0.44% Si - 5.46% Cr - 0.42% Mo

Type: 410, 23

Composition: Fe - 0.11% C - 0.44% Mn - 0.37% Si - 0.16% Ni - 12.18% Cr

Type: Fe-C-Ni-Cr-Mo-V, 23

Composition: Fe - 0.22% C - 0.54% Mn - 0.64% Ni - 12.46% Cr - 0.99% Mo - 0.29% V

Type: 4027, 24

Composition: Fe - 0.26% C - 0.87% Mn - 0.26% Mo

Type: 4037, 24

Composition: Fe - 0.35% C - 0.80% Mn - 0.25% Mo

Type: Fe-C-Mo, 24

Composition: Fe - 0.42% C - 0.20% Mn - 0.21% Mo

Type: 4047, 24

Composition: Fe - 0.48% C - 0.94% Mn - 0.25% Mo

Type: 4068, 25

Composition: Fe - 0.68% C - 0.87% Mn - 0.24% Mo

Type: Fe-C-Mo, 25

Composition: Fe - 0.97% C - 1.04% Mn - 0.32% Mo

Composition: Fe - 0.22% C - 0.79% Mn - 0.50% Mo

Type: Mn-Mo Weld Metal, 25

Composition: Fe - 0.10% C - 1.63% Mn - 0.41% Mo

Type: Fe-C-Mo, 26

Composition: Fe - 0.40% C - 0.42% Mn - 0.53% Mo

Composition: Fe - 0.36% C - 0.17% Mn - 0.82% Mo

Composition: Fe - 0.33% C - 0.41% Mn - 1.96% Mo

Type: Fe-C-Ni, 26

Composition: Fe - 0.40% C - 0.57% Mn - 3.49% Ni - 0.01% Mo

Type: Fe-C-Ni-Mo, 27

Composition: Fe - 0.41% C - 0.60% Mn - 3.51% Ni - 0.21% Mo

Composition: Fe - 0.39% C - 0.56% Mn - 3.53% Ni - 0.74% Mo

Type: Fe-C-Si, 27

Composition: Fe - 0.50% C - 0.23% Mn - 0.53% Si - 0.05% Cr

Composition: Fe - 0.54% C - 0.23% Mn - 1.27% Si - 0.05% Cr

Type: Fe-C-Si-Cr, 28
 Composition: Fe - 0.55% C - 0.78% Mn - 1.62% Si - 0.77% Cr
 Composition: Fe - 0.53% C - 0.24% Mn - 2.32% Si - 0.32% Cr
 Composition: Fe - 0.51% C - 0.25% Mn - 3.80% Si - 0.32% Cr

Type: 9260, 28
 Composition: Fe - 0.62% C - 0.82% Mn - 2.01% Si - 0.07% Cr

Type: 9261, 29
 Composition: Fe - 0.62% C - 0.95% Mn - 2.01% Si - 0.15% Cr

Type: 9262, 29
 Composition: Fe - 0.62% C - 0.86% Mn - 2.13% Si - 0.33% Cr

Type: 6145, 30
 Composition: Fe - 0.43% C - 0.74% Mn - 0.92% Cr - 0.16% V

Type: 6150, 30
 Composition: Fe - 0.53% C - 0.67% Mn - 0.93% Cr - 0.18% V

Type: Fe-C-Cr-Mo-V, 30
 Composition: Fe - 0.23% C - 0.82% Mn - 1.22% Cr - 0.53% Mo - 0.22% V
 Composition: Fe - 0.40% C - 0.78% Mn - 1.25% Cr - 0.53% Mo - 0.22% V

Type: Fe-C-Cr-Mo-V, 31
 Composition: Fe - 0.33% C - 0.84% Mn - 1.05% Cr - 1.07% Mo - 0.26% V

Type: Fe-C-Mn-Ni-V, 31
 Composition: Fe - 0.20% C - 1.44% Mn - 0.49% Ni - 0.16% V

Type: Fe-C-Ni-Mo-V, 31
 Composition: Fe - 0.26% C - 0.57% Mn - 2.20% Ni - 0.48% Mo - 0.09% V
 Composition: Fe - 0.24% C - 0.69% Mn - 3.35% Ni - 0.50% Mo - 0.09% V

Type: Fe-C-Mn-Ni-Cr-Mo-V, 32
 Composition: Fe - 0.27% C - 0.84% Mn - 0.60% Ni - 0.73% Cr - 0.90% Mo - 0.11% V
 Composition: Fe - 0.25% C - 0.88% Mn - 0.59% Ni - 0.73% Cr - 0.88% Mo - 0.23% V

Type: 3140, 32
 Composition: Fe - 0.38% C - 0.72% Mn - 1.32% Ni - 0.49% Cr

Type: 3310, 32
 Composition: Fe - 0.11% C - 0.45% Mn - 3.33% Ni - 1.52% Cr

Type: Carburized 3310 (0.4% C), 33
 Composition: Fe - 0.4% C - 0.45% Mn - 3.33% Ni - 1.52% Cr

Type: Carburized 3310 (0.6% C), 33
 Composition: Fe - 0.6% C - 0.45% Mn - 3.33% Ni - 1.52% Cr

Type: Carburized 3310 (0.8% C), 33
 Composition: Fe - 0.8% C - 0.45% Mn - 3.33% Ni - 1.52% Cr

Type: Carburized 3310 (1.0% C), 34
 Composition: Fe - 1.0% C - 0.45% Mn - 3.33% Ni - 1.52% Cr

Type: 4130, 34
 Composition: Fe - 0.33% C - 0.53% Mn - 0.90% Cr - 0.18% Mo

Type: 4137/4140, 34
 Composition: Fe - 0.37% C - 0.77% Mn - 0.98% Cr - 0.21% Mo

Type: 4150 Mod., 34
 Composition: Fe - 0.55% C - 0.60% Mn - 1.03% Cr - 0.19% Mo - 0.36% Ni

Type: 4317, 35
 Composition: Fe - 0.17% C - 0.57% Mn - 1.87% Ni - 0.45% Cr - 0.24% Mo

Type: 4340, 35
 Composition: Fe - 0.42% C - 0.78% Mn - 1.79% Ni - 0.80% Cr - 0.33% Mo

Type: 4360, 35
 Composition: Fe - 0.62% C - 0.54% Mn - 0.67% Si - 1.79% Ni - 0.60% Cr - 0.32% Mo

Type: 4615, 35
 Composition: Fe - 0.15% C - 0.63% Mn - 1.90% Ni - 0.24% Mo

Type: 4640, 36
 Composition: Fe - 0.36% C - 0.63% Mn - 1.84% Ni - 0.23% Mo

Type: 4815, 36
 Composition: Fe - 0.16% C - 0.52% Mn - 3.36% Ni - 0.19% Mo

Type: 4815 (1.0% C), 36
 Composition: Fe - 0.97% C - 0.52% Mn - 3.36% Ni - 0.19% Mo

Type: 8620, 36
 Composition: Fe - 0.18% C - 0.79% Mn - 0.52% Ni - 0.56% Cr - 0.19% Mo

Type: 8630, 37
 Composition: Fe - 0.30% C - 0.80% Mn - 0.54% Ni - 0.55% Cr - 0.21% Mo

Type: 8660, 37
 Composition: Fe - 0.59% C - 0.89% Mn - 0.53% Ni - 0.64% Cr - 0.22% Mo

Type: 8745, 37
 Composition: Fe - 0.44% C - 0.90% Mn - 0.45% Ni - 0.54% Cr - 0.22% Mo

Type: 9420, 37
 Composition: Fe - 0.24% C - 0.94% Mn - 0.47% Si - 0.30% Ni - 0.34% Cr - 0.14% Mo

Type: 9440, 38
 Composition: Fe - 0.38% C - 1.08% Mn - 0.70% Si - 0.34% Ni - 0.40% Cr - 0.11% Mo - 0.030% Zr

Type: 9860, 38
 Composition: Fe - 0.57% C - 0.82% Mn - 1.16% Ni - 1.07% Cr - 0.26% Mo

Type: Fe-Ni-Cr-Mo, 38
 Composition: Fe - 0.14% C - 0.26% Mn - 2.21% Ni - 1.05% Cr - 0.26% Mo
 Composition: Fe - 0.13% C - 0.16% Mn - 3.08% Ni - 1.76% Cr - 0.49% Mo

Type: Fe-Ni-Cr-Mo, 39
 Composition: Fe - 0.55% C - 0.83% Mn - 1.15% Ni - 1.01% Cr - 0.48% Mo
 Composition: Fe - 0.51% C - 0.73% Mn - 2.74% Ni - 0.99% Cr - 0.45% Mo

Type: Nitralloy, 135 Mod., 39
 Composition: Fe - 0.41% C - 0.57% Mn - 1.57% Cr - 0.36% Mo - 1.26% Al

Type: 1060/10B60, 39
 Composition: Fe - 0.63% C - 0.87% Mn - none or 0.0018% B

Type: 4317/43B17, 40
 Composition: Fe - 0.17% C - 0.57% Mn - 1.87% Ni - 0.45% Cr - 0.24% Mo
 Composition: Fe - 0.14% C - 0.81% Mn - 1.81% Ni - 0.49% Cr - 0.27% Mo - 0.0030% B

Type: 4615/46B15, 40
Composition: Fe - 0.15% C - 0.63% Mn - 1.90% Ni - 0.24% Mo
Composition: Fe - 0.16% C - 0.60% Mn - 1.92% Ni - 0.27% Mo - 0.0017% B

Type: 5160/51B60, 40
Composition: Fe - 0.61% C - 0.94% Mn - 0.88% Cr
Composition: Fe - 0.64% C - 0.88% Mn - 0.83% Cr - 0.0006% B

Type: 8620/86B20, 40
Composition: Fe - 0.23% C - 0.72% Mn - 0.59% Ni - 0.52% Cr - 0.21% Mo
Composition: Fe - 0.22% C - 0.76% Mn - 0.57% Ni - 0.51% Cr - 0.20% Mo - 0.0025% B

Type: 8650/86B50, 41
Composition: Fe - 0.50% C - 0.77% Mn - 0.60% Ni - 0.51% Cr - 0.22% Mo (0.21% Mo for 86B50 + 0.0016% B)

Type: 8680/86B80, 41
Composition: Fe - 0.79% C - 0.77% Mn - 0.58% Ni - 0.50% Cr - 0.21% Mo
Composition: Fe - 0.78% C - 0.86% Mn - 0.59% Ni - 0.49% Cr - 0.21% Mo - 0.0025% B

Type: 80B20, 41
Composition: Fe - 0.18% C - 0.57% Mn - 0.31% Ni - 0.31% Cr - 0.15% Mo - 0.0009% B

Type: 81B40, 41
Composition: Fe - 0.43% C - 1.02% Mn - 0.31% Ni - 0.48% Cr - 0.13% Mo - 0.0009% B

Type: 86B45, 42
Composition: Fe - 0.45% C - 0.89% Mn - 0.59% Ni - 0.66% Cr - 0.12% Mo - 0.0015% B

Type: 94B17, 42
Composition: Fe - 0.19% C - 0.77% Mn - 0.42% Ni - 0.40% Cr - 0.12% Mo - 0.0018% B

Type: 98B45, 42
Composition: Fe - 0.46% C - 0.79% Mn - 0.91% Ni - 0.77% Cr - 0.18% Mo - 0.0021% B

Type: USS Cor-Ten Steel, 42
Composition: Fe - 0.12% C - 0.45% Mn - 0.41% Si - 0.12% P - 0.31% Ni - 0.62% Cr - 0.26% Cu

Type: USS Ti Steel, 43
Composition: Fe - 0.15% C - 0.92% Mn - 0.88% Ni - 0.50% Cr - 0.46% Mo - 0.06% V - 0.32% Cu - 0.0031% B

Type: USS Strux, 43
Composition: Fe - 0.39% C - 0.89% Mn - 0.48% Si - 0.68% Ni - 0.95% Cr - 0.50% Mo - 0.03% V - 0.002% B

Type: USS Airsteel X 200, 43
Composition: Fe - 0.44% C - 0.79% Mn - 1.63% Si - 2.10% Cr - 0.54% Mo - 0.06% V

Type: 1021/1021 + 1 Ni, 43
Composition: Fe - 0.20% C - 0.81% Mn
Composition: Fe - 0.18% C - 0.67% Mn - 1.07% Ni

Type: 1021 + 1 Ni / 1021 + 1 Ni + B, 44
Composition: Fe - 0.18% C - 0.67% Mn - 1.07% Ni
Composition: Fe - 0.19% C - 0.75% Mn - 1.04% Ni + 0.0021% B

Type: 1021 + Ni / 1021 + 1 Ni + Mn, 44
Composition: Fe - 0.18% C - 0.67% Mn - 1.07% Ni
Composition: Fe - 0.17% C - 1.65% Mn - 1.07% Ni

Type: 1021 + 1 Ni / 1021 + 1 Ni + 0.5 Cr, 44
Composition: Fe - 0.18% C - 0.67% Mn - 1.07% Ni
Composition: Fe - 0.21% C - 0.75% Mn - 1.08% Ni - 0.48% Cr

Type: 1021 + 1 Ni / 1021 + 1 Ni + 1 Cr, 44
Composition: Fe - 0.18% C - 0.67% Mn - 1.07% Ni
Composition: Fe - 0.21% C - 0.78% Mn - 1.09% Ni - 0.99% Cr

Type: 1021 + 1 Ni / 1021 + 1 Ni + 2 Cr, 45
Composition: Fe - 0.18% C - 0.67% Mn - 1.07% Ni
Composition: Fe - 0.22% C - 0.77% Mn - 1.08% Ni - 1.91% Cr

Type: 1021 + 1 Ni / 1021 + 1 Ni + 0.25 Mo, 45
Composition: Fe - 0.18% C - 0.67% Mn - 1.07% Ni
Composition: Fe - 0.18% C - 0.65% Mn - 1.09% Ni - 0.26% Mo

Type: 1021 + 1 Ni / 1021 + 1 Ni + 0.5 Mo, 45
Composition: Fe - 0.18% C - 0.67% Mn - 1.07% Ni
Composition: Fe - 0.21% C - 0.70% Mn - 1.08% Ni - 0.49% Mo

Type: 1021 + 1 Ni / 1021 + 1 Ni + 0.75 Si, 45
Composition: Fe - 0.18% C - 0.67% Mn - 1.07% Ni
Composition: Fe - 0.18% C - 0.75% Mn - 0.71% Si - 1.07% Ni

Type: 1021 + 1 Ni / 1021 + 1 Ni + 2 Si, 46
Composition: Fe - 0.18% C - 0.67% Mn - 1.07% Ni
Composition: Fe - 0.19% C - 0.75% Mn - 2.09% Si - 1.06% Ni

Type: 1030 Mod., 46
Composition: Fe - 0.27% C - 1.12% Mn

Type: 4140, 46
Composition: Fe - 0.37% C - 0.77% Mn - 0.98% Cr - 0.21% Mo

Type: Fe-C-Mo, 46
Composition: Fe - 0.22% C - 0.79% Mn - 0.50% Mo

Type: 1086/1095 + 0.25% V, 47
Composition: Fe - 0.87% C - 0.30% Mn - 0.27% V

Type: 52100, 47
Composition: Fe - 1.02% C - 0.36% Mn - 0.20% Ni - 1.41% Cr

Type: Fe-C-Mo, 47
Composition: Fe - 0.97% C - 1.04% Mn - 0.32% Mo

Type: Fe-C (Carbon), 48
Composition: Fe - 0.54% C - 0.46% Mn
Composition: Fe - 0.89% C - 0.30% Mn
Composition: Fe - 1.13% C - 0.30% Mn

Type: Fe-C-Mn (Manganese), 48
Composition: Fe - 0.59% C - 0.30% Mn
Composition: Fe - 0.54% C - 0.45% Mn
Composition: Fe - 0.50% C - 0.91% Mn
Composition: Fe - 0.64% C - 1.13% Mn
Composition: Fe - 0.65% C - 1.32% Mn

Type: Fe-C-Ni (Nickel), 49
Composition: Fe - 0.59% C - 0.20% Mn
Composition: Fe - 0.61% C - 0.19% Mn - 0.94% Ni
Composition: Fe - 0.57% C - 0.17% Mn - 1.94% Ni
Composition: Fe - 0.55% C - 0.17% Mn - 3.88% Ni

Type: Fe-C-Cr (Chromium), 49
Composition: Fe - 1.13% C - 0.30% Mn
Composition: Fe - 1.17% C - 0.30% Mn - 0.26% Cr

Type: Fe-C-Cr (Chromium), 50
Composition: Fe - 0.35% C - 0.37% Mn
Composition: Fe - 0.37% C - 0.37% Mn - 0.57% Cr
Composition: Fe - 0.42% C - 0.68% Mn - 0.93% Cr
Composition: Fe - 0.32% C - 0.45% Mn - 1.97% Cr

Type: Fe-C-Mo (Molybdenum), 50
Composition: Fe - 0.35% C - 0.37% Mn
Composition: Fe - 0.42% C - 0.20% Mn - 0.21% Mo
Composition: Fe - 0.40% C - 0.43% Mn - 0.52% Mo
Composition: Fe - 0.36% C - 0.17% Mn - 0.82% Mo
Composition: Fe - 0.33% C - 0.41% Mn - 1.96% Mo

Type: Fe-C-V (Vanadium), 51
Composition: Fe - 0.88% C - 0.41% Mn
Composition: Fe - 0.90% C - 0.47% Mn - 0.20% V

Type: Fe-C-Co (Cobalt), 51

Composition: Fe - 0.95% C - 0.45% Mn
Composition: Fe - 0.95% C - 0.48% Mn - 0.95% Co
Composition: Fe - 0.98% C - 0.49% Mn - 1.98% Co

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Introduction, 55 - 94

En 42 (1074/1075), 95

Composition: 0.75% C - 0.70% Mn - 0.33% Si - 0.016% S - 0.017% P - 0.20% Ni - 0.17% Cr - 0.02% Mo

En 44 (1095), 95

Composition: 0.96% C - 0.55% Mn - 0.32% Si - 0.012% S - 0.013% P - 0.08% Ni - 0.11% Cr - 0.01% Mo

En 15 (1536), 95

Composition: 0.33% C - 1.54% Mn - 0.23% Si - 0.024% S - 0.021% P - 0.18% Ni - 0.15% Cr - 0.05% Mo

En 14B (1527), 95

Composition: 0.29% C - 1.67% Mn - 0.26% Si - 0.030% S - 0.035% P - 0.21% Ni - 0.12% Cr - 0.04% Mo

En 45 (9260), 96

Composition: 0.55% C - 0.87% Mn - 1.74% Si - 0.037% S - 0.038% P - 0.16% Ni - 0.10% Cr - 0.02% Mo

En 12 (1030 + 0.9% Ni), 96

Composition: 0.33% C - 0.62% Mn - 0.21% Si - 0.025% S - 0.022% P - 0.89% Ni - 0.10% Cr - 0.05% Mo

En 11 (5060), 96

Composition: 0.59% C - 0.66% Mn - 0.34% Si - 0.012% S - 0.020% P - 0.17% Ni - 0.65% Cr - 0.02% Mo

En 18 (5150), 96

Composition: 0.48% C - 0.86% Mn - 0.25% Si - 0.021% S - 0.023% P - 0.18% Ni - 0.98% Cr - 0.04% Mo

En 31 (52100), 97

Composition: 1.08% C - 0.53% Mn - 0.25% Si - 0.015% S - 0.022% P - 0.33% Ni - 1.46% Cr - 0.06% Mo

En 56 (420 Stainless Steel), 97

Composition: 0.24% C - 0.27% Mn - 0.37% Si - 0.010% S - 0.021% P - 0.32% Ni - 13.3% Cr - 0.06% Mo

En 16 (4032), 97

Composition: 0.33% C - 1.48% Mn - 0.18% Si - 0.028% S - 0.028% P - 0.26% Ni - 0.16% Cr - 0.27% Mo

En 17 (4037), 97

Composition: 0.38% C - 1.49% Mn - 0.25% Si - 0.028% S - 0.056% P - 0.24% Ni - 0.14% Cr - 0.41% Mo

En 21 (2330), 98

Composition: 0.33% C - 0.74% Mn - 0.23% Si - 0.027% S - 0.031% P - 3.47% Ni - 0.07% Cr - 0.11% Mo

En 111 (3135), 98

Composition: 0.37% C - 0.89% Mn - 0.28% Si - 0.035% S - 0.025% P - 1.24% Ni - 0.63% Cr - 0.05% Mo

En 47 (6150), 98

Composition: 0.51% C - 0.72% Mn - 0.27% Si - 0.020% S - 0.021% P - 0.15% Ni - 0.94% Cr - 0.05% Mo - 0.20% V

En 19 (4140), 98

Composition: 0.41% C - 0.67% Mn - 0.23% Si - 0.016% S - 0.015% P - 0.20% Ni - 1.01% Cr - 0.23% Mo

En 20, 99

Composition: 0.27% C - 0.60% Mn - 0.13% Si - 0.022% S - 0.030% P - 0.19% Ni - 0.74% Cr - 0.55% Mo

Composition: 0.41% C - 0.58% Mn - 0.28% Si - 0.036% S - 0.028% P - 0.15% Ni - 1.39% Cr - 0.74% Mo

En 40B, 99

Composition: 0.26% C - 0.55% Mn - 0.21% Si - 0.022% S - 0.010% P - 0.25% Ni - 3.34% Cr - 0.54% Mo

En 13 (8717), 99

Composition: 0.19% C - 1.37% Mn - 0.14% Si - 0.012% S - 0.026% P - 0.56% Ni - 0.20% Cr - 0.31% Mo

En 23 (3435 + Mo), 100

Composition: 0.32% C - 0.61% Mn - 0.28% Si - 0.013% S - 0.018% P - 3.22% Ni - 0.63% Cr - 0.22% Mo

En 25 (3430 + Mo), 100

Composition: 0.31% C - 0.62% Mn - 0.20% Si - 0.012% S - 0.018% P - 2.63% Ni - 0.64% Cr - 0.58% Mo

En 30B (3335 + Mo), 100

Composition: 0.32% C - 0.47% Mn - 0.29% Si - 0.020% S - 0.022% P - 4.13% Ni - 1.21% Cr - 0.30% Mo

En 110 (4340), 100

Composition: 0.39% C - 0.62% Mn - 0.23% Si - 0.018% S - 0.021% P - 1.44% Ni - 1.11% Cr - 0.18% Mo

En 24 (4340), 101

Composition: 0.38% C - 0.69% Mn - 0.20% Si - 0.010% S - 0.017% P - 1.58% Ni - 0.95% Cr - 0.26% Mo

En 26 (4340), 101

Composition: 0.42% C - 0.67% Mn - 0.31% Si - 0.022% S - 0.029% P - 2.53% Ni - 0.72% Cr - 0.48% Mo

En 100 (8640/8740), 101

Composition: 0.40% C - 1.34% Mn - 0.21% Si - 0.027% S - 0.028% P - 1.03% Ni - 0.53% Cr - 0.22% Mo

En 28, 101

Composition: 0.25% C - 0.52% Mn - 0.15% Si - 0.024% S - 0.010% P - 3.33% Ni - 1.14% Cr - 0.65% Mo - 0.16% V

En 351 (3120), 102

Composition: 0.17% C - 0.88% Mn - 0.22% Si - 0.016% S - 0.019% P - 0.86% Ni - 0.59% Cr - 0.05% Mo

Carburized En 351 (3120 at 0.9% C), 102

Composition: 0.92% C - 0.93% Mn - 0.30% Si - 0.019% S - 0.028% O - 0.90% Ni - 0.57% Cr - 0.03% Mo

En 352 (3120), 103

Composition: 0.20% C - 0.71% Mn - 0.15% Si - 0.018% S - 0.032% P - 1.13% Ni - 0.80% Cr - 0.05% Mo

Carburized En 352 (3120 at 1% C), 103

Composition: 0.96% C - 0.74% Mn - 0.26% Si - 0.016% S - 0.029% P - 1.19% Ni - 0.84% Cr - 0.09% Mo

En 33, 104

Composition: 0.11% C - 0.36% Mn - 0.21% Si - 0.028% S - 0.010% P - 2.89% Ni - 0.28% Cr - 0.09% Mo

Carburized En 33, 104

Composition: 0.95% C - 0.40% Mn - 0.26% Si - 0.015% S - 0.28% P - 2.95% Ni - 0.36% Cr - 0.08% Mo

En 36 (9310), 105

Composition: 0.11% C - 0.38% Mn - 0.13% Si - 0.016% S - 0.023% P - 3.26% Ni - 0.87% Cr - 0.08% Mo

En 36 (9310), 105

Composition: 0.14% C - 0.46% Mn - 0.19% Si - 0.009% S - 0.006% P - 3.55% Ni - 1.11% Cr - 0.12% Mo

Carburized En 36 (9310 at 0.7% C), 107

Composition: 0.70% C - 0.35% Mn - 0.16% Si - 0.018% S - 0.025% P - 3.24% Ni - 0.96% Cr - 0.06% Mo

Carburized En 36 (9310 at 1% C), 106

Composition: 1.00% C - 0.30% Mn - 0.12% Si - 0.016% S - 0.028% P - 3.27% Ni - 0.90% Cr - 0.07% Mo

En 39A (9310), 107

Composition: 0.11% C - 0.38% Mn - 0.09% Si - 0.010% S - 0.026% P - 4.15% Ni - 1.33% Cr - 0.07% Mo

Carburized En 39A (9310 at 0.5% C), 107

Composition: 0.54% C - 0.34% Mn - 0.26% Si - 0.019% S - 0.024% P - 3.92% Ni - 1.28% Cr - 0.07% Mo

Carburized En 39A (9310 at 1% C), 108

Composition: 1.02% C - 0.47% Mn - 0.27% Si - 0.018% S - 0.029% P - 4.15% Ni - 1.22% Cr - 0.05% Mn

En 34, 108

Composition: 0.16% C - 0.53% Mn - 0.18% Si - 0.011% S - 0.022% P - 1.56% Ni - 0.26% Cr - 0.25% Mo

Carburized En 34, 109

Composition: 0.99% C - 0.56% Mn - 0.29% Si - 0.015% S - 0.025% P - 1.61% Ni - 0.32% Cr - 0.29% Mo

En 39B (9315), 109

Composition: 0.15% C - 0.38% Mn - 0.20% Si - 0.018% S - 0.027% P - 4.33% Ni - 1.16% Cr - 0.17% Mo

Carburized En 39B (9315 at 0.6% C), 110

Composition: 0.56% C - 0.47% Mn - 0.18% Si - 0.028% S - 0.020% P - 4.25% Ni - 1.16% Cr - 0.18% Mo

Carburized En 39B (9315 at 0.9% C), 110

Composition: 0.93% C - 0.50% Mn - 0.30% Si - 0.017% S - 0.026% P - 4.25% Ni - 1.18% Cr - 0.16% Mo

En 355, 111

Composition: 0.20% C - 0.61% Mn - 0.23% Si - 0.011% S - 0.015% P - 2.00% Ni - 1.65% Cr - 0.19% Mo

Carburized En 355, 111

Composition: 0.93% C - 0.71% Mn - 0.38% Si - 0.017% S - 0.029% P - 2.10% Ni - 1.70% Cr - 0.20% Mo

En 353, 112

Composition: 0.18% C - 0.93% Mn - 0.26% Si - 0.008% S - 0.016% P - 1.34% Ni - 1.11% Cr - 0.11% Mo

Carburized En 353, 112

Composition: 1.00% C - 0.99% Mn - 0.28% Si - 0.012% S - 0.023% P - 1.42% Ni - 1.12% Cr - 0.11% Mo

En 354 (4320), 113

Composition: 0.19% C - 0.90% Mn - 0.21% Si - 0.015% S - 0.017% P - 1.87% Ni - 1.08% Cr - 0.18% Mo

Carburized En 354 (4320 at 1% C), 113

Composition: 0.97% C - 1.00% Mn - 0.33% Si - 0.018% S - 0.029% P - 1.93% Ni - 1.13% Cr - 0.23% Mo

GERMAN STEELS, 117 - 161**Example Page, 117****Ck 45 0.44% C - 0.66% Mn (SAE 1042), 118**

Composition: 0.44% C - 0.66% Mn - 0.22% Si - 0.022% P - 0.029% S - 0.15% Cr - 0.02% V

C 70 W 1 0.76% C - 0.29% Mn (SAE 1078), 119

Composition: 0.76% C - 0.29% Mn - 0.22% Si - 0.008% P - 0.008% S - 0.11% Cr - 0.17% Cu - 0.019% Mo - 0.07% Ni - 0.02% V

C 100 W 1 1.03% C - 0.22% Mn (AISI W1 Tool Steel), 120

Composition: 1.03% C - 0.22% Mn - 0.17% Si - 0.014% P - 0.012% S - 0.07% Cr - 0.14% Cu - 0.01% Mo - 0.10% Ni - trace V

0.48% C - 1.98% Mn, 121

Composition: 0.48% C - 1.98% Mn - 0.28% Si - 0.020% P - 0.011% S

0.98% C - 1.84% Mn, 122

Composition: 0.98% C - 1.84% Mn - 0.08% Si - 0.023% P - 0.011% S

0.73% C - 1.62% Si (71 Si 7), 123

Composition: 0.73% C - 0.73% Mn - 1.62% Si - 0.019% P - 0.012% S - 0.10% Cr - 0.19% Cu - 0.12% Ni - 0.01% V

0.30% C - 3.03% Ni (SAE 2330), 124

Composition: 0.30% C - 0.51% Mn - 0.32% Si - 0.011% P - 0.007% S - 0.032% Al - 0.07% Cr - 3.03% Ni - <0.01% Ti

34 Cr 4 (SAE 5135), 125

Composition: 0.35% C - 0.656% Mn - 0.23% Si - 0.026% P - 0.013% S - 1.11% Cr - 0.18% Cu - 0.05% Mo - 0.23% Ni - <0.01% V

41 Cr 4 (SAE 5140), 126

Composition: 0.44% C - 0.80% Mn - 0.22% Si - 0.030% P - 0.023% S - 1.04% Cr - 0.17% Cu - 0.04% Mo - 0.26% Ni - <0.01% V

100 Cr 6, 127

Composition: 1.04% C - 0.33% Mn - 0.26% Si - 0.023% P - 0.006% S - 1.53% Cr - 0.20% Cu - <0.01% Mo - 0.31% Ni - <0.01% V

X 40 Cr 13 (AISI 420 Stainless Steel), 128

Composition: 0.44% C - 0.20% Mn - 0.30% Si - 0.025% P - 0.010% S - 13.12% Cr - 0.09% Cu - <0.01% Mo - 0.31% Ni - 0.02% V

X 210 Cr (AISI D3 Tool Steel), 129

Composition: 2.08% C - 0.39% Mn - 0.28% Si - 0.017% P - 0.012% S - 11.48% Cr - 0.15% Cu - 0.02% Mo - 0.31% Ni - 0.04% V

20 Mo 5, 130

Composition: 0.23% C - 0.65% Mn - 0.30% Si - 0.013% P - 0.030% S - 0.051% Al - 0.12% Cr - 0.08% Cu - 0.50% Mo - 0.05% Ni - 0.03% V

37 MnSi 5, 131

Composition: 0.38% C - 1.14% Mn - 1.05% Si - 0.035% P - 0.019% S - 0.23% Cr - 0.02% V

16 MnCr 5 (SAE 5115), 132

Composition: 0.16% C - 1.12% Mn - 0.22% Si - 0.030% P - 0.008% S - 0.015% Al - 0.99% Cr - 0.02% Mo - 0.12% Ni - 0.01% V

50 CrV 4 (SAE 6145), 133

Composition: 0.47% C - 0.82% Mn - 0.35% Si - 0.035% P - 0.015% S - 1.20% Cr - 0.14% Cu - 0.04% Ni - 0.11% V

50 CrV 4 (SAE 6150), 134

Composition: 0.55% C - 0.98% Mn - 0.22% Si - 0.017% P - 0.013% S - 1.02% Cr - 0.07% Cu - 0.01% Ni - 0.11% V

0.15% C - 0.67% Mn - 1.20% Cr - 0.31% V (SAE 6115), 135

Composition: 0.15% C - 0.67% Mn - 0.48% Si - 0.044% P - 0.024% S - 1.20% Cr - 0.18% Cu - 0.25% Ni - 0.31% V

15 CrNi 6, 136

Composition: 0.13% C - 0.51% Mn - 0.31% Si - 0.023% P - 0.009% S - 0.010% Al - 1.50% Cr - 0.06% Mo - 1.55% Ni - <0.01% V

18 CrNi 8, 136

Composition: 0.16% C - 0.50% Mn - 0.31% Si - 0.013% P - 0.014% S - 0.03% Al - 1.95% Cr - 0.03% Mo - 2.02% Ni - 0.01% V

14 NiCr 14, 137

Composition: 0.13% C - 0.46% Mn - 0.26% Si - 0.013% P - 0.012% S - 0.012% Al - 0.78% Cr - 0.16% Cu - 0.04% Mo - 3.69% Ni

25 CrMo 4 (SAE 4118), 138

Composition: 0.22% C - 0.64% Mn - 0.25% Si - 0.010% P - 0.011% S - 0.97% Cr - 0.16% Cu - 0.23% Mo - 0.33% Ni - <0.01% V

34 CrMo 4 (SAE 4130), 139

Composition: 0.30% C - 0.64% Mn - 0.22% Si - 0.011% P - 0.012% S - 1.01% Cr - 0.19% Cu - 0.24% Mo - 0.11% Ni - <0.01% V

42 CrMo 4 (SAE 4135/4140), 140

Composition: 0.38% C - 0.64% Mn - 0.23% Si - 0.019% P - 0.013% S - 0.99% Cr - 0.17% Cu - 0.16% Mo - 0.08% Ni - <0.01% V

50 CrMo 4 (SAE 4150), 141

Composition: 0.50% C - 0.80% Mn - 0.32% Si - 0.017% P - 0.022% S - 1.04% Cr - 0.17% Cu - 0.24% Mo - 0.11% Ni - <0.01% V

20 MoCr 4, 142

Composition: 0.22% C - 0.66% Mn - 0.30% Si - 0.018% P - 0.011% S - 0.049% Al - <0.0005% B - 0.56% Cr - 0.18% Cu - 0.44% Mo - 0.020% N - 0.15% Ni

Composition: 0.27% C - 0.67% Mn - 0.20% Si - 0.017% P - 0.022% S - 0.034% Al - 0.002% B - 0.50% Cr - 0.45% Mo - 0.005% N - 0.11% Ni

StE 70 (Cr-Mo-Zr), 143

Composition: 0.17% C - 0.84% Mn - 0.54% Si - 0.019% P - 0.011% S - 0.031% Al - 0.019% As - 0.89% Cr - 0.07% Cu - 0.40% Mo - 0.05% Ni - 0.008% N₂ - 0.005% O₂ - 0.008% Sn - 0.01% V - 0.09% Zr

StE 47 (Ni-V), 143

Composition: 0.21% C - 1.52% Mn - 0.40% Si - 0.022% P - 0.023% S - 0.043% Al - 0.019% N - 0.07% Ni - 0.13% V

StE 47 (Ni-Ti), 144

Composition: 0.17% C - 1.45% Mn - 0.55% Si - 0.016% P - 0.017% S - 0.055% Al - 0.74% Ni - 0.18% Ti

105 WCr 6, 145

Composition: 1.03% C - 0.97% Mn - 0.28% Si - 0.016% P - 0.018% S - 1.05% Cr - 0.25% Cu - 0.03% Mo - 0.13% Ni - 1.15% W

0.20% C - 1.20% Mn - 0.97% Cu - 0.55% Ni, 146

Composition: 0.20% C - 1.20% Mn - 0.38% Si - 0.039% P - 0.024% S - 0.06% Cr - 0.91% Cu - 0.55% Ni

28 NiCrMo 7 4, 147

Composition: 0.30% C - 0.46% Mn - 0.24% Si - 0.030% P - 0.025% S - 1.44% Cr - 0.20% Cu - 0.37% Mo - 2.06% Ni - <0.01% V

X 45 NiCrMo 4, 148

Composition: 0.40% C - 0.35% Mn - 0.20% Si - 0.010% P - 0.015% S - 1.27% Cr - 0.16% Cu - 0.24% Mo - 4.03% Ni - 0.04% V

20 NiMoCr 6, 149

Composition: 0.20% C - 0.62% Mn - 0.15% Si - 0.015% P - 0.020% S - 0.015% Al - <0.0005% B - 0.47% Cr - 0.48% Mo - 1.58% Ni

61 CrSiV 5, 150

Composition: 0.58% C - 0.81% Mn - 0.89% Si - 0.013% P - 0.006% S - 1.27% Cr - 0.14% Cu - 0.02% Mo - 0.06% Ni - 0.11% V

X 38 CrMoV 5 1 (AISI H 11 Tool Steel), 151

Composition: 0.39% C - 0.48% Mn - 0.94% Si - 0.013% P - 0.005% S - 5.53% Cr - 0.20% Cu - 0.87% Mo - 0.04% Ni - 0.48% V

45 CrMoV 6 7, 152

Composition: 0.43% C - 0.75% Mn - 0.27% Si - 0.011% P - 0.011% S - 1.31% Cr - 0.72% Mo - 0.11% Ni - 0.23% V

StE 47 (Cu-Ni-V), 153

Composition: 0.12% C - 1.28% Mn - 0.40% Si - 0.015% P - 0.016% S - 0.024% Al - 0.67% Cu - 0.62% Ni - 0.15% V

StE 47 (Cu-Ni-Ti), 153

Composition: 0.12% C - 1.28% Mn - 0.40% Si - 0.015% P - 0.016% S - 0.021% Al - 0.67% Cu - 0.62% Ni - 0.18% Ti

56 NiCrMoV 7, 154

Composition: 0.52% C - 0.70% Mn - 0.29% Si - 0.010% P - 0.010% S - 1.09% Cr - 0.43% Mo - 1.72% Ni - 0.14% V

X 30 WCrV 5 3, 155

Composition: 0.28% C - 0.39% Mn - 0.16% Si - 0.020% P - 0.006% S - 2.35% Cr - 0.06% Mo - 0.06% Ni - 0.53% V - 4.10% W

X 30 WCrV 9 3, 156

Composition: 0.28% C - 0.36% Mn - 0.11% Si - 0.008% P - 0.004% S - 2.57% Cr - 0.03% Mo - 0.04% Ni - 0.35% V - 8.88% W

X 210 CrW 12, 157

Composition: 2.19% C - 0.32% Mn - 0.26% Si - 0.027% P - 0.008% S - 11.76% Cr - 0.12% Cu - 0.12% Mo - 0.08% Ni - 0.08% V - 0.84% W

60 WCrV 7, 158

Composition: 0.55% C - 0.34% Mn - 0.94% Si - 0.015% P - 0.012% S - 1.27% Cr - 0.05% Mo - 0.12% Ni - 0.18% V - 2.10% W

45 CrVMoW 5 8, 159

Composition: 0.39% C - 0.45% Mn - 0.58% Si - 0.018% P - 0.003% S - 1.45% Cr - 0.47% Mo - 0.13% Ni - 0.70% V - 0.55% W

B 18 (AISI T1 High Speed Steel), 160

Composition: 0.81% C - 0.33% Mn - 0.15% Si - 0.024% P - 0.003% S - 3.77% Cr - 0.44% Mo - 0.12% Ni - 1.07% V - 18.25% W

D, 160

Composition: 0.87% C - 0.32% Mn - 0.27% Si - 0.020% P - 0.005% S - 3.99% Cr - 0.80% Mo - 0.11% Ni - 2.52% V - 11.91% W

D Mo 5, 161

Composition: 0.85% C - 0.31% Mn - 0.30% Si - 0.015% P - 0.010% S - 4.15% Cr - 4.79% Mo - 0.18% Ni - 2.01% V - 6.34% W

E 18 Co 5 (AISI T4 High Speed Steel), 161

Composition: 0.80% C - 0.30% Mn - 0.23% Si - 0.019% P - 0.005% S - 4.52% Co - 4.34% Cr - 0.78% Mo - 0.30% Ni - 1.52% V - 17.89% W

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XC 32 Steel, 165

Composition: 0.35% C - 0.69% Mo - 0.31% Si - 0.018% S - 0.011% P - 0.31% Ni - 0.12% Cr - 0.04% Mo - 0.14% Cu

XC 38 Steel, 165

Composition: 0.36% C - 0.66% Mn - 0.27% Si - 0.016% S - 0.020% P - 0.02% Ni - 0.21% Cr - 0.02% Mo - 0.22% Cu - 0.060% Al

XC 42 Steel, 165

Composition: 0.45% C - 0.52% Mn - 0.27% Si - 0.025% S - 0.015% P - 0.12% Ni - 0.05% Cr - 0.01% Mo - 0.13% Cu

Composition: 0.44% C - 0.72% Mn - 0.26% Si - 0.028% S - 0.038% P - 0.09% Ni - 0.16% Cr - 0.02% Mo

XC 55 Steel, 166

Composition: 0.53% C - 0.70% Mn - 0.35% Si - 0.010% S - 0.020% P - 0.24% Ni - 0.09% Cr - <0.10% Mo - 0.52% Cu - <0.03% V

Composition: 0.52% C - 0.60% Mn - 0.28% Si - 0.017% S - 0.020% P - 0.05% Ni - <0.04% Cr - <0.05% Mo

XC 70 Steel, 166

Composition: 0.75% C - 0.75% Mn - 0.24% Si - 0.010% S - 0.012% P - 0.43% Ni - 0.06% Cr - <0.10% Mo - 0.56% Cu - <0.03% V

Composition: 0.72% C - 0.72% Mn - 0.34% Si - 0.026% S - 0.031% P

55 S 7 Steel, 167

Composition: 0.55% C - 0.61% Mn - 1.68% Si - 0.014% S - 0.012% P - 0.19% Ni - 0.05% Cr - 0.01% Mo - 0.20% Cu - trace V - 0.05% Ti

35 M 5 Steel, 167

Composition: 0.33% C - 1.12% Mn - 0.30% Si - 0.027% S - 0.018% P - 0.24% Ni - 0.11% Cr - 0.04% Mo - 0.19% Cu - 0.010% Al

45 M 5 Steel, 168

Composition: 0.47% C - 1.37% Mn - 0.36% Si - 0.025% S - 0.015% P - 0.02% Ni - 0.15% Cr - 0.19% Cu

25 M 6 Steel, 169

Composition: 0.24% C - 1.58% Mn - 0.20% Si - 0.014% S - 0.016% P - 0.20% Ni - 0.24% Cr - 0.02% Mo - 0.12% Cu - 0.018% Co

10 N 14 Steel, 169

Composition: 0.11% C - 0.44% Mn - 0.22% Si - 0.007% S - 0.010% P - 3.47% Ni - 0.10% Cr - 0.04% Mo - 0.15% Cu - 0.007% Al

Z 10 N 5 Steel, 169

Composition: 0.10% C - 0.46% Mn - 0.33% Si - 0.011% S - 0.025% P - 5.00% Ni - 0.23% Cr - 0.04% Mo - 0.14% Cu

Z 10 N 9 Steel, 170

Composition: 0.09% C - 0.51% Mn - 0.27% Si - 0.008% S - 0.010% P - 9.00% Ni - 0.05% Cr - 0.03% Mo - 0.13% Cu - 0.012% Al

32 C 4 Steel, 170

Composition: 0.32% C - 0.76% Mn - 0.30% Si - 0.010% S - 0.021% P - 0.26% Ni - 1.08% Cr - 0.02% Mo - 0.17% Cu

38 C 4 Steel, 171

Composition: 0.38% C - 0.74% Mn - 0.26% Si - 0.010% S - 0.023% P - 0.26% Ni - 0.90% Cr - 0.04% Mo - 0.17% Cu

42 C 4 Steel, 171

Composition: 0.44% C - 0.80% Mn - 0.31% Si - 0.013% S - 0.030% P - 0.46% Ni - 0.96% Cr - 0.05% Mo - 0.18% Cu

100 C 6 Steel, 172

Composition: 1.00% C - 0.30% Mn - 0.27% Si - 0.030% S - 0.013% P - 0.21% Ni - 1.71% Cr - 0.04% Mo - 0.14% Cu - 0.010% V - 0.02% Ti

Z 40 C 14 Steel, 172

Composition: 0.42% C - 0.16% Mn - 0.44% Si - 0.049% S - 0.042% P - 0.27% Ni - 13.40% Cr - 0.08% Cu

60 SC 7 Steel, 173

Composition: 0.55% C - 0.88% Mn - 1.52% Si - 0.005% S - 0.032% P - 0.07% Ni - 0.74% Cr - 0.01% Mo - 0.03% Cu

Composition: 0.64% C - 0.74% Mn - 1.61% Si - 0.020% S - 0.016% P - 0.07% Ni - 0.61% Cr - 0.10% Cu

40 CV 5 Steel, 173

Composition: 0.38% C - 0.41% Mn - 0.21% Si - 0.010% S - 0.013% P - 0.03% Ni - 1.29% Cr - <0.10% Mo - 0.05% Cu - 0.120% V

50 CV 4 Steel, 174

Composition: 0.53% C - 0.81% Mn - 0.27% Si - 0.016% S - 0.024% P - 0.07% Ni - 1.09% Cr - 0.01% Mo - 0.11% Cu - 0.100% V

90 MV 8 Steel, 174

Composition: 0.81% C - 2.10% Mn - 0.29% Si - 0.003% S - 0.016% P - 0.06% Ni - 0.02% Cr - 0.01% Mo - 0.04% Cu - 0.17% V - 0.05% W

15 MDV 4-05 Steel, 175

Composition: 0.14% C - 1.20% Mn - 0.23% Si - 0.017% S - 0.016% P - 0.15% Ni - 0.10% Cr - 0.48% Mo - 0.15% Cu - 0.065% V

16 MC 5 Steel, 175

Composition: 0.18% C - 1.10% Mn - 0.27% Si - 0.025% S - 0.023% P - 0.28% Ni - 1.02% Cr - 0.04% Mo - 0.18% Cu

90 M 5 Steel, 176

Composition: 0.93% C - 1.25% Mn - 0.20% Si - 0.007% S - 0.020% P - 0.24% Ni - 0.60% Cr - 0.15% Cu

50 NC 2 Steel, 176

Composition: 0.50% C - 0.78% Mn - 0.40% Si - 0.027% S - 0.010% P - 0.48% Ni - 0.52% Cr - 0.03% Mo - 0.12% Cu

35 NC 6 Steel, 177

Composition: 0.41% C - 0.55% Mn - 0.24% Si - 0.007% S - 0.014% P - 0.93% Ni - 0.80% Cr - 0.06% Mo - 0.10% Cu - 0.010% V

10 NC 6 Steel, 177

Composition: 0.11% C - 0.50% Mn - 0.30% Si - 0.005% S - 0.017% P - 1.59% Ni - 0.64% Cr - <0.10% Mo - 0.31% Cu - <0.03% V

16 NC 6 Steel, 178

Composition: 0.15% C - 0.55% Mn - 0.30% Si - <0.010% S - 0.013% P - 1.38% Ni - 0.82% Cr - 0.09% Mo - 0.11% Cu

20 NC 6 Steel, 178

Composition: 0.19% C - 0.55% Mn - 0.30% Si - 0.010% S - 0.018% P - 1.52% Ni - 0.81% Cr - <0.10% Mo - 0.20% Cu - <0.030% V

14 NC 11 Steel, 179

Composition: 0.12% C - 0.51% Mn - 0.29% Si - 0.014% S - 0.013% P - 2.69% Ni - 0.70% Cr - 0.06% Mo - 0.18% Cu

35 NC 15 Steel, 179

Composition: 0.36% C - 0.53% Mn - 0.32% Si - 0.010% S - 0.013% P - 3.74% Ni - 1.86% Cr - 0.05% Mo - 0.13% Cu - 0.002% Ti

Composition: 0.38% C - 0.44% Mn - 0.22% Si - 0.003% S - 0.018% P - 3.40% Ni - 1.50% Cr - 0.15% Mo - 0.13% Cu - 0.015% V

30 NC 11 Steel, 180

Composition: 0.32% C - 0.30% Mn - 0.20% Si - 0.008% S - 0.017% P - 2.95% Ni - 0.69% Cr - <0.10% Mo - 0.31% Cu - <0.030% V - 0.06% W

50 CD 4 Steel, 180

Composition: 0.52% C - 0.60% Mn - 0.40% Si - 0.011% S - 0.013% P - 0.17% Ni - 1.00% Cr - 0.22% Mo - 0.38% Cu - <0.05% V

18 CD 4 Steel, 181

Composition: 0.17% C - 0.80% Mn - 0.23% Si - 0.025% S - 0.020% P - 0.21% Ni - 1.06% Cr - 0.24% Mo - 0.18% Cu - 0.006% V - 0.032% Ti

Composition: 0.15% C - 0.86% Mn - 0.28% Si - 0.010% S - 0.014% P - 0.14% Ni - 0.84% Cr - 0.20% Mo

25 CD 4 Steel, 181

Composition: 0.25% C - 0.68% Mn - 0.21% Si - 0.090% S - 0.018% P - 0.19% Ni - 1.10% Cr - 0.22% Mo - 0.16% Cu

35 CD 4 Steel, 182

Composition: 0.37% C - 0.79% Mn - 0.30% Si - 0.010% S - 0.019% P - <0.17% Ni - 1.00% Cr - 0.18% Mo - 0.10% Cu

Composition: 0.36% C - 0.77% Mn - 0.28% Si - 0.010% S - 0.019% P - 0.16% Ni - 0.96% Cr - 0.28% Mo

100 CD 7 Steel, 182

Composition: 1.07% C - 0.32% Mn - 0.31% Si - 0.016% S - 0.012% P - 0.17% Ni - 2.05% Cr - 0.18% Mo - 0.13% Cu

30 CD 12 Steel, 183

Composition: 0.30% C - 0.63% Mn - 0.29% Si - 0.016% S - 0.010% P - 0.17% Ni - 2.99% Cr - 0.43% Mo - 0.13% Cu

Z 15 CD 5-05 Steel, 183

Composition: 0.11% C - 0.47% Mn - 0.24% Si - 0.015% S - 0.016% P - 0.23% Ni - 4.48% Cr - 0.52% Mo - 0.15% Cu

45 SC 6 Steel, 184

Composition: 0.43% C - 0.95% Mn - 1.38% Si - <0.010% S - 0.012% P - 0.03% Ni - 1.06% Cr - <0.10% Mo - <0.05% Cu - 0.035% V

45 SCD 6 Steel, 184

Composition: 0.45% C - 0.55% Mn - 1.31% Si - 0.005% S - 0.013% P - 0.21% Ni - 0.60% Cr - 0.22% Mo - 0.27% Cu - <0.05% V - trace Ti

Composition: 0.42% C - 0.70% Mn - 1.40% Si - 0.005% S - 0.015% P - 0.24% Ni - 0.68% Cr - 0.19% Mo - 0.03%

45 MS 6 Steel, 185

Composition: 0.45% C - 1.50% Mn - 1.34% Si - <0.010% S - 0.017% P - 0.03% Ni - 0.03% Cr - <0.01% Mo - 0.09% Cu - 0.040% V

15 MDV 4-05 Steel, 185

Composition: 0.14% C - 1.20% Mn - 0.23% Si - 0.017% S - 0.016% P - 0.15% Ni - 0.10% Cr - 0.48% Mo - 0.15% Cu - 0.065% V

20 CDV 5-08 Steel, 186

Composition: 0.15% C - 0.53% Mn - 0.26% Si - 0.013% S - 0.020% P - 0.11% Ni - 1.04% Cr - 1.05% Mo - 0.15% Cu - 0.250% V - 0.028% Al

Composition: 0.14% C - 0.96% Mn - 0.15% Si - 0.011% S - 0.017% P - 1.40% Cr - 0.96% Mo - 0.270% V

10 CD 9-10 Steel, 186

Composition: 0.15% C - 0.36% Mn - 0.44% Si - 0.020% S - 0.022% P - 0.09% Ni - 2.24% Cr - 0.85% Mo - 0.23% Cu - 0.097% Al - 0.01% Ti

28 CDV 5-08 Steel, 187

Composition: 0.26% C - 0.58% Mn - 0.49% Si - 0.010% S - 0.014% P - 0.18% Ni - 1.65% Cr - 0.84% Mo - 0.07% Cu - 0.380% V

Z 38 CDV 5 Steel, 187

Composition: 0.41% C - 0.45% Mn - 0.66% Si - 0.001% S - 0.011% P - 4.90% Cr - 1.07% Mo - 0.09% Cu - 0.350% V

30 NCD 2 Steel, 188

Composition: 0.28% C - 0.70% Mn - 0.29% Si - 0.014% S - 0.011% P - 0.43% Ni - 0.70% Cr - 0.20% Mo - 0.20% Cu

20 NCD 2 Steel, 188

Composition: 0.21% C - 0.88% Mn - 0.31% Si - 0.002% S - 0.017% P - 0.65% Ni - 0.57% Cr - 0.26% Mo - 0.15% Cu

40 NCD 3 Steel, 189

Composition: 0.40% C - 0.80% Mn - 0.33% Si - 0.019% S - 0.018% P - 0.58% Ni - 0.56% Cr - 0.28% Mo - 0.10% Cu

35 NCD 5 Steel, 189

Composition: 0.33% C - 0.72% Mn - 0.24% Si - 0.010% S - 0.010% P - 1.22% Ni - 0.54% Cr - 0.17% Mo - 0.22% Cu

50 NCD 6 Steel, 190

Composition: 0.49% C - 0.57% Mn - 0.26% Si - 0.012% S - 0.011% P - 1.62% Ni - 0.83% Cr - 0.24% Mo - 0.13% Cu

28 NCD 6 Steel, 190

Composition: 0.29% C - 0.78% Mn - 0.24% Si - 0.009% S - 0.011% P - 1.62% Ni - 1.49% Cr - 0.44% Mo - 0.16% Cu - 0.010% Ti

20 NCD 7 Steel, 191

Composition: 0.17% C - 0.63% Mn - 0.25% Si - 0.013% S - 0.013% P - 2.02% Ni - 0.38% Cr - 0.13% Mo - 0.07% Cu - 0.010% Al

20 NCD 10 Steel, 191

Composition: 0.17% C - 1.23% Mn - 0.25% Si - 0.013% S - 0.015% P - 2.45% Ni - 0.94% Cr - 0.40% Mo - 0.011% N₂ - 0.042% Al

60 NCD 11 Steel, 192

Composition: 0.57% C - 0.65% Mn - 0.31% Si - 0.005% S - 0.010% P - 2.35% Ni - 0.75% Cr - 0.41% Mo - 0.13% Cu

32 CND 11 Steel, 192

Composition: 0.31% C - 0.67% Mn - 0.30% Si - 0.010% S - 0.010% P - 0.94% Ni - 3.00% Cr - 0.51% Mo - 0.19% Cu

16 NCD 13 Steel, 193

Composition: 0.16% C - 0.46% Mn - 0.20% Si - 0.013% S - 0.008% P - 3.02% Ni - 1.02% Cr - 0.26% Mo - 0.12% Cu

35 NCD 16 Steel, 193

Composition: 0.36% C - 0.39% Mn - 0.30% Si - 0.005% S - 0.010% P - 3.70% Ni - 1.65% Cr - 0.23% Mo - 0.12% Cu

Composition: 0.34% C - 0.35% Mn - 0.26% Si - 0.006% S - 0.008% P - 3.55% Ni - 1.54% Cr - 0.31% Mo - 0.008% N₂

30 CND 8 Steel, 194

Composition: 0.30% C - 0.56% Mn - 0.27% Si - 0.014% S - 0.012% P - 1.75% Ni - 1.85% Cr - 0.49% Mo

Composition: 0.32% C - 0.35% Mn - 0.27% Si - 0.022% S - 0.018% P - 2.10% Ni - 2.30% Cr - 0.64% Mo - 0.19% Cu

30 NCD 12 Steel, 194

Composition: 0.30% C - 0.40% Mn - 0.30% Si - 0.016% S - 0.015% P - 3.20% Ni - 0.86% Cr - 0.40% Mo - 0.17% Cu

40 NCD 18 Steel, 195

Composition: 0.42% C - 0.40% Mn - 0.32% Si - 0.005% S - 0.010% P - 4.34% Ni - 1.56% Cr - 0.44% Mo - 0.05% Cu

20 ND 16 Steel, 195

Composition: 0.20% C - 0.63% Mn - 0.32% Si - 0.026% S - 0.017% P - 3.85% Ni - 0.25% Cr - 0.94% Mo - 0.17% Cu

40 CAD 6-12 Steel, 196

Composition: 0.40% C - 0.56% Mn - 0.53% Si - 0.001% S - 0.012% P - 0.21% Ni - 1.65% Cr - 0.23% Mo - 0.15% Cu - 1.100% Al

18 CDSV 5 Steel, 196

Composition: 0.16% C - 0.49% Mn - 1.14% Si - 0.080% S - 0.010% P - 0.25% Ni - 1.22% Cr - 1.05% Mo - 0.19% Cu - 0.460% V - 0.030% Ti

100 WC 40 Steel, 197

Composition: 0.98% C - 0.30% Mn - 0.16% Si - 0.003% S - 0.015% P - 0.17% Ni - 0.63% Cr - 0.28% Mo - 0.11% Cu - 0.280% V - 3.66% W

15 NCDV 11 Steel, 197

Composition: 0.16% C - 0.51% Mn - 0.27% Si - 0.019% S - 0.010% P - 2.59% Ni - 0.67% Cr - 0.49% Mo - 0.20% Cu - 0.080% V

55 NCDV 7-05 Steel, 198

Composition: 0.58% C - 0.62% Mn - 0.39% Si - 0.012% S - 0.015% P - 1.68% Ni - 1.35% Cr - 0.40% Mo - 0.01% Cu - 0.100% V

Z 38 CDWV 5 Steel, 198

Composition: 0.37% C - 0.34% Mn - 0.95% Si - 0.008% S - 0.018% P - 0.17% Ni - 4.70% Cr - 1.40% Mo - 0.11% Cu - 0.500% V - 1.80% W

XC 48 Steel, 199

Composition: 0.50% C - 0.67% Mn - 0.24% Si - 0.022% S - 0.031% P

E 36 Steel, 199

Composition: 0.20% C - 1.37% Mn - 0.35% Si - 0.017% S - 0.022% P - 0.007% N - 0.054% Al

35 M 6 Steel, 199

Composition: 0.34% C - 1.55% Mn - 0.18% Si - 0.028% S - 0.026% P - 0.17% Ni - 0.08% Cr - 0.02% Mo

19 M Nb 6 Steel, 199

Composition: 0.19% C - 1.39% Mn - 0.26% Si - 0.019% S - 0.029% P - 0.043% Nb - 0.007% N - 0.046% Al

17 MV Az 6 Steel, 200

Composition: 0.17% C - 1.50% Mn - 0.34% Si - 0.018% S - 0.017% P - 0.110% V - 0.025% N - 0.082% Al

22 N 8 Steel, 200

Composition: 0.23% C - 0.56% Mn - 0.27% Si - 0.020% S - 0.021% P - 2.06% Ni - 0.15% Cr - 0.01% Mo - 0.18% Cu

20 NCD 8 Steel, 200

Composition: 0.19% C - 0.67% Mn - 0.20% Si - 0.020% S - 0.019% P - 2.00% Ni - 0.39% Cr - 0.09% Mo - 0.05% Cu

20 ND 8 Steel, 200

Composition: 0.24% C - 0.52% Mn - 0.27% Si - 0.012% S - 0.015% P - 2.10% Ni - 0.05% Cr - 0.32% Mo - 0.10% Cu

10 CAD 8 Steel, 201

Composition: 0.11% C - 0.46% Mn - 0.21% Si - 0.060% S - 0.020% P - 2.18% Cr - 0.31% Mo - 0.485% Al

- 30 CAD 6-12 Steel, 201
Composition: 0.28% C - 0.49% Mn - 0.32% Si - 0.050% S - 0.012% P - 0.13% Ni - 1.65% Cr - 0.22% Mo - 1.050% Al
- 14 NCD 4 Steel, 201
Composition: 0.13% C - 1.08% Mn - 0.14% Si - 0.020% S - 0.027% P - 1.13% Ni - 0.88% Cr - 0.40% Mo
- 18 NCD 6 Steel, 201
Composition: 0.18% C - 0.86% Mn - 0.27% Si - 0.009% S - 0.010% P - 1.53% Ni - 1.05% Cr - 0.16% Mo - 0.13% Cu
- 80 DCV 42-16 Steel, 202
Composition: 0.81% C - 0.26% Mn - 0.21% Si - 0.002% S - 0.021% P - 4.28% Cr - 3.98% Mo - 1.080% V
- 40 NDCV 18-11 Steel, 202
Composition: 0.41% C - 0.30% Mn - 0.36% Si - 0.006% S - 0.017% P - 4.80% Ni - 0.54% Cr - 1.13% Mo - 0.520% V
- Z 40 WCV 5 Steel, 202
Composition: 0.38% C - 0.52% Mn - 0.37% Si - 0.022% S - 0.018% P - 0.08% Ni - 3.23% Cr - 0.44% Mo - 0.580% V - 4.15% W
- Z 30 WCV 9 Steel, 202
Composition: 0.27% C - 0.43% Mn - 0.26% Si - 0.018% S - 0.008% P - 0.10% Ni - 2.45% Cr - 0.13% Mo - 0.360% V - 8.70% W
- Z 20 CDNbV 11 Steel, 203
Composition: 0.17% C - 0.39% Mn - 0.43% Si - 0.016% S - 0.017% P - 0.60% Ni - 11.30% Cr - 0.75% Mo - 0.370% V - 0.410% Nb - 0.070% N₂
- Z 65 WDCV 06-05 Steel, 203
Composition: 0.56% C - 0.27% Mn - 0.23% Si - 0.17% Ni - 4.00% Cr - 5.00% Mo - 1.800% V - 7.00% W - 0.40% Co
- Z 60 WCV 18 Steel, 203
Composition: 0.60% C - 0.22% Mn - 0.19% Si - 0.20% Ni - 4.65% Cr - 1.00% Mo - 1.350% V - 17.80% W - 0.72% Co
- XC 38 Steel, 203
Composition: 0.36% C - 0.66% Mn - 0.27% Si - 0.016% S - 0.020% P - 0.20% Ni - 0.21% Cr - 0.02% Mo - 0.22% Cu - 0.060% Al
- XC 38 Steel, 204
Composition: 0.37% C - 0.69% Mn - 0.33% Si - 0.019% S - 0.017% P - 0.06% Ni - 0.04% Cr - 0.05% Mo - 0.013% N₂
- Y₁ 90 Steel, 204
Composition: 0.93% C - 0.31% Mn - 0.11% Si - 0.010% S - 0.012% P - 0.20% Ni - 0.12% Cr - <0.10% Mo - 0.62% Cu - 0.08% V
- Y₁ 120 Steel, 204
Composition: 1.29% C - 0.20% Mn - 0.27% Si - 0.005% S - 0.015% P - 0.09% Ni - 0.04% Cr - 0.01% Mo - 0.08% Cu
- 41 S 7 Steel, 205
Composition: 0.42% C - 0.62% Mn - 1.78% Si - 0.013% S - 0.043% P - 0.18% Ni - 0.05% Cr - 0.01% Mo - 0.22% Cu - trace V - 0.03% Ti
- Z 120 M 12 Steel, 205
Composition: 1.28% C - 12.35% Mn - 0.35% Si - 0.009% S - 0.031% P - 0.28% Ni - 0.01% Mo - 0.23% Cu
- 10 N 8 Steel, 205
Composition: 0.08% C - 0.29% Mn - 0.16% Si - 0.035% S - 0.007% P - 2.06% Ni - 0.08% Cr - 0.02% Mo - 0.13% Cu
- Z 12 C 13 Steel, 205
Composition: 0.11% C - 0.49% Mn - 0.45% Si - 0.050% S - 0.012% P - 0.13% Ni - 12.00% Cr - 0.02% Mo - 0.07% Cu - 0.020% V - 0.06% W
- 18 C 3 Steel, 206
Composition: 0.20% C - 0.72% Mn - 0.30% Si - 0.010% S - 0.010% P - 0.27% Ni - 0.79% Cr - 0.02% Mo - 0.02% Cu
- Z 30 C 13 Steel, 206
Composition: 0.29% C - 0.40% Mn - 0.85% Si - 0.050% S - 0.023% P - 0.18% Ni - 12.32% Cr - <0.10% Mo - 0.12% Cu <0.05% V
- 70 C 1 Steel, 206
Composition: 0.72% C - 0.35% Mn - 0.20% Si - 0.050% S - 0.011% P - 0.06% Ni - 0.28% Cr - 0.049% Cu
- 95 C 3 Steel, 206
Composition: 0.88% C - 0.41% Mn - 0.24% Si - 0.010% S - 0.010% P - 0.10% Ni - 0.78% Cr - 0.05% Mo - 0.12% Cu
- 100 C 3 Steel, 207
Composition: 0.97% C - 0.27% Mn - 0.26% Si - 0.006% S - 0.010% P - 0.05% Ni - 0.77% Cr - <0.01% Mo - 0.04% Cu
- 30 MS 6 Steel, 207
Composition: 0.29% C - 1.33% Mn - 1.30% Si - 0.016% S - 0.008% P - 0.12% Ni - 0.10% Cu
- 30 SC 6 Steel, 207
Composition: 0.28% C - 0.92% Mn - 1.49% Si - 0.018% S - 0.001% P - 0.12% Ni - 0.99% Cr - 0.10% Cu
- 12 NC 15 Steel, 207
Composition: 0.13% C - 0.35% Mn - 0.33% Si - 0.015% S - 0.008% P - 3.42% Ni - 0.86% Cr - 0.08% Mo - 0.16% Cu
- 40 NC 18 Steel, 208
Composition: 0.42% C - 0.60% Mn - 0.41% Si - 0.012% S - 0.013% P - 4.40% Ni - 1.25% Cr - 0.05% Mo - 0.14% Cu - 0.02% Al
- 20 ND 8 Steel, 208
Composition: 0.21% C - 0.55% Mn - 0.29% Si - 0.010% S - 0.008% P - 1.84% Ni - 0.07% Cr - 0.20% Mo - 0.09% Cu
- 12 ND 16 Steel, 208
Composition: 0.08% C - 0.35% Mn - 0.06% Si - 0.020% S - 0.010% P - 4.06% Ni - 0.07% Cr - 0.88% Mo - 0.15% Cu
- 30 C 5 Steel, 208
Composition: 0.30% C - 0.50% Mn - 0.25% Si - 0.016% S - 0.012% P - 0.09% Ni - 1.28% Cr - 0.09% Cu - 0.050% V
- 30 CV 5 Steel, 209
Composition: 0.32% C - 0.40% Mn - 0.21% Si - 0.016% S - 0.007% P - 0.11% Ni - 1.30% Cr - 0.10% Mo - 0.13% Cu - 0.125% V
- 140 C 10 Steel, 209
Composition: 1.43% C - 0.22% Mn - 0.21% Si - 0.013% S - 0.020% P - 0.11% Ni - 2.55% Cr - 0.08% Mo - 0.05% Cu - 0.015% V
- 100 WC 10 Steel, 209
Composition: 1.15% C - 0.38% Mn - 0.38% Si - 0.008% S - 0.018% P - 0.21% Ni - 0.74% Cr - 0.02% Mo - 0.12% Cu - 1.20% W
- 30 SCD 6 Steel, 209
Composition: 0.28% C - 0.59% Mn - 1.25% Si - 0.048% S - 0.055% P - <0.05% Ni - 0.92% Cr - 0.22% Mo - 0.03% Cu
- 45 SCD 6 Steel, 210
Composition: 0.50% C - 1.05% Mn - 1.48% Si - 0.044% S - 0.048% P - <0.05% Ni - 1.20% Cr - 0.20% Mo - 0.04% Cu
- Z 40 CSD 10 Steel, 210
Composition: 0.30% C - 0.48% Mn - 2.20% Si - 0.012% S - <0.005% P - 0.12% Ni - 10.50% Cr - 1.00% Mo - 0.07% Cu - 0.012% V
- 18 NCD-4 Steel, 210
Composition: 0.17% C - 0.63% Mn - 0.28% Si - 0.011% S - 0.022% P - 1.13% Ni - 0.49% Cr - 0.13% Mo - 0.10% Cu
- 120 NCD 5-02 Steel, 210
Composition: 1.18% C - 0.63% Mn - 0.28% Si - 0.011% S - 0.022% P - 1.13% Ni - 0.49% Cr - 0.13% Mo - 0.10% Cu
- 30 NCD 8 Steel, 211
Composition: 0.32% C - 0.55% Mn - 0.27% Si - 1.90% Ni - 1.80% Cr - 0.58% Mo

30 NC 12 Steel, 211

Composition: 0.33% C - 0.51% Mn - 0.32% Si - 0.016% S - 0.008% P - 3.38% Ni - 0.83% Cr - 0.03% Mo - 0.13% Cu

35 NC 11 Steel, 211

Composition: 0.37% C - 0.59% Mn - 0.26% Si - 0.025% S - 0.017% P - 2.54% Ni - 0.94% Cr - 0.12% Mo - 0.20% Cu

10 NC 12 Steel, 212

Composition: 0.10% C - 0.33% Mn - 0.26% Si - 0.005% S - 0.010% P - 3.02% Ni - 0.68% Cr - 0.19% Mo - 0.14% Cu

14 NC 12 Steel, 212

Composition: 0.15% C - 0.32% Mn - 0.35% Si - 0.005% S - 0.016% P - 3.09% Ni - 0.84% Cr - 0.14% Mo - 0.12% Cu

32 NCD 15 Steel, 212

Composition: 0.31% C - 0.50% Mn - 0.28% Si - 0.005% S - 0.010% P - 3.33% Ni - 1.20% Cr - 0.50% Mo - 0.15% Cu - <0.03% V - 0.08% W

30 NCD 12 Steel, 213

Composition: 0.30% C - 0.40% Mn - 0.30% Si - 3.20% Ni - 0.86% Cr - 0.40% Mo

35 NCD 16 Steel, 213

Composition: 0.36% C - 0.39% Mn - 0.30% Si - 0.005% S - 0.010% P - 3.70% Ni - 1.65% Cr - 0.23% Mo - 0.12% Cu

16 NC 18 Steel, 213

Composition: 0.15% C - 0.48% Mn - 0.33% Si - 0.010% Si - 0.012% P - 4.21% Ni - 1.00% Cr - 0.20% Mo - 0.21% Cu

100 CV 6 Steel, 214

Composition: 0.86% C - 0.35% Mn - 0.34% Si - 0.012% S - 0.005% P - 0.58% Ni - 1.62% Cr - <0.01% Mo - 0.05% Cu - 0.174% V

Z 100 CDV 5 Steel, 214

Composition: 0.91% C - 0.32% Mn - 0.37% Si - 0.006% S - 0.016% P - 5.20% Cr - 1.07% Mo - 0.09% Cu - 0.420% V

45 WC 20-04 Steel, 214

Composition: 0.48% C - 0.27% Mn - 0.67% Si - 0.005% S - 0.010% P - 0.14% Ni - 1.20% Cr - 0.02% Mo - 0.21% Cu - 0.013% V - 2.34% W

Composition: 0.45% C - 0.34% Mn - 0.20% Si - 0.007% S - 0.019% P - 0.44% Ni - 1.25% Cr - <0.10% Mo - 0.14% Cu - 0.360% V - 2.20% W

40 WCDs 35-12 Steel, 215

Composition: 0.40% C - 0.34% Mn - 0.26% Si - 0.010% S - 0.032% P - 0.12% Ni - 2.85% Cr - 0.16% Mo - 0.14% Cu - 0.260% V - 3.39% W

Z 80 WCV 18-04-01 Steel, 215

Composition: 0.81% C - 0.17% Mn - 0.23% Si - 0.019% S - 0.018% P - 0.08% Ni - 4.25% Cr - 0.09% Mo - 1.080% V - 17.60% W - 0.05% Co

35 NC 15 Steel, 215

Composition: 0.38% C - 0.44% Mn - 0.22% Si - 0.003% S - 0.018% P - 3.40% Ni - 1.50% Cr - 0.15% Mo - 0.13% Cu - 0.015% V

35 NCDV 10 Steel, 216

Composition: 0.34% C - 0.52% Mn - 0.37% Si - 2.65% Ni - 1.80% Cr - 0.53% Mo - 0.15% V - 0.20% Cu

Z 200 C 12 Steel, 216

Composition: 1.78% C - 0.27% Mn - 0.25% Si - 0.010% S - 0.025% P - 0.35% Ni - 11.70% Cr - 0.61% Mo - 0.090% V - 0.63% W

Z 160 CDV 12 Steel, 216

Composition: 1.56% C - 0.37% Mn - 0.20% Si - 0.001% S - 0.020% P - 0.26% Ni - 12.46% Cr - 0.54% Mo - 0.10% Cu - 0.65% V - 0.28% W

Z 85 DCWV 08-04-02-02 Steel, 217

Composition: 0.85% C - 0.27% Mn - 0.24% Si - 0.023% S - 0.024% P - 4.03% Cr - 8.00% Mo - 1.380% V - 1.43% W - 0.19% Co

Z 130 WCV 12-04-04 Steel, 217

Composition: 1.43% C - 0.17% Mn - 0.29% Si - 0.045% S - 0.023% P - 0.15% Ni - 4.18% Cr - 0.87% Mo - 4.350% V - 11.00% W

Z 80 WCDX 12-04-02-02 Steel, 217

Composition: 0.82% C - 0.29% Mn - 0.25% Si - 0.010% S - 0.032% P - 0.20% Ni - 4.10% Cr - 1.60% Mo - 2.060% V - 12.10% W

Z 85 WCV 18-04-02 Steel, 217

Composition: 0.79% C - 0.17% Mn - 0.18% Si - 0.026% S - 0.035% P - 0.08% Ni - 4.00% Cr - 0.20% Mo - 2.110% V - 18.15% W - 0.17% Co

Z 30 WCKV 09-03 Steel, 218

Composition: 0.28% C - 0.54% Mn - 0.96% Si - 0.003% S - 0.025% P - 0.54% Ni - 2.80% Cr - 0.13% Mo - 0.240% V - 8.77% W - 2.05% Co

Z 80 WKCV 18-05-04-01 Steel, 218

Composition: 0.80% C - 0.53% Mn - 0.28% Si - 3.80% Cr - 1.050% V - 17.40% W - 4.62% Co

Z 80 WKCV 18-10-04-02 Steel, 218

Composition: 0.80% C - 0.29% Mn - 0.28% Si - 0.026% S - 0.018% P - 4.40% Cr - 0.37% Mo - 1.600% V - 19.20% W - 9.30% Co

Composition: 0.89% C - 0.50% Mn - 0.18% Si - 3.90% Cr - 1.030% V - 19.10% W - 9.66% Co

Z 150 WKVC 12-05-05-04 Steel, 219

Composition: 1.46% C - 0.10% Mn - 0.27% Si - 0.033% S - 0.031% P - 3.72% Cr - 0.47% Mo - 0.09% Cu - 4.100% V - 13.70% W - 5.00% Co

Z 165 WKVC 12-10-05-04 Steel, 219

Composition: 1.64% C - 0.21% Mn - 0.31% Si - 0.005% S - 0.021% P - 4.50% Cr - 0.66% Mo - 5.050% V - 11.64% W - 11.35% Co

55 NCDV 7 Steel, 219

Composition: 0.55% C - 0.68% Mn - 0.30% Si - 0.004% S - 0.014% P - 1.65% Ni - 1.00% Cr - 0.35% Mo - 0.11% Cu - 0.220% V - 0.08% W

Z 80 WDCV 6 Steel, 219

Composition: 0.76% C - 0.25% Mn - 0.35% Si - 0.031% S - 0.025% P - 4.54% Cr - 5.75% Mo - 2.050% V - 6.60% W - 0.86% Co

Z 85 WDKCV 06-05-05-04-02 Steel, 220

Composition: 0.84% C - 0.22% Mn - 0.23% Si - 0.014% S - 0.025% P - 4.36% Cr - 4.95% Mo - 1.830% V - 6.48% W - 4.85% Co

Z 130 WDCV 06-05-04-04 Steel, 220

Composition: 1.29% C - 0.26% Mn - 0.43% Si - 0.006% S - 0.025% P - 4.42% Cr - 4.10% Mo - 4.000% V - 5.54% W - 0.37% Co

Z 110 DKCWV 09-08-04-02-01 Steel, 220

Composition: 1.11% C - 0.24% Mn - 0.27% Si - 0.007% S - 0.023% P - 3.91% Cr - 9.50% Mo - 1.210% V - 1.47% W - 8.35% Co

BENELUX STEELS, 221 - 242

Example Page, 223

032 (SAE 1035), 224

Composition: 0.36% C - 0.60% Mn - 0.26% Si - 0.032% S - 0.012% P

034 (SAE 1045), 224

Composition: 0.45% C - 0.59% Mn - 0.28% Si - 0.03% S - 0.015% P - 0.06% Ni - 0.05% Cr - 0.14% Cu

- 038, 224
Composition: 0.771% C - 0.784% Mn - 0.16% Si - 0.021% S - 0.013% P
- 041 (SAE 1330), 225
Composition: 0.28% C - 1.48% Mn - 0.28% Si - 0.015% S - 0.015% P - 0.08% Ni - 0.02% Cr - 0.01% Mo - 0.14% Cu
- 045, 225
Composition: 0.36% C - 1.59% Mn - 0.26% Si - 0.03% S - 0.02% P
- 551, 225
Composition: 0.09% C - 0.45% Mn - 0.40% Si - 0.01% S - 0.02% P - 0.18% Ni - 12.30% Cr
- 287 (AISI D3 Tool Steel), 226
Composition: 2.09% C - 0.52% Mn - 0.33% Si - 12.76% Cr
- 505, 226
Composition: 0.145% C - 0.27% Mn - 0.02% Si - 0.005% S - 0.012% P - 9.12% Ni
- 507, 226
Composition: 0.315% C - 0.14% Mn - 0.01% Si - 0.006% S - 0.01% P - 9.12% Ni
- 506, 227
Composition: 0.14% C - 0.27% Mn - 0.01% Si - 0.005% S - 0.09% P - 9.12% Ni - 4.07% Co
- 508, 227
Composition: 0.325% C - 0.13% Mn - 0.15% Si - 0.005% S - 0.09% P - 9.05% Ni - 4.07% Co
- 004, 227
Composition: 0.22% C - 1.25% Mn - 0.25% Si - 0.04% S - 0.03% P - 0.33% Cr
- 091 (SAE 34/35), 228
Composition: 0.285% C - 0.62% Mn - 0.30% Si - 2.55% Ni - 0.71% Cr
- 144, 228
Composition: 0.12% C - 0.52% Mn - 0.22% Si - 0.014% S - 0.015% P - 4.15% Ni - 0.86% Cr
- 092, 228
Composition: 0.34% C - 0.49% Mn - 0.30% Si - 4.30% Ni - 1.16% Cr
- 455, 229
Composition: 0.14% C - 0.68% Mn - 0.67% Si - 0.012% S - 0.024% P - 2.95% Ni - 17.98% Cr - 0.06% Mo - 0.04% Al - 0.10% Co - 0.10% Cu
- 085 (SAE 4125), 229
Composition: 0.26% C - 0.73% Mn - 0.243% Si - 0.016% S - 0.018% P - 0.175% Ni - 1.065% Cr - 0.255% Mo
- 081 (SAE 1435), 229
Composition: 0.36% C - 0.72% Mn - 0.28% Si - 0.018% S - 0.077% P - 0.006% Ni - 0.97% Cr - 0.23% Mo - 0.10% Cu
- 082 (SAE 4140), 230
Composition: 0.41% C - 0.82% Mn - 0.29% Si - 0.022% S - 0.035% P - 0.165% Ni - 1.005% Cr - 0.18% Mo
- 280, 230
Composition: 0.55% C - 0.58% Mn - 0.43% Si - 0.021% S - 0.013% P - 0.20% Ni - 0.79% Cr - 0.42% Mo - 0.19% Cu - 0.025% Al
- 503, 230
Composition: 0.625% C - 0.30% Mn - 0.20% Si - 0.015% S - 0.015% P - 1.60% Cr - 0.30% Mo
- 290 (AISI A2 Tool Steel), 231
Composition: 0.95% C - 0.50% Mn - 0.24% Si - 0.011% S - 0.018% P - 0.26% Ni - 4.90% Cr - 1.03% Mo - 0.22% Cu - 0.02% Al
- 183 (SAE 6150), 231
Composition: 0.53% C - 0.62% Mn - 0.25% Si - 0.01% S - 0.015% P - 1.23% Cr - 0.27% V
- 311 (AISI D1 Tool Steel), 231
Composition: 0.90% C - 1.07% Mn - 0.30% Si - 0.49% Cr - 0.63% W
- 273, 232
Composition: 0.33% C - 0.38% Mn - 0.30% Si - 1.06% Cr - 1.01% W
- 272, 232
Composition: 0.64% C - 0.39% Mn - 0.67% Si - 1.20% Cr - 1.68% W
- 509, 232
Composition: 0.21% C - 1.46% Mn - 0.38% Si - 0.019% S - 0.016% P - 0.45% Mo
- 007, 233
Composition: 0.201% C - 1.55% Mn - 0.26% Si - 0.019% S - 0.025% P - 0.39% Cr - 0.005% Al - 0.11% Nb
- 275, 233
Composition: 0.46% C - 0.39% Mn - 1.40% Si - 0.30% Ni - 1.41% Cr - 0.10% V - 0.0017% Bo
- 005, 233
Composition: 0.224% C - 1.498% Mn - 0.226% Si - 0.02% S - 0.022% P - 0.037% Ni - 0.33% Cr - 0.195% Mo - 0.054% Al
- 297, 234
Composition: 0.70% C - 1.91% Mn - 0.35% Si - 0.009% S - 0.009% P - 0.98% Cr - 1.40% Mo
- 312 (AISI 02 Tool Steel), 234
Composition: 0.85% C - 1.98% Mn - 0.40% Si - 0.46% Cr - 0.14% V
- 150 (SAE 8620), 234
Composition: 0.20% C - 0.80% Mn - 0.27% Si - 0.017% S - 0.018% P - 0.58% Ni - 0.49% Cr - 0.18% Mo
- 454, 235
Composition: 0.67% C - 1.09% Mn - 0.31% Si - 0.016% S - 0.027% P - 0.75% Ni - 1.70% Cr - 0.36% Mo - 0.04% Cu
- 458, 235
Composition: 1.485% C - 0.80% Mn - 0.46% Si - 0.028% S - 0.028% P - 0.40% Ni - 1.24% Cr - 0.55% Mo
- 113 (SAE 4340), 235
Composition: 0.43% C - 0.49% Mn - 0.33% Si - 0.008% S - 0.02% P - 1.51% Ni - 1.10% Cr - 0.33% Mo
- 453, 236
Composition: 0.345% C - 0.42% Mn - 0.43% Si - 0.015% S - 0.015% P - 3.43% Ni - 1.36% Cr - 0.23% Mo - 0.041% Al - 0.19% Cu
- 295, 236
Composition: 0.54% C - 0.53% Mn - 0.36% Si - 0.005% S - 0.011% P - 3.14% Ni - 1.02% Cr - 0.34% Mo
- 504, 236
Composition: 0.25% C - 0.469% Mn - 0.235% Si - 0.023% S - 0.007% P - 3.65% Ni - 1.65% Cr - 0.395% Mo - 0.008% N₂ - 0.013% Al
- 114, 237
Composition: 0.36% C - 0.50% Mn - 0.31% Si - 0.014% S - 0.02% P - 4.04% Ni - 1.99% Cr - 0.54% Mo - 0.28% Cu
- 552, 237
Composition: 0.37% C - 0.58% Mn - 0.41% Si - 0.007% S - 0.021% P - 0.53% Ni - 16.20% Cr - 1.10% Mo
- 206, 237
Composition: 0.325% C - 0.54% Mn - 0.22% Si - 1.103% Cr - 0.63% Mo - 0.17% V

451, 238

Composition: 0.20% C - 0.70% Mn - 0.57% Si - 0.009% S - 0.016% P - 0.23% Ni - 1.18% Cr - 1.15% Mo - 0.27% V

368, 238

Composition: 0.28% C - 0.24% Mn - 0.29% Si - 0.005% S - 0.024% P - 0.18% Ni - 2.68% Cr - 2.84% Mo - 0.50% V

294 (AISI D2 Tool Steel), 238

Composition: 1.62% C - 0.40% Mn - 0.48% Si - 0.01% S - 0.024% P - 12.44% Cr - 0.80% Mo - 0.83% V

271 (AISI S1 Tool Steel), 239

Composition: 0.415% C - 0.34% Mn - 0.52% Si - 1.40% Cr - 0.31% V - 2.28% W

367 (H 13), 239

Composition: 0.37% C - 0.34% Mn - 0.94% Si - 0.015% S - 0.02% P - 4.80% Cr - 1.34% Mo - 1.19% V

006, 239

Composition: 0.18% C - 1.36% Mn - 0.21% Si - 0.025% S - 0.014% P - 0.91% Ni - 0.26% Cr - 0.37% Mo - 0.057% V - 0.048% Al

502, 240

Composition: 0.29% C - 0.52% Mn - 0.32% Si - 1.34% Ni - 0.77% Cr - 0.25% Mo - 0.19% V

501, 240

Composition: 0.22% C - 0.76% Mn - 0.32% Si - 0.023% S - 0.012% P - 2.657% Ni - 1.276% Cr - 0.51% Mo - 0.203% V - 0.002% Al

452, 240

Composition: 1.16% C - 0.30% Mn - 0.57% Si - 0.009% S - 0.006% P - 0.71% Ni - 1.79% Cr - 0.27% Mo - 1.30% W

354, 241

Composition: 0.545% C - 0.46% Mn - 0.26% Si - 4.12% Ni - 1.16% Cr - 0.48% Mo - 0.80% W

361 (AISI H 21 Tool Steel), 241

Composition: 0.31% C - 0.32% Mn - 0.41% Si - 0.014% S - 0.013% P - 0.31% Ni - 2.36% Cr - 0.22% Mo - 0.32% V - 8.59% W - 0.16% Cu - 0.013% Al

411 (AISI Tool Steel), 241

Composition: 0.95% C - 0.24% Mn - 0.28% Si - 0.018% S - 0.006% P - 4.64% Cr - 4.80% Mo - 2.45% V - 7.12% W

365 (H 11 Tool Steel), 242

Composition: 0.40% C - 0.48% Mn - 1.01% Si - 0.01% S - 0.014% P - 0.36% Ni - 5.13% Cr - 1.72% Mo - 0.50% V - 0.25% W - 0.13% Cu - 0.015% Al - 0.11% Co

405 (T 15 Tool Steel), 242

Composition: 1.42% C - 0.43% Mn - 0.38% Si - 0.025% S - 0.005% P - 4.42% Cr - 0.70% Mo - 4.55% V - 12.99% W - 4.97% Co

412, 242

Composition: 1.19% C - 0.31% Mn - 0.29% Si - 0.021% S - 0.01% P - 4.54% Cr - 5.10% Mo - 3.29% V - 7.92% W - 12.27% Co

MOLYBDENUM STEELS, 243 - 296**Chromium Steel Series, 245**

Composition: Fe - 0.05% C - 0.9% Mn - 1.20% Si - 0.40% Mo - 0% Cr
 Composition: Fe - 0.05% C - 0.9% Mn - 1.20% Si - 0.40% Mo - 0.16% Cr
 Composition: Fe - 0.05% C - 0.9% Mn - 1.20% Si - 0.40% Mo - 0.30% Cr
 Composition: Fe - 0.50% C - 0.9% Mn - 1.20% Si - 0.40% Mo - 0.48% Cr

Molybdenum Steel Series, 246

Composition: Fe - 0.05% C - 0.9% Mn - 1.20% Si - 0.5% Cr - 0% Mo
 Composition: Fe - 0.05% C - 0.9% Mn - 1.20% Si - 0.5% Cr - 0.15% Mo
 Composition: Fe - 0.05% C - 0.9% Mn - 1.20% Si - 0.5% Cr - 0.30% Mo
 Composition: Fe - 0.05% C - 0.9% Mn - 1.20% Si - 0.5% Cr - 0.38% Mo
 Composition: Fe - 0.05% C - 0.9% Mn - 1.20% Si - 0.5% Cr - 0.50% Mo

Silicon Steel Series, 247

Composition: Fe - 0.07% C - 0.93% Mn - 0.99% Si - 0.27% Mo - 0.32% Cr
 Composition: Fe - 0.07% C - 0.93% Mn - 1.50% Si - 0.27% Mo - 0.32% Cr
 Composition: Fe - 0.07% C - 0.93% Mn - 2.00% Si - 0.27% Mo - 0.32% Cr

0.10% C - 0.7% Mn - 0.3% Si Steels (Mo Additions), 248

Composition: Fe - 0.10% C - 0.74% Mn - 0.29% Si
 Composition: Fe - 0.09% C - 0.72% Mn - 0.29% Si - 0.28% Mo
 Composition: Fe - 0.10% C - 0.71% Mn - 0.29% Si - 0.54% Mo

0.10% C - 0.7% Mn - 0.3% Si - B Steels (Mo Additions), 249

Composition: 0.096% C - 0.66% Mn - 0.32% Si - 0.0048% B
 Composition: 0.097% C - 0.70% Mn - 0.36% Si - 0.26% Mo - 0.0050% B
 Composition: 0.093% C - 0.70% Mn - 0.36% Si - 0.51% Mo - 0.0054% B

0.37% C - 0.5% Mn - 0.30% Si Steels (Mo Additions), 250

Composition: 0.37% C - 0.49% Mn - 0.32% Si - 0.0033% Mo
 Composition: 0.36% C - 0.50% Mn - 0.32% Si - 0.077% Mo
 Composition: 0.36% C - 0.50% Mn - 0.31% Si - 0.19% Mo

0.40% C - 0.8% Mn - 0.3% Si Steels (Mo Additions), 251

Composition: 0.40% C - 0.83% Mn - 0.34% Si - 0.01% Mo
 Composition: 0.38% C - 0.82% Mn - 0.32% Si - 0.26% Mo
 Composition: 0.40% C - 0.82% Mn - 0.35% Si - 0.53% Mo
 Composition: 0.40% C - 0.80% Mn - 0.33% Si - 0.79% Mo

0.39% C - 0.8% Mn - 1.5% Si Steels (Mo Additions), 252

Composition: 0.40% C - 0.81% Mn - 1.48% Si - 0.02% Mo
 Composition: 0.39% C - 0.80% Mn - 1.48% Si - 0.26% Mo
 Composition: 0.38% C - 0.80% Mn - 1.47% Si - 0.52% Mo
 Composition: 0.37% C - 0.80% Mn - 1.47% Si - 0.79% Mo

0.10% C - 1.4% Mn - 0.3% Si - B Steels (Mo Additions), 253

Composition: 0.088% C - 1.45% Mn - 0.35% Si - 0.0055% B
 Composition: 0.10% C - 1.46% Mn - 0.34% Si - 0.26% Mo - 0.0051% B
 Composition: 0.11% C - 1.43% Mn - 0.35% Si - 0.52% Mo - 0.0062% B

0.40% C - 1.3% Mn - 0.3% Si - B Steels (Mo Additions), 254

Composition: 0.40% C - 1.32% Mn - 0.33% Si - 0.004% Mo - 0.004% B
 Composition: 0.40% C - 1.33% Mn - 0.35% Si - 0.08% Mo - 0.003% B
 Composition: 0.40% C - 1.33% Mn - 0.36% Si - 0.18% Mo - 0.003% B

0.39% C - 1.4% Mn - 0.3% Si Steels (Mo Additions), 255

Composition: 0.39% C - 1.46% Mn - 0.36% Si - 0.03% Mo
 Composition: 0.40% C - 1.47% Mn - 0.37% Si - 0.26% Mo
 Composition: 0.39% C - 1.45% Mn - 0.37% Si - 0.49% Mo
 Composition: 0.38% C - 1.45% Mn - 0.36% Si - 0.76% Mo

0.10% C - 0.7% Mn - 0.3% Si - 0.3% Ni - B Steels (Mo Additions), 256

Composition: 0.10% C - 0.71% Mn - 0.28% Si - 0.33% Ni - 0.0040% B

Composition: 0.11% C - 0.75% Mn - 0.31% Si - 0.34% Ni - 0.24% Mo - 0.0047% B

Composition: 0.11% C - 0.73% Mn - 0.31% Si - 0.35% Ni - 0.53% Mo - 0.0053% B

0.10% C - 0.7% Mn - 0.3% Si - 1.4% Ni - B Steels (Mo Additions), 257

Composition: 0.097% C - 0.69% Mn - 0.31% Si - 1.45% Ni - 0.0048% B

Composition: 0.10% C - 0.72% Mn - 0.33% Si - 1.43% Ni - 0.26% Mo - 0.0053% B

Composition: 0.099% C - 0.67% Mn - 0.32% Si - 1.46% Ni - 0.51% Mo - 0.0058% B

0.10% C - 0.7% Mn - 0.3% Si - 3.0% Ni - B Steels (Mo Additions), 258

Composition: 0.11% C - 0.72% Mn - 0.31% Si - 3.03% Ni - 0.0052% B

Composition: 0.11% C - 0.73% Mn - 0.32% Si - 3.06% Ni - 0.24% Mo - 0.0050% B

Composition: 0.11% C - 0.74% Mn - 0.34% Si - 3.03% Ni - 0.55% Mn - 0.0057% B

0.20% C - 0.6% Mn - 0.3% Si - 3.0% Ni Steels (Mo Additions), 259

Composition: 0.21% C - 0.58% Mn - 0.28% Si - 2.95% Ni - 0.004% Mo

Composition: 0.20% C - 0.58% Mn - 0.31% Si - 2.90% Ni - 0.25% Mo

Composition: 0.21% C - 0.56% Mn - 0.27% Si - 2.95% Ni - 0.51% Mo

0.36% C - 0.8% Mn - 0.3% Si - 0.7% Ni Steels (Mo Additions), 260

Composition: 0.36% C - 0.80% Mn - 0.30% Si - 0.75% Ni - 0.02% Mo

Composition: 0.37% C - 0.79% Mn - 0.31% Si - 0.74% Ni - 0.24% Mo

Composition: 0.36% C - 0.78% Mn - 0.31% Si - 0.73% Ni - 0.49% Mo

Composition: 0.36% C - 0.75% Mn - 0.29% Si - 0.72% Ni - 0.82% Mo

0.37% C - 0.8% Mn - 0.3% Si - 1.4% Ni Steels (Mo Additions), 261

Composition: 0.37% C - 0.85% Mn - 0.36% Si - 1.44% Ni - 0.02% Mo

Composition: 0.37% C - 0.85% Mn - 0.37% Si - 1.44% Ni - 0.24% Mo

Composition: 0.37% C - 0.84% Mn - 0.36% Si - 1.40% Ni - 0.47% Mo

Composition: 0.36% C - 0.82% Mn - 0.35% Si - 1.41% Ni - 0.74% Mo

0.36% C - 0.8% Mn - 0.3% Si - 2.6% Ni Steels (Mo Additions), 262

Composition: 0.36% C - 0.86% Mn - 0.37% Si - 2.62% Ni - 0.02% Mo

Composition: 0.36% C - 0.84% Mn - 0.38% Si - 2.60% Ni - 0.24% Mo

Composition: 0.36% C - 0.83% Mn - 0.36% Si - 2.60% Ni - 0.49% Mo

Composition: 0.35% C - 0.80% Mn - 0.36% Si - 2.58% Ni - 0.78% Mo

0.39% C - 0.8% Mn - 0.3% Si - 3.5% Ni Steels (Mo Additions), 263

Composition: 0.39% C - 0.71% Mn - 0.39% Si - 3.53% Ni - 0.02% Mo

Composition: 0.39% C - 0.69% Mn - 0.29% Si - 3.56% Ni - 0.24% Mo

Composition: 0.38% C - 0.68% Mn - 0.29% Si - 3.48% Ni - 0.48% Mo

0.40% C - 0.8% Mn - 0.3% Si - 4.5% Ni Steels (Mo Additions), 264

Composition: 0.41% C - 0.76% Mn - 0.35% Si - 4.45% Ni - 0.01% Mo

Composition: 0.40% C - 0.75% Mn - 0.35% Si - 4.43% Ni - 0.25% Mo

Composition: 0.40% C - 0.74% Mn - 0.36% Si - 4.40% Ni - 0.47% Mo

0.40% C - 0.3% Mn - 0.2% Si - 4% Co Steels (Mo Additions), 265

Composition: 0.40% C - 0.34% Mn - 0.17% Si - 0.01% Mo - 3.76% Co

Composition: 0.39% C - 0.32% Mn - 0.18% Si - 0.48% Mo - 3.72% Co

Composition: 0.40% C - 0.33% Mn - 0.16% Si - 0.95% Mo - 3.90% Co

0.10% C - 0.7% Mn - 0.3% Si - 0.3% Cr - B Steels (Mo Additions), 266

Composition: 0.10% C - 0.68% Mn - 0.32% Si - 0.29% Cr - 0.0038% B

Composition: 0.11% C - 0.70% Mn - 0.35% Si - 0.28% Cr - 0.25% Mo - 0.0045% B

Composition: 0.11% C - 0.70% Mn - 0.35% Si - 0.28% Cr - 0.50% Mo - 0.0057% B

0.10% C - 0.7% Mn - 0.3% Si - 0.7% Cr - B Steels (Mo Additions), 267

Composition: 0.10% C - 0.70% Mn - 0.29% Si - 0.76% Cr - 0.0036% B

Composition: 0.11% C - 0.72% Mn - 0.32% Si - 0.75% Cr - 0.22% Mo - 0.0052% B

Composition: 0.10% C - 0.71% Mn - 0.32% Si - 0.7% Cr - 0.51% Mo - 0.0060% B

0.10% C - 0.7% Mn - 0.3% Si - 1.4% Cr - B Steels (Mo Additions), 268

Composition: 0.10% C - 0.72% Mn - 0.29% Si - 1.43% Cr - 0.0059% B

Composition: 0.11% C - 0.75% Mn - 0.33% Si - 1.46% Cr - 0.25% Mn - 0.0059% B

Composition: 0.11% C - 0.75% Mn - 0.32% Si - 1.44% Cr - 0.56% Mo - 0.0066% B

Composition: 0.10% C - 0.72% Mn - 0.33% Si - 1.43% Cr - 1.03% Mo - 0.0064% B

0.35% C - 0.8% Mn - 0.3% Si - 0.3% Cr Steels (Mo Additions), 269

Composition: 0.36% C - 0.83% Mn - 0.38% Si - 0.34% Cr - 0.01% Mo

Composition: 0.35% C - 0.83% Mn - 0.39% Si - 0.35% Cr - 0.24% Mo

Composition: 0.35% C - 0.80% Mn - 0.38% Si - 0.35% Cr - 0.51% Mo

Composition: 0.34% C - 0.80% Mn - 0.38% Si - 0.34% Cr - 0.78% Mo

0.40% C - 0.8% Mn - 0.3% Si - 0.3% Cr Steels (Mo Additions), 270

Composition: 0.41% C - 0.86% Mn - 0.36% Si - 0.33% Cr - 0.01% Mo

Composition: 0.40% C - 0.87% Mn - 0.36% Si - 0.34% Cr - 0.25% Mo

Composition: 0.41% C - 0.84% Mn - 0.35% Si - 0.35% Cr - 0.49% Mo

Composition: 0.41% C - 0.84% Mn - 0.34% Si - 0.35% Cr - 0.77% Mo

0.37% C - 0.8% Mn - 0.3% Si - 0.7% Cr Steels (Mo Additions), 271

Composition: 0.37% C - 0.85% Mn - 0.37% Si - 0.74% Cr - 0.02% Mo
Composition: 0.37% C - 0.85% Mn - 0.39% Si - 0.73% Cr - 0.26% Mo
Composition: 0.37% C - 0.84% Mn - 0.37% Si - 0.74% Cr - 0.50% Mo
Composition: 0.37% C - 0.82% Mn - 0.36% Si - 0.73% Cr - 0.76% Mo

SAE 4140, 272

Composition: 0.39% C - 0.82% Mn - 0.26% Si - 1.00% Cr - 0.21% Mo

SAE 4150, 272

Composition: 0.53% C - 0.83% Mn - 0.34% Si - 0.92% Cr - 0.21% Mo

0.36% C - 0.8% Mn - 0.3% Si - 1.5% Cr Steels (Mo Additions), 273

Composition: 0.36% C - 0.82% Mn - 0.37% Si - 1.54% Cr - 0.01% Mo
Composition: 0.36% C - 0.86% Mn - 0.38% Si - 1.54% Cr - 0.26% Mo
Composition: 0.36% C - 0.85% Mn - 0.37% Si - 1.52% Cr - 0.50% Mo
Composition: 0.35% C - 0.82% Mn - 0.36% Si - 1.51% Cr - 0.84% Mo

0.80% C - 0.7% Mn - 0.5% Si - 6.0% Cr Steels (Mo Additions), 274

Composition: 0.81% C - 0.76% Mn - 0.50% Si - 6.04% Cr - 0.035% Mo
Composition: 0.81% C - 0.73% Mn - 0.45% Si - 6.10% Cr - 1.05% Mo
Composition: 1.03% C - 0.76% Mn - 0.50% Si - 6.03% Cr - 0.038% Mo
Composition: 1.02% C - 0.73% Mn - 0.46% Si - 6.08% Cr - 1.03%

1.35% C - 0.7% Mn - 0.5% Si - 6.0% Cr Steels (Mo Additions), 275

Composition: 1.36% C - 0.77% Mn - 0.50% Si - 5.99% Cr - 0.041% Mo
Composition: 1.35% C - 0.73% Mn - 0.45% Si - 6.00% Cr - 0.98% Mo

0.85% C - 0.7% Mn - 0.5% Si - 12.0% Cr Steels (Mo Additions), 276

Composition: 0.85% C - 0.75% Mn - 0.45% Si - 12.0% Cr - 0.068% Mo
Composition: 0.84% C - 0.72% Mn - 0.44% Si - 12.10% Cr - 1.05% Mo
Composition: 0.85% C - 0.71% Mn - 0.43% Si - 12.10% Cr - 3.07% Mo

1.35% C - 0.7% Mn - 0.5% Si - 12.0% Cr Steels (Mo Additions), 277

Composition: 1.38% C - 0.74% Mn - 0.46% Si - 11.80% Cr - 0.078% Mo
Composition: 1.36% C - 0.72% Mn - 0.44% Si - 12.0% Cr - 1.00% Mo

Composition: 1.36% C - 0.70% Mn - 0.43% Si - 11.9% Cr - 3.06% Mo

0.40% C - 1.4% Mn - 1.5% Si Steels (Mo Additions), 278

Composition: 0.41% C - 1.42% Mn - 1.52% Si - 0.02% Mo
Composition: 0.41% C - 1.41% Mn - 1.51% Si - 0.27% Mo
Composition: 0.40% C - 1.40% Mn - 1.51% Si - 0.53% Mo
Composition: 0.40% C - 1.38% Mn - 1.50% Si - 0.80% Mo

0.39% C - 0.8% Mn - 1.5% Si - 0.7% Cr Steels (Mo Additions), 279

Composition: 0.40% C - 0.84% Mn - 1.50% Si - 0.74% Cr - 0.02% Mo
Composition: 0.40% C - 0.84% Mn - 1.50% Si - 0.74% Cr - 0.26% Mo
Composition: 0.39% C - 0.84% Mn - 1.49% Si - 0.73% Cr - 0.52% Mo
Composition: 0.38% C - 0.82% Mn - 1.48% Si - 0.72% Cr - 0.77% Mo

0.37% C - 1.4% Mn - 0.3% Si - 0.7% Cr Steels (Mo Additions), 280

Composition: 0.38% C - 1.50% Mn - 0.40% Si - 0.77% Cr - 0.02% Mo
Composition: 0.37% C - 1.49% Mn - 0.41% Si - 0.77% Cr - 0.25% Mo
Composition: 0.36% C - 1.47% Mn - 0.41% Si - 0.76% Cr - 0.50% Mo
Composition: 0.36% C - 1.46% Mn - 0.42% Si - 0.75% Cr - 0.78% Mo

0.12% C - 0.85% Mn - 0.3% Si - 1.4% Ni - 0.7% Cr Steels (Mo Additions), 281

Composition: 0.12% C - 0.87% Mn - 0.35% Si - 1.44% Ni - 0.76% Cr
Composition: 0.12% C - 0.87% Mn - 0.34% Si - 1.43% Ni - 0.77% Cr - 0.19% Mo
Composition: 0.12% C - 0.85% Mn - 0.33% Si - 1.41% Ni - 0.76% Cr - 0.45% Mo

0.11% C - 0.85% Mn - 0.4% Si - 1.4% Ni - 0.7% Cr - B Steels (Mo Additions), 282

Composition: 0.11% C - 0.87% Mn - 0.37% Si - 1.45% Ni - 0.77% Cr - 0.005% B
Composition: 0.11% C - 0.86% Mn - 0.36% Si - 1.44% Ni - 0.76% Cr - 0.21% Mo - 0.005% B
Composition: 0.11% C - 0.85% Mn - 0.38% Si - 1.42% Ni - 0.76% Cr - 0.005% B - 0.54% Mo

0.30% C - 0.7% Mn - 0.4% Si - Ni - Cr Steels (Mo Additions), 283

Composition: 0.30% C - 0.69% Mn - 0.38% Si - 1.79% Ni - 0.78% Cr - 0.24% Mo
Composition: 0.30% C - 0.69% Mn - 0.40% Si - 0.20% Ni - 0.99% Cr - 0.43% Mo
Composition: 0.31% C - 0.69% Mn - 0.38% Si - 0.20% Ni - 0.79% Cr - 0.57% Mo

0.40% C - 0.7% Mn - 0.4% Si - 0.8% Ni - 0.7% Cr Steels (Mo Additions), 284

Composition: 0.40% C - 0.74% Mn - 0.40% Si - 0.78% Ni - 0.75% Cr - 0.03% Mo
Composition: 0.40% C - 0.73% Mn - 0.40% Si - 0.78% Ni - 0.75% Cr - 0.27% Mo
Composition: 0.40% C - 0.72% Mn - 0.40% Si - 0.78% Ni - 0.75% Cr - 0.50% Mo

0.38% C - 0.8% Mn - 0.3% Si - 1.4% Ni - 0.7% Cr Steels (Mo Additions), 285

Composition: 0.38% C - 0.85% Mn - 0.33% Si - 1.46% Ni - 0.74% Cr - 0.01% Mo
Composition: 0.38% C - 0.85% Mn - 0.35% Si - 1.45% Ni - 0.73% Cr - 0.24% Mo
Composition: 0.38% C - 0.84% Mn - 0.34% Si - 1.46% Ni - 0.73% Cr - 0.48% Mo
Composition: 0.38% C - 0.82% Mn - 0.34% Si - 1.46% Ni - 0.75% Cr - 0.78% Mo

0.40% C - 0.7% Mn - 0.4% Si - 2.5% Ni - 0.7% Cr Steels (Mo Additions), 286

Composition: 0.40% C - 0.74% Mn - 0.38% Si - 2.57% Ni - 0.75% Cr - 0.03% Mo
Composition: 0.40% C - 0.73% Mn - 0.38% Si - 2.58% Ni - 0.75% Cr - 0.24% Mo
Composition: 0.39% C - 0.73% Mn - 0.35% Si - 2.51% Ni - 0.75% Cr - 0.49% Mo

0.40% C - 0.8% Mn - 0.3% Si - 3.5% Ni - 0.8% Cr Steels (Mo Additions), 287

Composition: 0.41% C - 0.76% Mn - 0.32% Si - 3.59% Ni - 0.77% Cr - 0.03% Mo

Composition: 0.41% C - 0.76% Mn - 0.32% Si - 3.59% Ni - 0.77% Cr - 0.25% Mo

Composition: 0.40% C - 0.74% Mn - 0.31% Si - 3.56% Ni - 0.77% Cr - 0.50% Mo

0.40% C - 0.7% Mn - 0.3% Si - 4.5% Ni - 0.7% Cr Steels (Mo Additions), 288

Composition: 0.41% C - 0.74% Mn - 0.40% Si - 4.56% Ni - 0.75% Cr - 0.03% Mo

Composition: 0.41% C - 0.73% Mn - 0.42% Si - 4.54% Ni - 0.75% Cr - 0.26% Mo

Composition: 0.40% C - 0.73% Mn - 0.41% Si - 4.53% Ni - 0.75% Cr - 0.50% Mo

0.40% Cr - 1.4% Mn - 1.5% Si - 0.7% Cr Steels (Mo Additions), 289

Composition: 0.41% C - 1.44% Mn - 1.50% Si - 0.75% Cr - 0.01% Mo

Composition: 0.40% C - 1.43% Mn - 1.51% Si - 0.76% Cr - 0.26% Mo

Composition: 0.39% C - 1.41% Mn - 1.49% Si - 0.74% Cr - 0.51% Mo

Composition: 0.39% C - 1.39% Mn - 1.48% Si - 0.73% Cr - 0.77% Mo

Ni-Cr-Si-Mo-V Steel Series, 290

Composition: 0.33% C - 0.86% Mn - 1.62% Si - 1.80% Ni - 0.81% Cr - 0.40% Mo - 0.067% V

Composition: 0.32% C - 0.86% Mn - 1.44% Si - 0.51% Ni - 1.01% Cr - 0.49% Mo - 0.071% V

Composition: 0.35% C - 0.86% Mn - 1.55% Si - 0.21% Ni - 1.21% Cr - 0.58% Mo - 0.037% V

Composition: 0.35% C - 0.86% Mn - 1.58% Si - 0.23% Ni - 1.50% Cr - 0.58% Mo - 0.071% V

0.40% C - 1.4% Mn - 1.4% Si - 1.4% Ni - 0.8% Cr Steels (Mo Additions), 291

Composition: 0.41% C - 1.42% Mn - 1.42% Si - 1.37% Ni - 0.78% Cr - 0.03% Mo

Composition: 0.41% C - 1.41% Mn - 1.41% Si - 1.36% Ni - 0.78% Cr - 0.26% Mo

Composition: 0.40% C - 1.39% Mn - 1.37% Si - 1.34% Ni - 0.76% Cr - 0.52% Mo

Composition: 0.40% C - 1.37% Mn - 1.38% Si - 1.31% Ni - 0.75% Cr - 0.73% Mo

0.40% C - 0.3% Mn - 0.2% Si - 8.0% Ni - 4.0% Co Steels (Mo Additions), 292

Composition: 0.39% C - 0.30% Mn - 0.20% Si - 8.0% Ni - 3.89% Co

Composition: 0.39% C - 0.29% Mn - 0.22% Si - 7.78% Ni - 0.44% Mo - 3.87% Co

Composition: 0.39% C - 0.28% Mn - 0.20% Si - 8.04% Ni - 1.00% Mo - 3.90% Co

0.08% C - 1.0% Ni - 12.0% Cr - 2.0% Mo - 0.3% V Steel, 293

Composition: 0.08% C - 1.0% Ni - 12.0% Cr - 2.0% Mo - 0.3% V

Composition: 0.08% C - 1.0% Ni - 12.0% Cr - 2.0% Mo - 0.3% V

18Ni200 Maraging Steel, 293

Composition: 0.012% C - <0.03% Mn - <0.05% Si - 17.6% Ni - 3.1% Mo - 0.10% Al - 8.3% Co - 0.08% Ti

18Ni250 Maraging Steel, 294

Composition: 0.02% C - 0.09% Mn - 0.09% Si - 17.8% Ni - 0.0021% B - 0.12% Al - 7.9% Co - 0.42% Ti

18Ni300 Maraging Steel, 294

Composition: 0.02% C - 0.07% Mn - 0.07% Si - 18.4% Ni - 4.9% Mo - 0.003% B - 0.09% Al - 8.8% Co - 0.66% Ti

18Ni350 Maraging Steel, 294

Composition: 0.008% C - 0.03% Mn - 0.03% Si - 17.4% Ni - 3.7% Mo - 0.17% Al - 12.4% Co - 1.82% Ti

Carbon-Free Fe - 15.0%Co - 10.0% Mo Alloys, 295

Composition: 0.004% C - 0.42% Mn - 0.12% Si - 9.95% Mo - 15.20% Co

Composition: 0.004% C - 0.41% Mn - 0.15% Si - 9.95% Ni - 9.99% Mo - 15.30% Co

Composition: 0.003% C - 4.78% Mn - 0.21% Si - 10.04% Mo - 15.33% Co

Carbon-Free Fe - 15.0% Co - 20.0% Mo Alloys, 296

Composition: 0.003% C - 0.47% Mn - 0.13% Si - 20.02% Mo - 15.00% Co

Composition: 0.004% C - 0.43% Mn - 0.13% Si - 9.95% Ni - 20.02% Mo - 15.13% Co

Composition: 0.006% C - 4.93% Mn - 0.23% Si - 20.17% Mo - 15.33% Co

VANADIUM STEELS, 297 - 370

Mn-V Structural Steels (As Rolled), 299 - 308

Composition: 0.04% C - 1.90% Mn - 0.11% Si - 0.021% S - 0.019% P - 0.09% V - 0.02% Al - 0.009% N

Composition: 0.06% C - 1.95% Mn - 0.29% Si - 0.003% S - 0.010% P - 0.010% Mo - 0.25% V - 0.037% Al - 0.008% N

Composition: 0.07% C - 1.94% Mn - 0.30% Si - 0.003% S - 0.009% P - 0.010% Mo - 0.14% V - 0.038% Al - 0.007% N

Composition: 0.09% C - 1.48% Mn - 0.25% Si - 0.060% S - 0.014% P - 0.010% Cr - 0.010% Ni - 0.010% Mo - 0.04% V - 0.010% Cu - 0.047% Al

Composition: 0.11% C - 1.23% Mn - 0.31% Si - 0.018% S - 0.031% P - 0.08% V - 0.005% N

Composition: 0.11% C - 1.23% Mn - 0.31% Si - 0.018% S - 0.031% P - 0.08% V - 0.005% N

Composition: 0.11% C - 1.40% Mn - 0.55% Si - 0.063% V

Composition: 0.14% C - 1.52% Mn - 0.48% Si - 0.004% S - 0.011% P - 0.071% V

Composition: 0.14% C - 1.53% Mn - 0.36% Si - 0.008% S - 0.009% P - 0.06% Cr - 0.03% Ni - 0.01% Mo - 0.04% V - 0.02% Cu - 0.057% Al

Composition: 0.15% C - 0.90% Mn - 0.40% Si - 0.05% V - 0.014% N

Composition: 0.15% C - 1.30% Mn - 0.27% Si - 0.009% S - 0.010% P - 0.15% Cr - 0.15% Ni - 0.04% Mo - 0.13% V - 0.19% Cu - 0.02% Al - 0.010% N

Composition: 0.16% C - 1.42% Mn - 0.44% Si - 0.021% S - 0.032% P - 0.025% V - 0.003% Ti - 0.002% Nb - 0.042% Al

Composition: 0.19% C - 1.44% Mn - 0.37% Si - 0.007% S - 0.011% P - 0.10% Cr - 0.08% Ni - 0.01% Mo - 0.17% V - 0.20% Cu - 0.03% Al - 0.010% N

Composition: 0.20% C - 1.45% Mn - 0.30% Si - 0.005% S - 0.012% P - 0.11% Cr - 0.10% Ni - 0.02% Mo - 0.08% V - 0.14% Cu - 0.01% Al - 0.010% N

Composition: 0.20% C - 1.46% Mn - 0.34% Si - 0.008% S - 0.013% P - 0.12% Cr - 0.10% Ni - 0.02% Mo - 0.14% V - 0.19% Cu - 0.03% Al - 0.012% N

Composition: 0.06% C - 1.97% Mn - 0.37% Si - 0.020% S - 0.006% P - 0.45% V - 0.029% Al - 0.009%

Composition: 0.06% C - 2.00% Mn - 0.37% Si - 0.005% S - 0.006% P - 0 - 0.45% V - 0.029% Al - 0.009% N

Composition: 0.07% C - 1.99% Mn - 0.25% Si - 0.004% S - 0.013% P - 0.48% V - 0.038% Al - 0.008% N

Composition: 0.07% C - 1.90% Mn - 0.24% Si - 0.006% S - 0.010% P - 0.08% Mo - 0.43% V - 0.06% Al - 0.009% N

Mn-V-N Structural Steels (As Rolled), 308 - 310

Composition: 0.07% C - 2.79% Mn - 0.18% V - 0.046% Al - 0.005% N
Composition: 0.16% C - 1.40% Mn - 0.04% Si - 0.012% S - 0.004% P - 0.11% V - 0.04% Al - 0.018% N
Composition: 0.17% C - 1.75% Mn - 0.20% Si - 0.10% V - 0.02% Al - 0.038% N
Composition: 0.17% C - 1.48% Mn - 0.30% Si - 0.021% S - 0.034% P - 0.035% Cr - 0.075% Ni - 0.02% Mo - 0.15% V - 0.04% Cu - 0.028% Al - 0.018%
Composition: 0.19% C - 1.55% Mn - 0.32% Si - 0.005% S - 0.013% P - 0.57% Ni - 0.13% V - 0.01% Al - 0.017% N

Ni-V Structural Steels (As Rolled), 311

Composition: 0.15% C - 0.71% Mn - 0.28% Si - 0.005% S - 0.007% P - 0.25% Cr - 1.07% Ni - 0.05% Mo - 0.08% V - 0.15% Cu

Mn-V-Ti Structural Steels (As Rolled), 311 - 312

Composition: 0.05% C - 1.17% Mn - 0.26% Si - 0.015% S - 0.016% P - 0.04% V - 0.01% Ti
Composition: 0.06% C - 1.27% Mn - 0.30% Si - 0.080% S - 0.009% P - 0.01% Cr - 0.01% Ni - 0.01% Mo - 0.04% V - 0.01% Cu - 0.045% Al
Composition: 0.10% C - 1.51% Mn - 0.44% Si - 0.008% S - 0.033% P - 0.05% V - 0.013% Ti - 0.002% Nb - 0.033% Al

Mn-Nb-V, 313 - 317

Composition: 0.05% C - 1.82% Mn - 0.39% Si - 0.012% S - 0.018% P - 0.06% V - 0.055% Nb - 0.011% Al - 0.011% N
Composition: 0.06% C - 1.21% Mn - 0.25% Si - 0.001% S - 0.015% P - 0.31% Ni - 0.07% V - 0.043% Nb - 0.30% Cu - 0.041% Al - 0.003% N
Composition: 0.07% C - 1.35% Mn - 0.29% Si - 0.004% S - 0.005% P - 0.08% V - 0.025% Nb - 0.036% Al - 0.006% N
Composition: 0.08% C - 1.52% Mn - 0.37% Si - 0.007% S - 0.023% P - 0.21% Cr - 0.10% Ni - 0.10% V - 0.05% Nb - 0.34% Cu - 0.02% Al - 0.008% N
Composition: 0.06% C - 1.69% Mn - 0.25% Si - 0.001% S - 0.015% P - 0.31% Ni - 0.08% V - 0.043% Nb - 0.30% Cu - 0.040% Al - 0.003% N
Composition: 0.06% C - 2.33% Mn - 0.38% Si - 0.008% S - 0.025% P - 0.40% Cr - 0.01% Ni - 0.01% Mo - 0.08% V - 0.048% Nb - 0.01% Cu - 0.035% Al
Composition: 0.10% C - 1.53% Mn - 0.35% Si - 0.010% S - 0.013% P - 0.01% Mo - 0.07% V - 0.05% Nb - 0.045% Al - 0.007% N
Composition: 0.10% C - 1.48% Mn - 0.36% Si - 0.008% S - 0.014% P - 0.019% V - 0.003% Ti - 0.023% Nb - 0.046% Al
Composition: 0.11% C - 1.60% Mn - 0.30% Si - 0.002% S - 0.017% P - 0.09% V - 0.005% Ti - 0.032% Nb - 0.021% Al

Mn-V-Nb-Ti, 317

Composition: 0.10% C - 1.50% Mn - 0.37% Si - 0.007% S - 0.011% P - 0.022% V - 0.023% Ti - 0.023% Nb - 0.044% Al

Mn-Mo-V Structural Steels (As Rolled), 318 - 324

Composition: 0.04% C - 1.19% Mn - 0.30% Si - 0.001% S - 0.002% P - 0.02% Cr - 0.02% Ni - 0.33% Mo - 0.09% V - 0.01% Nb - 0.057% Al
Composition: 0.04% C - 1.90% Mn - 0.11% Si - 0.021% S - 0.019% P - 0.19% Mo - 0.09% V - 0.02% Al - 0.009% N
Composition: 0.04% C - 1.90% Mn - 0.11% Si - 0.021% S - 0.019% P - 0.19% Mo - 0.09% V - 0.02% Al - 0.009% N
Composition: 0.04% C - 1.90% Mn - 0.11% Si - 0.021% S - 0.019% P - 0.34% Mo - 0.09% V - 0.02% Al - 0.009% N
Composition: 0.06% C - 1.96% Mn - 0.32% Si - 0.003% S - 0.006% P - 0.18% Mo - 0.22% V - 0.020% Al - 0.005% N
Composition: 0.06% C - 1.70% Mn - 0.50% Mo - 0.10% V - 0.020% N
Composition: 0.06% C - 1.46% Mn - 0.14% Si - 0.003% S - 0.018% P - 0.20% Cr - 0.02% Ni - 0.25% Mo - 0.03% V - 0.01% Cu - 0.035% Al
Composition: 0.07% C - 1.52% Mn - 0.47% Si - 0.008% S - 0.004% P - 0.01% Cr - 0.01% Ni - 0.27% Mo - 0.05% V - 0.01% Cu - 0.064%

Composition: 0.07% C - 1.57% Mn - 0.49% Si - 0.008% S - 0.004% P - 0.01% Cr - 0.01% Ni - 0.27% Mo - 0.05% V - 0.0005% B - 0.01% Cu - 0.066% Al

Composition: 0.12% C - 0.83% Mn - 0.30% Si - 0.005% S - 0.004% P - 0.53% Cr - 1.11% Ni - 0.49% Mo - 0.03% V - 0.30% Cu - 0.031% Al

Composition: 0.15% C - 1.39% Mn - 0.40% Si - 0.013% S - 0.016% P - 0.27% Mo - 0.05% V - 0.018% Al - 0.004% N

Composition: 0.17% C - 1.54% Mn - 0.44% Si - 0.006% S - 0.012% P - 0.01% Cr - 0.02% Ni - 0.47% Mo - 0.14% V - 0.002% Nb - 0.01% Cu - 0.010% Al - 0.006% N

Composition: 0.06% C - 0.82% Mn - 0.26% Si - 0.001% S - 0.015% P - 0.25% Mo - 0.08% V - 0.04% Nb - 0.040% Al - 0.003% N

Mn-Mo-Nb-V Structural Steels (As Rolled), 324 - 326

Composition: 0.06% C - 1.21% Mn - 0.25% Si - 0.001% S - 0.014% P - 0.25% Mo - 0.08% V - 0.044% Nb - 0.036% Al - 0.003% N

Composition: 0.07% C - 1.49% Mn - 0.26% Si - 0.001% S - 0.015% P - 0.25% Mo - 0.08% V - 0.042% Nb - 0.036% Al - 0.003% N

Composition: 0.09% C - 1.03% Mn - 0.28% Si - 0.015% S - 0.010% P - 0.01% Cr - 0.01% Ni - 0.31% Mo - 0.10% V - 0.09% Nb - 0.021% Al

Composition: 0.12% C - 1.72% Mn - 0.28% Si - 0.005% S - 0.016% P - 0.20% Mo - 0.06% V - 0.038% Nb - 0.068% Al - 0.0001% N

Composition: 0.14% C - 1.44% Mn - 0.23% Si - 0.007% S - 0.011% P - 0.065% Cr - 0.23% Ni - 0.035% Mo - 0.10% V - 0.03% Nb - 0.48% Cu - 0.028% Al - 0.013% N

Quenched and Tempered Structural Steels, 327 - 339

Composition: 0.09% C - 0.94% Mn - 0.28% Si - 0.008% S - 0.010% P - 0.10% Cr - 2.54% Ni - 0.64% Mo - 0.04% V - 0.07% Cu - 0.029% Al

Composition: 0.09% C - 0.59% Mn - 0.57% Si - 0.010% S - 0.015% P - 2.00% Cr - 0.56% Mo - 0.37% V - 0.18% Ti - 0.005% B - 0.41% W

Composition: 0.09% C - 1.01% Mn - 0.32% Si - 0.009% S - 0.011% P - 0.52% Cr - 1.49% Ni - 0.52% Mo - 0.05% V - 0.002% B - 0.25% Cu - 0.055% Al

Composition: 0.09% C - 0.82% Mn - 0.29% Si - 0.013% S - 0.019% P - 0.12% Cr - 1.85% Ni - 0.53% Mo - 0.04% V - 0.01% Cu - 0.031% Al

Composition: 0.10% C - 2.00% Mn - 1.09% Si - 0.005% S - 0.012% P - 1.80% Cr - 0.65% Mo - 0.15% V

Composition: 0.10% C - 0.76% Mn - 0.22% Si - 0.007% S - 0.012% P - 0.68% Cr - 0.85% Ni - 0.48% Mo - 0.07% V - 0.001% B - 0.21% Cu

Composition: 0.11% C - 0.52% Mn - 0.26% Si - 0.012% S - 0.007% P - 0.56% Cr - 4.92% Ni - 0.53% Mo - 0.08% V - 0.10% Cu - 0.04% Al

Composition: 0.11% C - 0.85% Mn - 0.31% Si - 0.009% S - 0.007% P - 0.51% Cr - 1.30% Ni - 0.48% Mo - 0.03% V - 0.002% B - 0.27% Cu - 0.077% Al

Composition: 0.11% C - 0.56% Mn - 0.28% Si - 0.005% S - 0.017% P - 1.08% Cr - 0.04% Ni - 0.31% Mo - 0.22% V - 0.03% Cu - 0.01% Al

Composition: 0.12% C - 0.75% Mn - 0.06% Si - 0.008% S - 0.007% P - 0.57% Cr - 2.62% Ni - 0.48% Mo - 0.05% V - 0.002% B - 0.25% Cu - 0.062% Al

Composition: 0.12% C - 0.73% Mn - 0.37% Si - 0.003% S - 0.008% P - 5.75% Cr - 0.55% Mo - 0.24% V - 0.16% Ti - 0.011% B - 0.26% W

Composition: 0.12% C - 0.55% Mn - 0.68% Si - 0.010% S - 0.012% P - 2.05% Cr - 0.55% Mo - 0.32% V - 0.08% Ti - 0.006% B - 0.32% W

Composition: 0.13% C - 0.71% Mn - 0.56% Si - 5.43% Cr - 0.47% Mo - 0.20% V - 0.16% Ti - 0.010% B - 0.19% W

Composition: 0.13% C - 1.16% Mn - 0.31% Si - 0.017% S - 0.018% P - 0.23% Cr - 0.01% Ni - 0.27% Mo - 0.05% V - 0.01% Cu - 0.010% Al

Composition: 0.13% C - 0.80% Mn - 0.29% Si - 0.016% S - 0.010% P - 0.98% Cr - 0.01% Ni - 0.31% Mo - 0.20% V - 0.02% Cu - 0.010% Al

Composition: 0.14% C - 0.53% Mn - 0.54% Si - 0.006% S - 0.022% P - 1.43% Cr - 0.54% Mo - 0.03% V - 0.006% Ti

Composition: 0.15% C - 0.57% Mn - 0.28% Si - 0.019% S - 0.013% P - 0.63% Cr - 0.91% Ni - 0.61% Mo - 0.30% V - 0.032% Al

Composition: 0.14% C - 0.50% Mn - 0.30% Si - 0.005% S - 0.008% P - 0.38% Cr - 0.03% Ni - 0.55% Mo - 0.27% V - 0.01% Cu - 0.010% Al

Composition: 0.15% C - 3.06% Mn - 0.59% Si - 0.005% S - 0.020% P - 0.14% Cr - 0.04% Ni - 0.46% Mo - 0.09% V - 0.09% Cu - 0.70% W

Composition: 0.15% C - 0.77% Mn - 0.20% Si - 0.011% S - 0.010% P - 1.27% Cr - 4.25% Ni - 0.45% Mo - 0.10% V - 0.23% Nb

Composition: 0.14-0.20% C - 0.60-1.00% Mn - 0.17-0.37% Si - <0.070% S - <0.070% P - <0.25% Cr - <0.25% Ni - 0.05-0.09% V - <0.25% Cu

Composition: 0.22% C - 1.45% Mn - 0.30% Si - 0.006% S - 0.020% P - 0.98% Cr - 0.01% Ni - 0.45% Mo - 0.03% V - 0.01% Cu - 0.044% Al

Composition: 0.23% C - 0.53% Mn - 0.30% Si - 0.018% P - 1.55% Cr - 0.30% Ni - 0.29% Mo - 0.21% V - 0.11% Cu

Composition: 0.23% C - 0.22% Mn - 0.22% Si - 0.004% S - 0.015% P - 1.70% Cr - 3.60% Ni - 0.53% Mo - 0.12% V

Composition: 0.26% C - 0.75% Mn - 0.26% Si - 0.014% S - 0.010% P - 0.45% Cr - 0.81% Ni - 0.61% Mo - 0.05% V

Composition: 0.26% C - 1.67% Mn - 0.30% Si - 0.015% S - 0.023% P - 0.05% Cr - 0.03% Ni - 0.11% Mo - 0.06% V - 0.01% Cu - 0.013% Al

Mn-V Quenched and Tempered Steels, 340 - 341

Composition: 0.34% C - 1.31% Mn - 0.24% Si - 0.10% V - 0.018% Al - 0.016% N

Composition: 0.35% C - 1.62% Mn - 0.47% Si - 0.008% S - 0.001% P - 0.10% Cr - 0.10% Ni - 0.01% Mo - 0.11% V - 0.14% Cu - 0.02% Al

Composition: 0.38% C - 1.63% Mn - 0.30% Si - 0.016% S - 0.018% P - 0.02% Cr - 0.01% Ni - 0.12% Mo - 0.07% V - 0.01% Cu - 0.021% Al

Composition: 0.45% C - 1.34% Mn - 1.45% Si - 0.013% S - 0.022% P - 0.10% V

Cr-V Quenched and Tempered Engineering Steels, 342

Composition: 0.43% C - 0.67% Mn - 0.28% Si - 0.10% V - 0.32% Cr

Cr-V-Ti Quenched and Tempered Engineering Steels, 342 - 343

Composition: 0.38% C - 0.78% Mn - 0.29% Si - 0.030% S - 0.005% P - 0.99% Cr - 0.14% Ni - 0.08% Mo - 0.06% V - 0.021% Ti - 0.20% Cu - 0.022% Al - 0.01% N

Composition: 0.39% C - 0.76% Mn - 0.28% Si - 0.033% S - 0.007% P - 0.99% Cr - 0.14% Ni - 0.03% Mo - 0.12% V - 0.047% Ti - 0.21% Cu - 0.01% N

Composition: 0.40% C - 0.75% Mn - 0.27% Si - 0.034% S - 0.007% P - 0.96% Cr - 0.13% Ni - 0.07% Mo - 0.06% V - 0.035% Ti - 0.20% Cu - 0.01% N

Mn-Mo-V Quenched and Tempered Engineering Steels, 344 - 345

Composition: 0.30% C - 1.91% Mn - 0.34% Si - 0.009% S - 0.016% P - 0.67% Mo - 0.07% V

Composition: 0.35% C - 1.51% Mn - 0.28% Si - 0.007% S - 0.015% P - 1.29% Mo - 0.21% V - 0.10% Cu

Composition: 0.33% C - 2.16% Mn - 0.32% Si - 2.02% Ni - 0.64% Mo - 0.14% V

Cr-Mo-V Quenched and Tempered Engineering Steels, 345 - 347

Composition: 0.32-0.40% C - 4.75-5.50% Cr - 1.10-1.75% Mo - 0.80-1.20% V

Composition: 0.40% C - 0.60% Mn - 1.00% Si - 0.003% S - 0.010% P - 5.00% Cr - 1.30% Mo - 0.40% V

Composition: 0.43% C - 0.90% Mn - 0.32% Si - 0.30% Cr - 0.10% V - 0.03% Nb - 0.015% Al - 0.015% N

Cr-Ni-Mo-V Quenched and Tempered Engineering Steels, 347 - 354

Composition: 0.24% C - 0.74% Mn - 0.25% Si - 0.016% S - 0.012% P - 0.37% Cr - 0.67% Ni - 0.52% Mo - 0.03% V

Composition: 0.26% C - 0.76% Mn - 0.32% Si - 0.012% S - 0.014% P - 1.08% Cr - 0.72% Ni - 1.25% Mo - 0.31% V

Composition: 0.27% C - 1.36% Mn - 0.50% Si - 0.006% S - 0.016% P - 0.58% Cr - 0.68% Ni - 0.34% Mo - 0.08% V

Composition: 0.32% C - 0.40% Mn - 0.40% Si - 1.43% Cr - 3.30% Ni - 0.33% Mo - 0.19% V

Composition: 0.33% C - 0.89% Mn - 0.24% Si - 0.009% S - 0.008% P - 1.13% Cr - 0.15% Ni - 1.19% Mo - 0.22% V

Composition: 0.33% C - 0.39% Mn - 0.16% Si - 0.005% S - 0.004% P - 1.09% Cr - 3.60% Ni - 0.72% Mo - 0.12% V - 0.002% Ti - 0.013% Nb - 0.09% Cu - 0.009% Al

Composition: 0.34% C - 0.26% Mn - 0.13% Si - 0.007% S - 0.010% P - 0.61% Cr - 5.10% Ni - 0.53% Mo - 0.09% V

Composition: 0.34% C - 0.62% Mn - 0.27% Si - 0.010% S - 0.006% P - 1.22% Cr - 2.80% Ni - 0.50% Mo - 0.09% V

Composition: 0.37% C - 0.83% Mn - 0.35% Si - 0.006% S - 0.017% P - 0.87% Cr - 1.70% Ni - 1.18% Mo - 0.18% V

Composition: 0.38% C - 0.46% Mn - 0.26% Si - 0.008% S - 0.019% P - 2.94% Cr - 0.45% Ni - 0.45% Mo - 0.12% V - 0.05% Cu - 0.010% Al

Composition: 0.39% C - 0.75% Mn - 0.26% Si - 0.033% S - 0.008% P - 0.94% Cr - 0.19% Ni - 0.03% Mo - 0.003% V - 0.007% Ti - 0.21% Cu - 0.01% N

Composition: 0.39% C - 0.77% Mn - 0.39% Si - 0.032% S - 0.006% P - 0.96% Cr - 0.14% Ni - 0.08% Mo - 0.05% V - 0.21% Cu - 0.01% N

Composition: 0.40% C - 0.83% Mn - 0.33% Si - 0.007% S - 0.011% P - 1.00% Cr - 1.75% Ni - 0.46% Mo - 0.12% V - 0.07% Cu - 0.010% Al

Composition: 0.49% C - 0.78% Mn - 0.26% Si - 0.012% S - 0.018% P - 1.04% Cr - 0.50% Ni - 0.96% Mo - 0.09% V

Composition: 0.56% C - 0.67% Mn - 0.31% Si - 0.023% S - 0.012% P - 0.76% Cr - 1.53% Ni - 0.24% Mo - 0.14% V - 0.06% Cu - 0.010% Al

Prestressed Concrete Wires, 355

Composition: 0.67% C - 1.39% Mn - 0.75% Si - 0.009% S - 0.015% P - 0.03% Cr - 0.32% Ni - 0.19% V - 0.40% Cu - 0.002% Al - 0.010% N

Composition: 0.69% C - 1.41% Mn - 0.70% Si - 0.009% S - 0.030% P - 0.05% Cr - 0.03% Ni - 0.19% V - 0.03% Cu - 0.005% Al - 0.007% N

Rail Steels, 356 - 357

Composition: 0.65% C - 1.14% Mn - 0.40% Si - 0.015% S - 0.024% P - 1.15% Cr - 0.15% V - 0.005% N

Composition: 0.73% C - 0.77% Mn - 0.27% Si - 0.010% S - 0.012% P - 1.58% Cr - 0.01% Ni - 0.46% Mo - 0.05% V - 0.05% Cu - 0.010% Al

Composition: 0.78% C - 1.61% Mn - 0.48% Si - 0.028% S - 0.014% P - 0.16% V - 0.18% Cu - 0.018% Al - 0.018% N

Spring Steels, 357 - 361

Composition: 0.27% C - 0.77% Mn - 1.39% Si - 1.64% Cr - 0.20% Ni - 0.56% Mo - 0.07% V

Composition: 0.30% C - 0.69% Mn - 1.40% Si - 0.78% Cr - 1.71% Ni - 0.31% Mo - 0.04% V

Composition: 0.32% C - 0.86% Mn - 1.54% Si - 0.014% S - 0.024% P - 1.01% Cr - 0.51% Ni - 0.49% Mo - 0.07% V - 0.037% Al - 0.022% N

Composition: 0.33% C - 0.86% Mn - 1.62% Si - 0.014% S - 0.024% P - 0.81% Cr - 1.80% Ni - 0.40% Mo - 0.07% V - 0.040% Al - 0.020% N

Composition: 0.35% C - 0.86% Mn - 1.55% Si - 0.014% S - 0.023% P - 1.21% Cr - 0.21% Ni - 0.58% Mo - 0.06% V - 0.037% Al - 0.021% N

Composition: 0.35% C - 0.86% Mn - 1.55% Si - 0.014% S - 0.024% P - 1.50% Cr - 0.23% Ni - 0.58% Mo - 0.07% V - 0.039% Al - 0.022% N

Composition: 0.55% C - 0.50% Mn - 0.87% Si - 0.035% S - 0.02% P - 0.10% Cr - 0.10% Ni - 0.55% Mo - 0.22% V
Composition: 0.64% C - 0.73% Mn - 0.82% Si - 0.011% S - 0.014% P - 1.26% Cr - 0.05% Ni - 0.16% V - 0.03% Cu - 0.006% Al - 0.012% N

High-Temperature Creep-Resistant Steels, 361 - 364

Composition: 0.11% C - 0.53% Mn - 0.35% Si - 0.010% S - 0.015% P - 2.28% Cr - 0.04% Ni - 1.00% Mo - 0.20% V - 0.03% Cu - 0.010% Al

Composition: 0.12% C - 0.47% Mn - 0.31% Si - 0.010% S - 0.014% P - 2.16% Cr - 0.16% Ni - 0.88% Mo - 0.17% V - 0.05% Cu - 0.010% Al

Composition: 0.12% C - 0.65% Mn - 0.26% Si - 0.015% S - 0.007% P - 1.16% Cr - 0.01% Ni - 1.02% Mo - 0.26% V - 0.02% Cu - 0.010% Al

Composition: 0.18% C - 0.53% Mn - 0.26% Si - 0.007% S - 0.012% P - 1.00% Cr - 0.96% Mo - 0.19% V

Composition: 0.20% C - 0.45% Mn - 1.03% V - 0.002% N
Composition: 0.21% C - 0.48% Mn - 0.97% Si - 2.92% Ni - 1.09% V - 0.01% Al

Composition: 0.24% C - 0.45% Mn - 2.92% Ni - 1.09% V - 0.55% Al

Tool and Die Steels, 365 - 367

Composition: 0.37% C - 0.51% Mn - 1.00% Si - 5.10% Cr - 1.26% Mo - 0.97% V

Composition: 0.75% C - 0.31% Mn - 0.22% Si - 0.019% S - 0.025% P - 4.25% Cr - 0.20% Ni - 1.45% V - 17.54% W

Composition: 0.92% C - 0.31% Mn - 0.35% Si - 0.019% S - 0.025% P - 4.10% Cr - 4.90% Mo - 1.88% V - 6.20% W

Composition: 1.06% C - 4.43% Cr - 0.44% Mo - 2.32% V - 10.32% W - 3.92% Co

Composition: 1.13% C - 0.51% Mn - 0.50% Si - 0.022% S - 0.025% P - 4.02% Cr - 8.80% Mo - 1.24% V - 1.80% W - 7.90% Co

Composition: 2.50% C - 2.00% Cr - 0.60% Ni - 5.20% Mo - 7.20% V

Stainless Steels, 368 - 369

Composition: 0.20% C - 12.00% Cr - 1.00% Mo - 0.30% V

Composition: 0.20% C - 0.48% Mn - 0.36% Si - 0.012% S - 0.016% P - 12.80% Cr - 0.13% Ni - 0.03% Mo - 0.05% V - 0.01% Cu - 0.036% Al

Composition: 0.20% C - 0.51% Mn - 0.33% Si - 0.006% S - 0.022% P - 11.80% Cr - 0.49% Ni - 1.00% Mo - 0.31% V - 0.03% Cu - 0.010% Al

BRITISH ENGINEERING STEELS, 371 - 451

Introduction, 373 - 376

0.05 C (SAE 1005-1006), 377

Composition: 0.05% C - 0.25% Mn

0.06 C (SAE 1005-1006), 377

Composition: 0.06% C - 0.30% Mn

0.06 C (SAE 1008), 378

Composition: 0.06% C - 0.50% Mn

1-1/4 Mn (SAE 1518-1524), 378

Composition: 0.19% C - 1.20% Mn - 0.20% Si - 0.020% P - 0.020% S

1-1/2 Mn (SAE 1518-1524), 379

Composition: 0.19% C - 1.50% Mn - 0.20% Si - 0.020% P - 0.020% S

1-1/4 Mn (SAE 1525-1527), 379

Composition: 0.28% C - 1.20% Mn - 0.20% Si - 0.020% P - 0.020% S

1-1/2 Mn (SAE 1526-1527), 380

Composition: 0.28% C - 1.50% Mn - 0.20% Si - 0.020% P - 0.020% S

1-3/4 Mn (SAE 1330), 380

Composition: 0.30% C - 1.80% Mn - 0.15% Si - 0.020% P - 0.020% S

1-1/4 Mn (SAE 1536), 381

Composition: 0.36% C - 1.20% Mn - 0.20% Si - 0.020% P - 0.020% S

1-1/2 Mn (SAE 1536-1541), 381

Composition: 0.36% C - 1.50% Mn - 0.20% Si - 0.020% P - 0.020% S

1-3/4 Mn (SAE 1541, 1335-1340), 382

Composition: 0.38% C - 1.80% Mn - 0.25% Si - 0.025% P - 0.020% S

1-3/4 Mn (SAE 1547, 1345), 382

Composition: 0.46% C - 1.80% Mn - 0.25% Si - 0.020% P - 0.015% S

1 Mn + S (SAE 1212-12L14), 383

Composition: 0.10% C - 1.10% Mn - 0.20% Si - 0.020% P - 0.250% S

1 Mn + S (SAE 1140-1146), 383

Composition: 0.42% C - 1.15% Mn - 0.20% Si - 0.020% P - 0.160% S

1-1/2 Mn + S (SAE 1139), 384

Composition: 0.44% C - 1.50% Mn - 0.20% Si - 0.020% P - 0.250% S

1-3/4 Si Mn, 384

Composition: 0.40% C - 0.85% Mn - 1.75% Si - 0.030% P - 0.030% S

2 Si Mn, 385 - 386

Composition: 0.54% C - 0.85% Mn - 1.90% Si - 0.030% P - 0.030% S - 0.10% Cr - 0.02% Mo - 0.16% Ni

Composition: 0.59% C - 0.85% Mn - 1.90% Si - 0.030% P - 0.030% S

Composition: 0.62% C - 0.85% Mn - 1.90% Si - 0.030% P - 0.030% S

1/2 Ni, 386

0.55% C - 0.65% Mn - 0.20% Si - 0.025% P - 0.025% S - 0.65% Ni

1 Ni, 387

Composition: 0.36% C - 0.80% Mn - 0.20% Si - 0.020% P - 0.020% S - 0.85% Ni

Composition: 0.43% C - 0.80% Mn - 0.20% Si - 0.020% P - 0.020% S - 0.85% Ni

1-1/2 Ni, 388

Composition: 0.16% C - 0.60% Mn - 0.25% Si - 0.020% P - 0.015% S - 0.20% Cr - 0.05% Mo - 1.50% Ni

3 Ni, 388

Composition: 0.30% C - 0.51% Mn - 0.32% Si - 0.011% P - 0.007% S - 0.07% Cr - 3.03% Ni - 0.032% Al - <0.01% Ti

3-1/2 Ni, 389 - 390

Composition: 0.10% C - 0.53% Mn - 0.26% Si - 0.007% P - 0.005% S - 0.05% Cr - 3.65% Ni - 0.045% Al - 0.07% Cu

Composition: 0.33% C - 0.74% Mn - 0.23% Si - 0.031% P - 0.027% S - 0.07% Cr - 0.11% Mo - 3.47% Ni

Composition: 0.40% C - 0.62% Mn - 0.26% Si - 0.007% P - 0.005% S - 0.23% Cr - 0.10% Mo - 3.45% Ni

5 Ni, 390

Composition: 0.10% C - 0.40% Mn - 0.20% Si - 0.020% P - 0.020% S - 4.8% Ni

9 Ni, 391

Composition: 0.09% C - 0.45% Mn - 0.25% Si - 0.010% P - 0.012% S - 0.10% Cr - 0.04% Mo - 9.00% Ni - 0.030% Al

1/2 Cr (SAE 5015, 4118), 391

Composition: 0.15% C - 0.40% Mn - 0.20% Si - 0.020% P - 0.020% S - 0.40% Cr

3/4 Cr (SAE 5117-5120, 4118), 392

Composition: 0.20% C - 0.80% Mn - 0.20% Si - 0.020% P - 0.020% S - 0.80% Cr

1 Cr, 392

Composition: 0.20% C - 0.75% Mn - 0.30% Si - 0.020% P - 0.020% S - 0.95% Cr

1 Cr (SAE 5130-5132), 393

Composition: 0.30% C - 0.70% Mn - 0.20% Si - 0.020% P - 0.020% S - 1.05% Cr

1/2 Cr, 393

Composition: 0.38% C - 0.70% Mn - 0.25% Si - 0.020% P - 0.020% S - 0.50% Cr

1 Cr (SAE 5140), 394

Composition: 0.39% C - 0.70% Mn - 0.20% Si - 0.020% P - 0.020% S - 1.05% Cr

1/2 Cr (SAE 5046), 394

Composition: 0.46% C - 0.70% Mn - 0.25% Si - 0.020% P - 0.020% S - 0.50% Cr

1 Cr (SAE 5145-5150), 395

Composition: 0.50% C - 0.75% Mn - 0.35% Si - 0.025% P - 0.020% S - 1.20% Cr

1/2 Cr (SAE 5060, 5155-5160), 395

Composition: 0.59% C - 0.60% Mn - 0.25% Si - 0.025% P - 0.025% S - 0.65% Cr - 0.20% Ni

3/4 Cr, 396

Composition: 0.60% C - 0.85% Mn - 0.25% Si - 0.025% P - 0.025% S - 0.75% Cr

13 Cr (SAE 51405-51409), 396

Composition: 0.07% C - 0.50% Mn - 0.40% Si - 0.020% P - 0.010% S - 13.0% Cr - 0.20% Ni

13 Cr (SAE 51410), 397

0.12% C - 0.50% Mn - 0.40% Si - 0.020% P - 0.010% S - 12.5% Cr - 0.20% Ni

13 Cr (SAE 51420), 397 - 398

Composition: 0.17% C - 0.40% Mn - 0.38% Si - 0.020% P - 0.020% S - 12.5% Cr - 0.20% Ni

Composition: 0.24% C - 0.27% Mn - 0.37% Si - 0.021% P - 0.010% S - 13.3% Cr - 0.06% Mo - 0.32% Ni

Composition: 0.32% C - 0.30% Mn - 0.30% Si - 0.020% P - 0.010% S - 13.0% Cr - 0.06% Mo - 0.20% Ni

1/4 Mo (SAE 4012), 399

Composition: 0.17% C - 0.60% Mn - 0.25% Si - 0.020% P - 0.020% S - 0.30% Mo

1/4 Mo (SAE 4023-4024), 399

Composition: 0.24% C - 0.90% Mn - 0.30% Si - 0.020% P - 0.020% S - 0.23% Mo

1/4 Mo, 400

Composition: 0.32% C - 0.80% Mn - 0.30% Si - 0.025% P - 0.020% S - 0.26% Mo

1/4 Mo (SAE 4037-4042), 400

Composition: 0.40% C - 0.80% Mo - 0.30% Si - 0.025% P - 0.020% S - 0.26% Mo

1/4 Mo (SAE 4047), 401

Composition: 0.48% C - 0.80% Mn - 0.25% Si - 0.025% P - 0.020% S - 0.26% Mo

1/2 Mo (SAE 4419-4422), 401

Composition: 0.22% C - 0.60% Mn - 0.25% Si - 0.020% P - 0.020% S - 0.50% Mo

1/2 Mo, 402

Composition: 0.38% C - 0.80% Mn - 0.30% Si - 0.025% P - 0.021% S - 0.53% Mo

1-1/2 Mn (SAE 1513-1518), 402

Composition: 0.15% C - 1.40% Mn - 0.25% Si - 0.020% P - 0.020% S

1-1/2 Mn Mo, 403 - 405

Composition: 0.27% C - 1.55% Mn - 0.20% Si - 0.025% P - 0.025% S - 0.28% Mo

Composition: 0.30% C - 1.55% Mn - 0.20% Si - 0.025% P - 0.025% S - 0.28% Mo

Composition: 0.32% C - 1.50% Mn - 0.18% Si - 0.020% P - 0.020% S - 0.27% Mo

Composition: 0.35% C - 1.55% Mn - 0.20% Si - 0.025% P - 0.025% S - 0.28% Mo

Composition: 0.37% C - 1.50% Mn - 0.18% Si - 0.020% P - 0.020% S - 0.27% Mo

Composition: 0.38% C - 1.50% Mn - 0.25% Si - 0.020% P - 0.020% S - 0.45% Mo

1-1/4 Mn Cr, 406 - 407

Composition: 0.22% C - 1.10% Mn - 0.21% Si - 0.015% P - 0.020% S - 0.60% Cr - 0.02% Mo - 0.18% Ni - 0.08% V - 0.30% Cu

Composition: 0.16% C - 1.15% Mn - 0.25% Si - 0.020% P - 0.020% S - 0.95% Cr

Composition: 0.20% C - 1.25% Mn - 0.25% Si - 0.025% P - 0.015% S - 1.15% Cr - 0.02% Mo - 0.15% Ni

1-1/2 Si Cr, 407

Composition: 0.55% C - 0.75% Mn - 1.50% Si - 0.020% P - 0.020% S - 0.70% Cr

3-1/2 Si Cr, 408

Composition: 0.45% C - 0.60% Mn - 3.40% Si - 0.015% P - 0.010% S - 8.50% Cr

1-1/2 Ni Mn, 408

Composition: 0.16% C - 1.40% Mn - 0.25% Si - 0.020% P - 0.015% S - 0.20% Cr - 0.05% Mo - 1.50% Ni

1-3/4 Ni Mo (SAE 4615-4620), 409

Composition: 0.17% C - 0.55% Mn - 0.20% Si - 0.020% P - 0.020% S - 0.20% Cr - 0.25% Mo - 1.80% Ni

1-3/4 Ni Mo, 409

Composition: 0.24% C - 0.55% Mn - 0.20% Si - 0.020% P - 0.020% S - 0.20% Cr - 0.25% Mo - 1.80% Ni

1-3/4 Ni Mo, 410

Composition: 0.40% C - 0.48% Mn - 0.15% Si - 0.016% P - 0.040% S - 0.15% Cr - 0.25% Mo - 1.75% Ni

3-1/2 Ni Mo (SAE 4815-4820), 410

Composition: 0.18% C - 0.47% Mn - 0.27% Si - 0.009% P - 0.010% S - 0.18% Cr - 0.23% Mo - 3.33% Ni

5 Ni Mo, 411

Composition: 0.10% C - 0.40% Mn - 0.20% Si - 0.020% P - 0.020% S - 0.20% Mo - 5.00% Ni

3/4 Ni Cr, 411

Composition: 0.15% C - 0.80% Mn - 0.20% Si - 0.020% P - 0.020% S - 0.63% Cr - 0.05% Mo - 0.85% Ni

1 Ni Cr, 412

Composition: 0.16% C - 0.80% Mn - 0.20% Si - 0.020% P - 0.020% S - 0.85% Cr - 0.05% Mo - 1.15% Ni

1-1/4 Ni Cr, 412 - 413

Composition: 0.35% C - 0.75% Mn - 0.23% Si - 0.020% P - 0.020% S - 0.65% Cr - 1.30% Ni

Composition: 0.40% C - 0.75% Mn - 0.23% Si - 0.020% P - 0.020% S - 0.65% Cr - 1.30% Ni

1-1/2 Ni Cr, 413 - 414

Composition: 0.15% C - 0.75% Mn - 0.25% Si - 0.020% P - 0.020% S - 0.95% Cr - 1.45% Ni

Composition: 0.14% C - 0.50% Mn - 0.25% Si - 0.020% P - 0.020% S - 1.55% Cr - 1.55% Ni

2 Ni Cr, 414

Composition: 0.16% C - 0.50% Mn - 0.31% Si - 0.013% P - 0.014% S - 1.95% Cr - 0.03% Mo - 2.02% Ni - 0.030% Al

3-1/4 Ni Cr, 415

Composition: 0.12% C - 0.50% Mn - 0.20% Si - 0.020% P - 0.020% S - 0.90% Cr - 3.25% Ni

3 Ni Cr, 415

Composition: 0.32% C - 0.57% Mn - 0.20% Si - 0.020% P - 0.020% S - 1.15% Cr - 3.00% Ni

4 Ni Cr, 416

Composition: 0.15% C - 0.40% Mn - 0.15% Si - 0.020% P - 0.020% S - 1.15% Cr - 4.10% Ni

Composition: 0.30% C - 0.50% Mn - 0.20% Si - 0.020% P - 0.020% S - 1.25% Cr - 4.10% Ni

18 Cr Ni (SAE 51431), 417

Composition: 0.14% C - 0.68% Mn - 0.67% Si - 0.024% P - 0.012% S - 17.98% Cr - 0.06% Mo - 2.95% Ni - 0.04% Al - 0.10% Co - 0.10% Cu

1/2 Cr Mo, 417 - 418

Composition: 0.14% C - 0.55% Mn - 0.25% Si - 0.020% P - 0.020% S - 0.60% Cr - 0.55% Mo

1/2 Cr Mo, 418

Composition: 0.20% C - 0.75% Mn - 0.25% Si - 0.020% P - 0.020% S - 0.40% Cr - 0.45% Mo

3/4 Cr Mo, 418 - 419

Composition: 0.12% C - 0.45% Mn - 0.30% Si - 0.015% P - 0.015% S - 0.85% Cr - 0.60% Mo - 0.16% Ni

Composition: 0.27% C - 0.60% Mn - 0.13% Si - 0.030% P - 0.022% S - 0.74% Cr - 0.55% Mo - 0.19% Ni

3/4 Cr Mo (SAE 4161), 419

Composition: 0.60% C - 0.85% Mn - 0.25% Si - 0.020% P - 0.020% S - 0.80% Cr - 0.30% Mo

1 Cr Mo, 420

Composition: 0.18% C - 0.75% Mn - 0.25% Si - 0.020% P - 0.020% S - 1.00% Cr - 0.20% Mo

Composition: 0.26% C - 0.70% Mn - 0.25% Si - 0.020% P - 0.020% S - 1.05% Cr - 0.22% Mo

1 Cr Mo (SAE 4130), 421

Composition: 0.30% C - 0.50% Mn - 0.25% Si - 0.020% P - 0.020% S - 1.00% Cr - 0.20% Mo

1 Cr Mo (SAE 4135), 421

Composition: 0.34% C - 0.65% Mn - 0.25% Si - 0.020% P - 0.020% S - 1.05% Cr - 0.25% Mo

1 Cr Mo (SAE 4135-4137), 422

Composition: 0.36% C - 0.80% Mn - 0.25% Si - 0.020% P - 0.020% S - 1.00% Cr - 0.20% Mo

1 Cr Mo (SAE 4140-4142), 422

Composition: 0.40% C - 0.85% Mn - 0.20% Si - 0.020% P - 0.020% S - 1.05% Cr - 0.30% Mo

1 Cr Mo (SAE 4145-4147), 423

Composition: 0.46% C - 0.85% Mn - 0.25% Si - 0.020% P - 0.020% S - 1.00% Cr - 0.20% Mo

1 Cr Mo (SAE 4147-4150), 423

Composition: 0.50% C - 0.85% Mn - 0.25% Si - 0.020% P - 0.020% S - 1.00% Cr - 0.22% Mo

1-1/4 Cr Mo (SAE 4137), 424

Composition: 0.37% C - 0.85% Mn - 0.25% Si - 0.020% P - 0.020% S - 1.15% Cr - 0.20% Mo

1 1/4 Cr Mo (SAE 4140-4142), 424

Composition: 0.42% C - 0.85% Mn - 0.25% Si - 0.020% P - 0.020% S - 1.15% Cr - 0.20% Mo

1-1/4 Cr Mo, 425

Composition: 0.15% C - 0.60% Mn - 0.30% Si - 0.030% P - 0.030% S - 1.25% Cr - 0.50% Mo

Composition: 0.35% C - 0.55% Mn - 0.27% Si - 0.031% P - 0.022% S - 1.23% Cr - 0.51% Mo - 0.14% Ni

2-1/4 Cr Mo, 426

Composition: 0.14% C - 0.46% Mn - 0.23% Si - 0.010% P - 0.010% S - 2.28% Cr - 1.05% Mo - 0.21% Ni

3 Cr Mo, 426 - 427

Composition: 0.20% C - 0.50% Mn - 0.25% Si - 0.020% P - 0.020% S - 3.10% Cr - 0.52% Mo

Composition: 0.28% C - 0.50% Mn - 0.25% Si - 0.020% P - 0.020% S - 3.10% Cr - 0.52% Mo

Composition: 0.32% C - 0.55% Mn - 0.25% Si - 0.020% P - 0.020% S - 3.05% Cr - 0.40% Mo - 0.30% Ni

3-1/4 Cr Mo, 428

Composition: 0.17% C - 0.60% Mn - 0.14% Si - 0.020% P - 0.020% S - 3.25% Cr - 0.55% Mo

Composition: 0.26% C - 0.60% Mn - 0.14% Si - 0.020% P - 0.020% S - 3.25% Cr - 0.55% Mo

5 Cr Mo (SAE 51501), 429

Composition: 0.14% C - 0.45% Mn - 0.26% Si - 0.016% P - 0.025% S - 4.66% Cr - 0.56% Mo - 0.13% Ni

5 Cr Mo, 429

Composition: 0.28% C - 0.50% Mn - 0.25% Si - 0.020% P - 0.020% S - 5.00% Cr - 0.55% Mo

9 Cr Mo, 430

Composition: 0.12% C - 0.70% Mn - 0.30% Si - 0.025% P - 0.020% S - 9.0% Cr - 1.00% Mo

1 Cr V (SAE 6150), 430

Composition: 0.50% C - 0.75% Mn - 0.25% Si - 0.025% P - 0.025% S - 0.95% Cr - 0.05% Mo - 0.15% Ni - 0.20% V

1-1/2 Mn Ni Mo, 431

Composition: 0.19% C - 1.60% Mn - 0.20% Si - 0.020% P - 0.020% S - 0.25% Mo - 0.55% Ni

2 Si Cr Mo, 431

Composition: 0.60% C - 0.85% Mn - 1.90% Si - 0.025% P - 0.025% S - 0.30% Cr - 0.25% Mo

1/2 Ni Cr Mo (SAE 8115, 8615-8617), 432

Composition: 0.15% C - 0.80% Mn - 0.20% Si - 0.020% P - 0.020% S - 0.50% Cr - 0.20% Mo - 0.55% Ni

1/2 Ni Cr Mo (SAE 8622-8627, 8720, 8822), 432

Composition: 0.24% C - 0.80% Mn - 0.20% Si - 0.020% P - 0.020% S - 0.50% Cr - 0.20% Mo - 0.55% Ni

1/2 Ni Cr Mo (SAE 8625-8630), 433

Composition: 0.30% C - 0.80% Mn - 0.25% Si - 0.020% P - 0.020% S - 0.50% Cr - 0.20% Mo - 0.55% Ni

1/2 Ni Cr Mo (SAE 8640-8642, 8740), 433

Composition: 0.41% C - 0.85% Mn - 0.25% Si - 0.020% P - 0.020% S - 0.50% Cr - 0.25% Mo - 0.55% Ni

1/2 Ni Cr Mo (SAE 8645-8650), 434

Composition: 0.48% C - 0.75% Mn - 0.34% Si - 0.020% P - 0.010% S - 0.58% Cr - 0.20% Mo - 0.60% Ni

1/2 Ni Cr Mo (SAE 8660), 434

Composition: 0.60% C - 0.85% Mn - 0.25% Si - 0.025% P - 0.025% S - 0.50% Cr - 0.20% Mo - 0.55% Ni

3/4 Ni Cr Mo, 435

Composition: 0.40% C - 0.65% Mn - 0.25% Si - 0.020% P - 0.025% S - 0.75% Cr - 0.25% Mo - 0.85% Ni

1 Ni Cr Mo, 435

Composition: 0.36% C - 0.65% Mn - 0.25% Si - 0.020% P - 0.020% S - 1.05% Cr - 0.22% Mo - 1.05% Ni

1 1/2 Ni Cr Mo, 436 - 438

Composition: 0.16% C - 0.80% Mn - 0.20% Si - 0.020% P - 0.020% S - 1.05% Cr - 0.15% Mo - 1.40% Ni

Composition: 0.16% C - 0.50% Mn - 0.25% Si - 0.020% P - 0.020% S - 1.65% Cr - 0.20% Mo - 1.55% Ni

Composition: 0.36% C - 0.70% Mn - 0.25% Si - 0.020% P - 0.020% S - 1.50% Cr - 0.25% Mo - 1.50% Ni

Composition: 0.40% C - 0.60% Mn - 0.25% Si - 0.020% P - 0.020% S - 1.20% Cr - 0.15% Mo - 1.50% Ni

Composition: 0.40% C - 0.60% Mn - 0.25% Si - 0.020% P - 0.020% S - 1.20% Cr - 0.30% Mo - 1.50% Ni

1-3/4 Ni Cr Mo, 438 - 439

Composition: 0.16% C - 0.80% Mn - 0.20% Si - 0.020% P - 0.020% S - 1.05% Cr - 0.15% Mo - 1.80% Ni

Composition: 0.41% C - 0.70% Mn - 0.25% Si - 0.020% P - 0.020% S - 0.80% Cr - 0.25% Mo - 1.80% Ni

2 Ni Cr Mo, 439 - 440

Composition: 0.17% C - 0.60% Mn - 0.20% Si - 0.020% P - 0.020% S - 1.55% Cr - 0.20% Mo - 2.00% Ni

Composition: 0.30% C - 0.48% Mn - 0.25% Si - 0.020% P - 0.020% S - 2.00% Cr - 0.40% Mo - 2.00% Ni

2-1/2 Ni Cr Mo, 440 - 441

Composition: 0.31% C - 0.60% Mn - 0.25% Si - 0.020% P - 0.020% S - 0.65% Cr - 0.55% Mo - 2.55% Ni

Composition: 0.40% C - 0.60% Mn - 0.25% Si - 0.020% P - 0.020% S - 0.65% Cr - 0.55% Mo - 2.55% Ni

3 Ni Cr Mo, 441 - 442

Composition: 0.31% C - 0.55% Mn - 0.25% Si - 0.020% P - 0.020% S - 1.05% Cr - 0.28% Mo - 3.00% Ni

Composition: 0.12% C - 0.53% Mn - 0.28% Si - 0.020% P - 0.010% S - 0.58% Cr - 0.20% Mo - 3.20% Ni

3-1/2 Ni Cr Mo (SAE 9310), 442

Composition: 0.13% C - 0.50% Mn - 0.20% Si - 0.020% P - 0.020% S - 0.85% Cr - 0.18% Mn - 3.40% Ni

4 Ni Cr Mo, 443 - 444

Composition: 0.15% C - 0.40% Mn - 0.25% Si - 0.020% P - 0.018% S - 1.15% Cr - 0.20% Mo - 4.10% Ni

Composition: 0.30% C - 0.60% Mn - 0.25% Si - 0.020% P - 0.020% S - 1.25% Cr - 0.30% Mo - 4.10% Ni

Composition: 0.34% C - 0.50% Mn - 0.20% Si - 0.020% P - 0.020% S - 1.80% Cr - 0.35% Mo - 4.00% Ni

1/2 Cr Mo V, 444

Composition: 0.12% C - 0.55% Mn - 0.25% Si - 0.020% P - 0.020% S - 0.40% Cr - 0.60% Mo - 0.15% Ni - 0.25% V

1 Cr Mo V, 445

Composition: 0.22% C - 0.60% Mn - 0.30% Si - 0.020% P - 0.020% S - 1.15% Cr - 0.60% Mo - 0.13% Ni - 0.22% V

1-1/4 Cr Mo V, 445

Composition: 0.37% C - 0.62% Mn - 0.29% Si - 0.032% P - 0.026% S - 1.19% Cr - 0.59% Mo - 0.13% Ni - 0.22% V

2-1/2 Cr Mo V, 446

Composition: 0.30% C - 0.60% Mn - 0.25% Si - 0.010% P - 0.015% S - 2.50% Cr - 0.20% Mo - 0.30% Ni - 0.18% V

3-1/4 Cr Mo V, 446

Composition: 0.39% C - 0.60% Mn - 0.15% Si - 0.020% P - 0.020% S - 3.25% Cr - 0.95% Mo - 0.20% V

1 Cr Al Mo, 447

Composition: 0.33% C - 0.65% Mn - 0.30% Si - 0.020% P - 0.020% S - 1.15% Cr - 0.20% Mo - 1.00% Al

1-1/2 Cr Al Mo, 447 - 448

Composition: 0.31% C - 0.55% Mn - 0.30% Si - 0.020% P - 0.020% S - 1.60% Cr - 0.20% Mo - 1.10% Al

Composition: 0.39% C - 0.55% Mn - 0.30% Si - 0.020% P - 0.020% S - 1.60% Cr - 0.20% Mo - 1.10% Al

Composition: 0.42% C - 0.65% Mn - 0.30% Si - 0.020% P - 0.020% S - 1.65% Cr - 0.33% Mo - 1.00% Al

1-1/2 Mn Ni Cr Mo, 449 - 451

Composition: 0.27% C - 1.35% Mn - 0.24% Si - 0.025% P - 0.025% S - 0.45% Cr - 0.20% Mo - 0.75% Ni

Composition: 0.33% C - 1.35% Mn - 0.24% Si - 0.025% P - 0.025% S - 0.45% Cr - 0.20% Mo - 0.75% Ni

Composition: 0.37% C - 1.35% Mn - 0.24% Si - 0.025% P - 0.025% S - 0.45% Cr - 0.20% Mo - 0.75% Ni

Composition: 0.38% C - 1.40% Mn - 0.25% Si - 0.030% P - 0.030% S - 0.50% Cr - 0.20% Mo - 0.75% Ni

Composition: 0.43% C - 1.35% Mn - 0.24% Si - 0.025% P - 0.025% S - 0.45% Cr - 0.20% Mo - 0.75% Ni

12 Cr Mo V (SAE 51420 mod), 451

Composition: 0.20% C - 0.70% Mn - 0.25% Si - 0.030% P - 0.030% S - 12.00% Cr - 1.00% Mo - 0.65% Ni - 0.30% V

OTHER STEELS, 453 - 520**8640 & 8740, 455**

Composition: 0.42% C - 0.89% Mn - 0.30% Si - 0.018% P - 0.015% S - 0.58% Ni - 0.52% Cr - 0.24%

AMS 6416 (300-M), 455

Composition: 0.43% C - 0.83% Mn - 1.55% Si - 0.021% P - 0.009% S - 1.84% Ni - 0.91% Cr - 0.40% Mo - 0.12% V

AMS 6418, 456

Composition: 0.22% C - 1.30% Mn - 1.36% Si - 1.88% Ni - 0.22% Cr - 0.38% Mo

AMS 6428 and 6434, 456

Composition: 0.32% C - 0.72% Mn - 0.19% Si - 0.012% P - 0.021% S - 1.70% Ni - 0.82% Cr - 0.31% Mo - 0.12% Cu - 0.17% V

L6 Tool Steel, 457

Composition: 0.72% C - 0.35% Mn - 0.23% Si - 0.018% P - 0.010% S - 1.75% Ni - 0.94% Cr

Composition: 0.75% C - 0.70% Mn - 0.25% Si - 1.35% Ni - 0.75% Cr - 0.30% Mo - 0.15% V

A10 Tool Steel, 458

Composition: 1.36% C - 1.84% Mn - 1.14% Si - 1.81% Ni - 0.15% Cr - 1.41% Mo - 0.38% Graphite

2315, 458

Composition: 0.19% C - 0.57% Mn - 0.22% Si - 0.015% P - 0.023% S - 3.60% Ni - 0.09% Cr - 0.05% Mo

2340, 459

Composition: 0.40% C - 0.89% Mn - 0.31% Si - 0.021% P - 0.011% S - 3.34% Ni - 0.11% Cr

9% Nickel Low Carbon Steel, 459

Composition: 0.10% C - 0.77% Mn - 0.28% Si - 8.56% Ni - 0.05% Cr - 0.02% Mo

3120 Steel, 460

Composition: 0.21% C - 0.61% Mn - 0.24% Si - 0.017% P - 0.016% S - 1.35% Ni - 0.67% Cr - 0.02% Mo - 0.04%

3190 Steel, 460

Composition: 0.91% C - 0.65% Mn - 0.23% Si - 0.013% P - 0.026% S - 1.35% Ni - 0.60% Cr - 0.03% Cu

3240 Steel, 461

Composition: 0.43% C - 0.52% Mn - 0.29% Si - 0.025% P - 0.021% S - 1.76% Ni - 1.19% Cr - 0.05% Mo - 0.06% Cu

3330 Steel, 461

Composition: 0.29% C - 0.21% Mn - 0.06% Si - 0.026% P - 0.017% S - 3.25% Ni - 1.45% Cr

Krupp 0.15 C Steel, 462

Composition: 0.15% C - 0.45% Mn - 0.20% Si - 0.013% P - 0.020% S - 4.03% Ni - 1.54% Cr - 0.03% Mo

Krupp 0.90C Steel, 462

Composition: 0.89% C - 0.39% Mn - 0.19% Si - 4.00% Ni - 1.58% Cr

4330 Steel, 463

Composition: 0.33% C - 0.69% Mn - 0.41% Si - 0.043% P - 0.028% S - 1.41% Ni - 0.72% Cr - 0.28% Mo

4330 Mod. (Si + V) Steel, 463

Composition: 0.34% C - 0.98% Mn - 1.37% Si - 0.015% P - 0.005% S - 1.82% Ni - 0.95% Cr - 0.42% Mo - 0.14% V

4630 Steel, 464

Composition: 0.32% C - 0.74% Mn - 0.31% Si - 0.015% P - 0.014% S - 1.70% Ni - 0.12% Cr - 0.23% Mo

4695 Steel, 464

Composition: 0.95% C - 0.58% Mn - 0.24% Si - 1.79% Ni - 0.25% Mo

SAE EX-1 Steel, 465
Composition: 0.17% C - 0.49% Mn - 0.29% Si - 0.010% P - 0.015% S - 5.07% Ni - 0.18% Cr - 0.24% Mo - 0.10% Cu

SAE EX-2 Steel, 465
Composition: 0.69% C - 0.42% Mn - 0.80% Ni - 0.20% Cr - 0.13% Mo

8695 Steel, 466
Composition: 0.95% C - 0.82% Mn - 0.23% Si - 0.56% Ni - 0.52% Cr - 0.19% Mo

9310 Steel, 466
Composition: 0.11% C - 0.70% Mn - 3.19% Ni - 1.26% Cr - 0.11% Mo

9315 Steel, 467
Composition: 0.17% C - 0.59% Mn - 0.30% Si - 3.18% Ni - 1.12% Cr - 0.13% Mo

9395 Steel, 467
Composition: 0.95% C - 0.60% Mn - 0.22% Si - 3.27% Ni - 1.23% Cr - 0.13% Mo

6F4 Tool Steel, 468
Composition: 0.22% C - 0.50% Mn - 0.30% Si - 0.016% P - 0.026% S - 2.80% Ni - 2.95% Mo

6F5 Tool Steel, 468
Composition: 0.55% C - 0.90% Mn - 1.00% Si - 2.75% Ni - 0.40% Cr - 0.45% Mo - 0.13% V

2-3/4 Nickel Forging Steel, 469
Composition: 0.29% C - 0.77% Mn - 0.23% Si - 0.34% P - 0.31% S - 2.72% Ni - 0.04% Cr - 0.05% Mo

2-1/2 Nickel Saw Steel, 469
Composition: 0.76% C - 0.41% Mn - 0.20% Si - 0.012% P - 0.023% S - 2.50% Ni - 0.13% Cr - 0.08% Mo - 0.12% Cu

VCM Nitriding Steel, 470
Composition: 0.32% C - 0.76% Mn - 0.014% P - 0.018% S - 0.70% Ni - 1.06% Cr - 1.01% Mo

2-1/2 Ni - 1/2 Mo - V Turbine Rotor Steel, 470
Composition: 0.34% C - 0.71% Mn - 0.22% Si - 0.039% P - 0.028% S - 2.52% Ni - 0.14% Cr - 0.42% Mo - 0.02% V

5-1/4 Ni - 1/4 Mo - V, 471
Composition: 0.23% C - 0.52% Mn - 0.25% Si - 5.35% Ni - 0.20% Cr - 0.27% Mo - 0.08% V

Ni-Cr-Mo-V-Cu-B, 471
Composition: 0.15% C - 0.92% Mn - 0.26% Si - 0.014% P - 0.020% S - 0.88% Ni - 0.50% Cr - 0.46% Mo - 0.32% Cu - 0.06% V - 0.003% B

3-1/4 Ni-Cr-Mo, 472
Composition: 0.33% C - 0.57% Mn - 0.23% Si - 0.005% P - 0.007% S - 3.26% Ni - 0.85% Cr - 0.09% Mo

3 Ni-Cr-Mo-V, 472
Composition: 0.32% C - 0.51% Mn - 0.19% Si - 0.013% P - 0.009% S - 3.02% Ni - 1.37% Cr - 0.48% Mo - 0.18% V

4-1/4 Ni - 1-1/2 Cr - 1/10 Mo, 473
Composition: 0.35% C - 0.44% Mn - 0.14% Si - 0.016% P - 0.008% S - 4.23% Ni - 1.43% Cr - 0.13% Mo

4-1/4 Ni - 1-1/2 Cr - 1/3 Mo, 473
Composition: 0.33% C - 0.51% Mn - 0.17% Si - 0.013% P - 0.009% S - 4.16% Ni - 1.44% Cr - 0.31% Mo

5% Nickel Steel, 0.50% C, 474
Composition: 0.51% C - 0.23% Mn - 0.17% Si - 0.006% P - 0.017% S - 5.26% Ni

5% Nickel Steel, 0.80% C, 474
Composition: 0.79% C - 0.23% Mn - 0.22% Si - 0.007% P - 0.015% S - 5.25% Ni

5% Nickel Steel, 1.2% C, 474
Composition: 1.26% C - 0.21% Mn - 0.23% Si - 0.009% P - 0.019% S - 5.30% Ni

7-1/2% Nickel Steel, 0.25% C, 474
Composition: 0.29% C - 0.15% Mn - 0.13% Si - 0.010% P - 0.011% S - 7.61% Ni

7-1/2% Nickel Steel, 0.50% C, 475
Composition: 0.48% C - 0.22% Mn - 0.16% Si - 0.006% P - 0.16% S - 7.61% Ni

7-1/2% Nickel Steel, 0.80% C, 475
Composition: 0.79% C - 0.21% Mn - 0.22% Si - 0.008% P - 0.016% S - 7.53% Ni

7-1/2% Nickel Steel, 1.2% C, 475
Composition: 1.18% C - 0.22% Mn - 0.22% Si - 0.008% P - 0.016% S - 7.64% Ni

10% Nickel Steel, 0.50% C, 475
Composition: 0.51% C - 0.21% Mn - 0.16% Si - 0.005% P - 0.016% S - 10.11% Ni

10% Nickel, 0.80% C, 476
Composition: 0.77% C - 0.20% Mn - 0.22% Si - 0.006% P - 0.019% S - 10.01% Ni

10% Nickel Steel, 1.2% C, 476
Composition: 1.17% C - 0.21% Mn - 0.22% Si - 0.009% P - 0.019% S - 10.30% Ni

Fe-1V-0.2C Steel, 476
Composition: 0.19% C - 0.92% V

Fe-1V-1Al-0.2C Steel, 476
Composition: 0.21% C - 0.96% V - 0.97% Al

Fe-1V-1.5Ni-0.2C, 476
Composition: 0.20% C - 1.46% Ni - 0.96% V

Fe - 0.19 C - 1.81 Mo Steel, 477
Composition: 0.19% C - <0.002% Mn - 0.004% Si - 0.006% P - 0.002% S - 1.81% Mo

Fe - 4Mo - 0.4C Steel, 477
Composition: 0.43% C - 4.0% Mo

Fe - 4 Mo - 1.0C Steel, 477
Composition: 1.0% C - 4.0% Mo

Fe - 2.3% Mo - 0.22% C Steel, 477
Composition: 0.22% C - 2.3% Mo

Fe-C-Mo Steels, 478
Composition: 0.14% C - <0.003% Mn - 0.0009% Si - 0.002% P - 0.002% S - <0.005% Ni - <0.004% Cr - 2.29% Mo - <0.002% Cu - <10 ppm N - 168 ppm O

Composition: 0.15% C - <0.002% Mn - 0.001% Si - 0.001% P - 0.006% S - 2.55% Mo

Composition: 0.17% C - 0.002% Mn - 0.003% Si - 0.002% P - 0.004% S - 0.030% Ni - 0.002% Cr - 2.94% Mo - 0.007% Co - 0.004% Cu - 0.002% Al - 0.003% V - 0.004 N

Composition: 0.15% C - 3.40% Mo

Composition: 0.15% C - 3.67% Mo

Composition: 0.14% C - 3.98% Mo

Composition: 0.19% C - 2.30% Mo

Composition: 0.19% C - 2.56% Mo

Composition: 0.19% C - 2.98% Mo

Composition: 0.17% C - 3.76% Mo

Composition: 0.20% C - 4.00% Mo

Composition: 0.18% C - 4.25% Mo

Composition: 0.24% C - 2.31% Mo

Composition: 0.24% C - 2.56% Mo

Composition: 0.26% C - 2.94% Mo

Composition: 0.25% C - 3.19% Mo

Composition: 0.24% C - 3.76% Mo

Composition: 0.23% C - 4.00% Mo

Composition: 0.24% C - 4.28% Mo

Fe - 7.6 Ni - 0.48 C Steel, 478
Composition: 0.48% C - <0.01% Mn - 0.011% Si - 0.003% P - 0.004% S - 7.64% Ni - <0.01% Cr - <0.01% Al

Fe - 0.61C Steel, 478
Composition: 0.61% C - 0.01% Mn - 0.014% Si - 0.003% P - 0.005% S - <0.01% Ni - <0.01% Cr - <0.01% Al

- Fe - 0.13C - 2.99 Cr Steel, 479**
Composition: 0.13% C - 0.002% Mn - 0.001% Si - 0.001% P - 0.006% S - 2.99% Cr
- Low Carbon 2.4-4.15% Cr Steels, 479**
Composition: 0.16% C - <0.02% Ni - 2.40% Cr - <0.02% Mo - <0.001% B
Composition: 0.17% C - <0.02% Ni - 3.16% Cr - <0.02% Mo - <0.001% B
Composition: 0.14% C - <0.02% Ni - 3.83% Cr - <0.02% Mo - <0.001% B
Composition: 0.15% C - <0.02% Ni - 4.15% Cr - <0.02% Mo - <0.001% B
- Fe - 10 Cr Steel, 480**
Composition: Fe - 0.003-0.007% C - 9.6% Cr
- Fe-C-Cr Steel, 480**
Composition: Fe - 0.19% C - 4.5% Cr
Composition: Fe - 0.22% C - 10.6% Cr
- Fe-Cr-C Steels, 481**
Composition: Fe - 0.1% C - 13.0% Cr
- HSLA Steel, 482**
Composition: 0.11% C - 1.51% Mn - 0.34% Si - 0.003% S - 0.029% Nb
- SAE 1513 + Cb (Nb), 482**
Composition: 0.12% C - 1.23% Mn - 0.23% Si - 0.03% Al
- Croloy 1-1/4, 482**
Composition: 0.10% C - 0.38% Mn - 0.62% Si - 0.013% P - 0.012% S - 0.17% Ni - 1.15% Cr - 0.48% Mo - 0.10% Cu
- Croloy 2-1/4, 482**
Composition: 0.10% C - 0.42% Mn - 0.25% Si - 0.018% P - 0.013% S - 0.27% Ni - 2.16% Cr - 0.96% Mo
- Croloy 3M, 483**
Composition: 0.12% C - 0.40% Mn - 0.26% Si - 0.017% P - 0.016% S - 0.34% Ni - 2.95% Cr - 0.94% Mo
- Croloy 5, 483**
Composition: 0.12% C - 0.46% Mn - 0.35% Si - 0.012% P - 0.016% S - 0.20% Ni - 4.79% Cr - 0.54% Mo
- Croloy 7, 483**
Composition: 0.12% C - 0.53% Mn - 0.55% Si - 0.015% P - 0.036% S - 0.07% Ni - 7.50% Cr - 0.45% Mo
- Croloy 9M, 483**
Composition: 0.12% C - 0.50% Mn - 0.45% Si - 0.013% P - 0.017% S - 0.28% Ni - 8.40% Cr - 0.96% Mo
- 2-1/4 Cr - 1 Mo Steel, 484**
Composition: 0.10% C - 0.42% Mn - 0.25% Si - 0.018% P - 0.013% S - 0.27% Ni - 2.16% Cr - 0.96% Mo
- 0.2% Carbon Steel, 484**
Composition: 0.2% C - 0.6% Mn - 1.0% Ni - 1.0% Cr - 0.4% Mo
- PS 32 Steel, 485**
Composition: 0.22% C - 0.79% Mn - 0.32% Si - 0.87% Ni - 0.52% Cr - 0.47% Mo
- PS 55 Steel, 485**
Composition: 0.16% C - 0.81% Mn - 0.19% Si - 1.80% Ni - 0.48% Cr - 0.66% Mo
- 3% Mo Low Carbon Tool Steels, 485**
Composition: 0.22% C - 0.50% Mn - 0.30% Si - 0.016% P - 0.026% S - 2.80% Ni - 2.95% Mo
Composition: 0.24% C - 0.63% Mn - 0.30% Si - 0.016% P - 0.027% S - 2.95% Mo
Composition: 0.10% C - 0.50% Mn - 0.26% Si - 0.017% P - 0.025% S - 2.95% Mo
- Non-Superhardening NPLD Steel, 486**
Composition: 0.43% C - 1.58% Mn - 0.42% Si - 0.022% P - 0.042% S - 0.24% Ni - 0.27% Cr - 0.12% Mo - 0.18% Co - 0.033% Sn - 0.005% Al
- Superhardening 12TT Steel, 486**
Composition: 0.42% C - 1.75% Mn - 0.36% Si - 0.031% P - 0.029% S - 0.24% Ni - 0.28% Cr - 0.12% Mo - 0.17% Co - 0.020% Sn - 0.11% Al
- D-6ac High Strength Steel, 486**
Composition: 0.45% C - 0.80% Mn - 0.25% Si - 0.55% Ni - 1.15% Cr - 1.0% Mo - 0.05% V
- Deep Hardening Steels, 487**
Composition: 0.65% C - 0.79% Mn - 0.35% Si - 1.27% Ni - 1.00% Cr - 0.29% Mo
Composition: 0.60% C - 0.37% Mn - 0.24% Si - 3.22% Ni - 2.14% Cr - 0.07% Mo
Composition: 0.35% C - 0.69% Mn - 0.24% Si - 3.25% Ni - 1.32% Cr - 0.48% Mo - 0.27% V
- Ni-Cr-Mo Steel, 488**
Composition: 0.32% C - 0.58% Mn - 0.30% Si - 0.032% P - 0.020% S - 2.35% Ni - 0.75% Cr - 0.52% Mo - 0.11% V
- Alloy Steels, 488 - 489**
Composition: 0.59% C - 0.96% Mn - 0.28% Si - 0.032% P - 0.022% S - 1.06% Cr - 0.54% Mo - 0.12% V
Composition: 0.86% C - 0.66% Mn - 0.38% Si - 0.040% P - 0.024% S - 2.47% Ni - 1.21% Cr - 0.50% Mo
Composition: 0.60% C - 0.60% Mn - 0.30% Si - 0.035% P - 0.024% S - 2.75% Ni - 1.25% Cr - 0.50% Mo - 0.12% V
Composition: 0.42% C - 0.67% Mn - 0.31% Si - 0.030% P - 0.022% S - 2.71% Ni - 1.00% Cr - 0.48% Mo
- 65Nb Steel, 489**
Composition: 0.66% C - 0.15% Mn - 0.18% Si - 4.02% Cr - 2.04% Mo - 1.02% V - 0.26% Nb - 2.99% W
- SAE 1075, 489**
Composition: 0.75% C - 0.57% Mn - 0.17% Si - 0.013% P - 0.015% S - 0.012% Ni - 0.014% Cr
- Eutectoid Steels, 490**
Composition: 0.76% C - 0.61% Mn - 0.25% Si - 0.02% P - 0.02% S - 0.017% Cr - 0.006% Mo - 0.003-0.01% Al
Composition: 0.75% C - 0.61% Mn - 0.27% Si - 0.02% P - 0.02% S - 0.004% Cr - 0.10% Mo - 0.003-0.01% Al
Composition: 0.76% C - 0.82% Mn - 0.25% Si - 0.02% P - 0.02% S - 0.60% Cr - 0.16% Mo - 0.003-0.01% Al
Composition: 0.76% C - 0.6% Mn - 0.27% Si - 0.02% P - 0.02% S - 0.58% Cr - 0.30% Mo
- 3.5% Chromium Magnet Steel, 491**
Composition: 0.93% C - 0.50% Mn - 0.26% Si - 0.01% P - 0.02% S - 0.16% Ni - 3.65% Cr
- SAE 51100 Steel, 491**
Composition: 0.97% C - 0.39% Mn - 0.25% Si - 0.020% P - 0.013% S - 1.04% Cr
- 1.0% C High-Chromium Steels, 492**
Composition: 1.02% C - 0.33% Mn - 0.35% Si - 0.016% P - 0.011% S - 8.8% Cr
Composition: 1.02% C - 0.33% Mn - 0.35% Si - 0.020% P - 0.012% S - 2.9% Cr
Composition: 1.04% C - 0.18% Mn - 0.35% Si - <0.01% P - <0.01% S - 4.0% Cr
Composition: 1.05% C - 0.31% Mn - 0.35% Si - 0.017% P - 0.012% S - 5.7% Cr
- Hypereutectoid Carbon Steels, 493**
Composition: 1.20% C - 0.91% Mn - 0.23% Si - <0.003% P - 0.002% S
Composition: 1.48% C - 0.90% Mn - 0.24% Si - 0.002% P - 0.0039% S
Composition: 1.72% C - 0.90% Mn - 0.25% Si - <0.003% P - <0.003% S
- 403/410 Stainless Steels, 494**
Composition: 0.06% C - 12.8% Cr
Composition: 0.10% C - 12.4% Cr
Composition: 0.12% C - 12.3% Cr

403 Stainless Steel, 495

Composition: 0.15% C - 1.00% max Mn - 0.50% max Si - 0.04% max P - 0.03% max S - 11.50-13.00% Cr

416 Stainless Steel, 495

Composition: 0.12% C - 0.79% Mn - 0.74% Si - 0.017% P - 0.190% S - 0.25% Ni - 12.82% Cr - 0.05% Mo - 0.037% N - 0.08% Zr

440A Stainless Steel, 496

Composition: 0.62% C - 0.30% Mn - 0.17% Si - 16.59% Cr

440B Stainless Steel, 496

Composition: 0.93% C - 0.49% Mn - 0.43% Si - 18.40% Cr - 0.55% Mo

0.1% C - 13.0% Cr Steels, 497 - 498

Composition: 0.11% C - 0.49% Mn - 0.10% Si - 0.016% P - 0.013% S - 0.48% Ni - 12.80% Cr

Composition: 0.12% C - 0.49% Mn - 0.09% Si - 0.024% P - 0.012% S - 0.46% Ni - 12.50% Cr - 0.45% Co

Composition: 0.13% C - 0.50% Mn - 0.45% Si - 0.034% P - 0.010% S - 0.52% Ni - 13.2% Cr - 0.99% Co

Composition: 0.13% C - 0.52% Mn - 0.22% Si - 0.023% P - 0.008% S - 0.48% Ni - 12.5% Cr - 1.87% Co

Composition: 0.13% C - 0.49% Mn - 0.15% Si - 0.012% P - 0.010% S - 0.51% Ni - 12.4% Cr - 4.9% Co

Composition: 0.10% C - 0.48% Mn - 0.55% Si - 0.024% P - 0.011% S - 0.51% Ni - 13.3% Cr - 8.0% Co

Composition: 0.13% C - 0.42% Mn - 0.33% Si - 0.025% P - 0.012% S - 0.49% Ni - 13.5% Cr - 11.9% Co

430 Stainless Steel, 499

Composition: 0.09% C - 0.40% Mn - 0.33% Si - 0.34% Ni - 17.20% Cr - 0.06% Mo - 0.010% Al - 0.03% N

442 Stainless Steel, 499

0.17% C - 0.56% Mn - 0.46% Si - 0.35% Ni - 20.96% Cr - 0.04% Mo - 0.013% Al - 0.12% N

446 Stainless Steel, 499

Composition: 0.24% C - 0.46% Mn - 0.42% Si - 0.26% Ni - 24.85% Cr - 0.02% Mo - 0.010% Al - 0.17% N

M2 Tool Steel, 500

Composition: 0.81% C - 0.24% Mn - 0.26% Si - 0.016% P - 0.007% S - 4.10% Cr - 4.69% Mo - 1.64% V - 5.95% W

M2 Mod Tool Steel, 500

Composition: 0.83% C - 0.32% Mn - 0.25% Si - 3.89% Cr - 4.30% Mo - 1.30% V - 5.79% W

M10 Tool Steel, 501

Composition: 0.85% C - 4.00% Cr - 8.00% Mo - 1.90% V

T1 Tool Steel, 501

Composition: 0.72% C - 0.27% Mn - 0.39% Si - 4.09% Cr - 1.25% V - 18.59% W

T2 Tool Steel, 502

Composition: 0.85% C - 4.00% Cr - 0.75% Mo - 2.10% V - 18.50% W

T4 Tool Steels, 502

Composition: 0.72% C - 0.23% Mn - 0.43% Si - 4.04% Cr - 4.72% Co - 1.24% V - 18.38% W

T7 Tool Steel, 503

Composition: 0.73% C - 4.00% Cr - 2.00% V - 14.00% W

T8 Tool Steel, 503

Composition: 0.80% C - 4.00% Cr - 0.75% Mo - 5.00% Co - 2.00% V - 14.00% W

H11 Tool Steel, 504

Composition: 0.40% C - 1.05% Si - 5.00% Cr - 1.35% Mo - 0.35% V

H12 Tool Steel, 504

Composition: 0.32% C - 0.35% Mn - 0.95% Si - 4.86% Cr - 1.45% Mo - 1.29% W

H13 Tool Steel, 505

Composition: 0.40% C - 1.05% Si - 5.00% Cr - 1.35% Mo - 1.10% V

H14 Tool Steel, 506

Composition: 0.40% C - 1.15% Si - 5.25% Cr - 4.25% W

H16 Tool Steel, 506

Composition: 0.54% C - 0.62% Mn - 0.93% Si - 7.83% Cr - 6.90% W

H21 Tool Steel, 507

Composition: 0.28% C - 3.25% Cr - 0.25% V - 9.00% W

D2 Tool Steel, 507

Composition: 1.50% C - 11.50% Cr - 0.80% Mo - 0.20% V

D4 Tool Steel, 508

Composition: 2.25% C - 11.50% Cr - 0.80% Mo - 0.20% V

A2 Tool Steel, 508

Composition: 0.97% C - 0.48% Mn - 0.40% Si - 4.58% Cr - 1.04% Mo - 0.25% V

O1 Tool Steel, 509

Composition: 0.85% C - 1.18% Mn - 0.26% Si - 0.50% Cr - 0.44% W

O2 Tool Steel, 509

Composition: 0.87% C - 1.78% Mn - 0.29% Si - 0.027% P - 0.010% S - 0.15% Ni - 0.20% Cr - 0.03% Mo

S1 Tool Steel, 510

Composition: 0.50% C - 1.25% Cr - 0.20% V - 2.75% W

S2 Tool Steel, 510

Composition: 0.50% C - 0.35% Mn - 1.0% Si - 0.018% P - 0.013% S - 0.19% Ni - 0.11% Cr - 0.50% Mo

S5 Tool Steel, 511

Composition: 0.60% C - 0.75% Mn - 1.90% Si - 0.25% Cr - 0.30% Mo

P2 Tool Steel, 511

Composition: 0.07% (max) C - 0.55% Ni - 1.35% Cr - 0.20% Mo

P2 (Carburized Case) Tool Steel, 512

Composition: 0.07% (max) C - 0.55% Ni - 1.35% Cr - 0.20% Mo

P4 Tool Steel, 512

Composition: 0.14% C - 0.41% Mn - 0.21% Si - 0.19% Ni - 5.12% Cr - 0.51% Mo

P20 Tool Steel, 513

Composition: 0.30% C - 0.75% Mn - 0.50% Si - 0.80% Cr - 0.25% Mo

L1 Tool Steel, 513

Composition: 1.01% C - 0.50% Mn - 0.30% Si - 1.21% Cr

L2 Tool Steel, 514

Composition: 0.45% C - 0.70% Mn - 1.00% Cr - 0.20% V

F2 Tool Steel, 514

Composition: 1.32% C - 0.28% Mn - 0.50% Si - 0.22% Cr - 3.51% W

W1 Tool Steel, 515

Composition: 0.95% C - 0.25% Mn - 0.20% Si

Composition: 1.14% C - 0.22% Mn - 0.16% Si

W2 Tool Steel, 516

Composition: 0.95% C - 0.20% V

W4 Tool Steel, 516

Composition: 1.05-1.15% C - 0.30% Mn - 0.50% Si - 0.25% Cr

Fe-Ni-Cr Steels, 517

Composition: 0.10% C - 0.40% Mn - 0.30% Si - <0.005% P - <0.015% S - 4.00% Ni - 17.0% Cr - 0.005% N

Composition: 0.11% C - 0.38% Mn - 0.33% Si - <0.005% P - <0.015% S - 7.25% Ni - 15.6% Cr - 0.005% N

Fe-Ni-Mn Steels, 518

Composition: 0.016% C - 3.62% Mn - 0.04% Si - 23.2% Ni - 0.001% N - 0.015% O

Composition: 0.05% C - 3.73% Mn - 22.94% Ni - 0.015% N

Ni-Al-Ti-Cb Steel, 519

Composition: 0.010% C - 0.08% Mn - 0.08% Si - 24.9% Ni - 0.26% Al - 1.58% Ti - 0.15% Cb (Nb)

Alnico Steels, 519

Composition: 0.025% C - 14.90% Ni - 34.75% Co - 3.55% Cu - 7.00% Al - 0% Ti

Composition: 0.017% C - 14.92% Ni - 34.25% Co - 3.20% Cu - 7.00% Al - 2.10 Ti

Composition: 0.005% C - 14.92% Ni - 34.50% Co - 2.88% Cu - 7.07% Al - 3.85% Ti

Composition: 0.014% C - 14.76% Ni - 34.50% Co - 3.05% Cu - 7.10% Al - 6.25% Ti

Ticonal 600, 520

Composition: 13.6% Ni - 24.0% Co - 3.0% Cu - 7.85% Al

Ticonal 800, 520

Composition: 13.75% Ni - 23.7% Co - 2.9% Cu - 8.0% Al - 1.8% Nb

Ticonal 1500, 520

Composition: 14.3% Ni - 34.1% Co - 3.6% Cu - 7.55% Al - 5.3% Ti

Ticonal 600 Si-Mod., 520

Composition: 13.45% Ni - 24.7% Co - 3.0% Cu - 7.95% Al - 0.8% Nb + Si

ADDITIONAL STEELS, 521 - 607**Low Carbon Low Alloy High Strength Steels, 523 - 524**

Composition: 0.12% C - 0.83% Mn - 0.30% Si - 0.004% P - 0.005% S - 0.30% Cu - 1.11% Ni - 0.53% Cr - 0.49% Mo - 0.03% V - 0.031% sol. Al

Composition: 0.22% C - 0.83% Mn - 0.24% Si - 0.007% P - 0.011% S - 0.30% Cu - 1.06% Ni - 0.54% Cr - 0.51% Mo - 0.029% sol. Al

Composition: 0.22% C - 0.85% Mn - 0.24% Si - 0.008% P - 0.012% S - 0.30% Cu - 1.05% Ni - 0.54% Cr - 0.51% Mo - 0.02% V - 0.024% sol. Al

2.6 Ni - 0.4 Mo Steel, 525

Composition: 0.30% C - 0.52% Mn - 0.18% Si - <0.02% P - 0.021% S - 2.64% Ni - <0.05% Cr - 0.37% Mo - <0.015% Al

3.6 Ni - 0.5 Mo Steel, 525

Composition: 0.30% C - 0.41% Mn - 0.28% Si - <0.02% P - 0.014% S - 3.64% Ni - <0.05% Cr - 0.47% Mo - 0.058% Al

1 Cr - 1 Mo - 0.2 V Steel, 526

Composition: 0.26% C - 0.72% Mn - 0.72% Mn - 0.29% Si - <0.02% P - 0.025% S - 0.11% Ni - 1.01% Cr - 1.04% Mo - 0.23% V - <0.015% Al

2 Ni - 1.3 Cr - 0.5 Mo Steel, 526

Composition: 0.33% C - 0.52% Mn - 0.11% Si - <0.02% P - 0.014% S - 2.02% Ni - 1.34% Cr - 0.47% Mo - 0.09% V - 0.040% Al

3 Ni - 2 Cr - 0.7 Mo Steel, 527

Composition: 0.26% C - 0.41% Mn - 0.22% Si - <0.02% P - 0.024% S - 2.91% Ni - 1.98% Cr - 0.69% Mo - <0.015% Al

3-1/2NiCrMoV Turbine Disk Steel, 528

Composition: 0.3% C - 0.3% Mn - 3.64% Ni - 1.63% Cr - 0.49% Mo - 0.08% V

AISI S7 Tool Steel, 529

Composition: 0.50% C - 0.71% Mn - 0.30% Si - 3.20% Cr - 1.32% Mo

Duracut Chipper Knife Steel, 530

Composition: 0.51% C - 0.34% Mn - 0.40% Si - 0.32% Ni - 4.8% Cr - 1.99% Mo

1010 Steel, 531

Composition: 0.12% C - 0.50% Mn - 0.16% Si - 0.004% P - 0.010% S - 0.0005% N

1010 Mo Steel, 531

Composition: 0.11% C - 0.50% Mn - 0.22% Si - 0.002% P - 0.007% S - 0.56% Mo - 0.003% Al - 0.002% N

1010 Mo-B Steel, 532

Composition: 0.10% C - 0.52% Mn - 0.21% Si - 0.002% P - 0.005% S - 0.0063% B - 0.050% Al - 0.0007% N

1036 Steel, 532

Composition: 0.37% C - 1.45% Mn - 0.25% Si

10B36 Steel, 533

Composition: 0.36% C - 1.45% Mn - 0.25% Si

SAE 1038 Steel, 534

Composition: 0.38% C - 0.70% Mn - 0.25% Si - 0.015% P - 0.030% S - 0.063% Al - 0.003% N

Composition: 0.38% C - 0.70% Mn - 0.25% Si - 0.015% P - 0.030% S - 0.063% Al - 0.003% N]

SAE 1040 Steel, 535

Composition: 0.39% C - 0.72% Mn - 0.23% Si - 0.010% P - 0.018% S

SAE 1541 Steel, 535

Composition: 0.39% C - 1.56% Mn - 0.21% Si - 0.010% P - 0.024% S

SAE 15B41 Steel, 536

Composition: 0.42% C - 1.61% Mn - 0.29% Si - 0.006% P - 0.019% S - 0.004% B

VAN-80 HSLA Steel, 536

Composition: 0.18% C - 1.28% Mn - 0.40% Si - 0.004% P - 0.012% S - 0.09% V - 0.07% Al - 0.018% N

SAE 3140 Steel, 537

Composition: 0.41% C - 0.86% Mn - 0.26% Si - 1.28% Ni - 0.71% Cr

SAE 4024 Steel, 537

Composition: 0.24% C - 0.88% Mn - 0.33% Si - 0.23% Mo

SAE 4047 Steel, 538

Composition: 0.51% C - 0.81% Mn - 0.25% Si - 0.26% Mo

SAE 4130 Steel, 539

Composition: 0.31% C - 0.47% Mn - 0.34% Si - 0.021% P - 0.019% S - 0.26% Ni - 0.92% Cr - 0.17% Mo

SAE 4140 Steel, 540 - 541

Composition: 0.37% C - 0.77% Mn - 0.98% Cr - 0.21% Mo

Composition: 0.44% C - 1.04% Mn - 0.29% Si - 1.13% Cr - 0.15% Mo

SAE 43BV14, 541

Composition: 0.12% C - 0.57% Mn - 0.29% Si - 1.86% Ni - 0.47% Cr - 0.18% Mo - 0.07% V - 0.0014% B

SAE 4315 Steel, 542

Composition: 0.16% C - 0.70% Mn - 0.42% Si - 0.008% P - 0.029% S - 1.84% Ni - 0.78% Cr - 0.35% Mo

SAE 4330 Steel, 543

Composition: 0.26% C - 0.60% Mn - 0.39% Si - 0.008% P - 0.007% S - 1.77% Ni - 0.70% Cr - 0.32% Mo

SAE 4340 Steel, 544

Composition: 0.41% C - 0.87% Mn - 0.28% Si - 1.83% Ni - 0.72% Cr - 0.20% Mo

SAE 4340+Si Steel, 544

Composition: 0.43% C - 0.83% Mn - 1.55% Si - 1.84% Ni - 0.91% Cr - 0.40% Mn - 0.12% V - 0.083% Al

SAE 4640 Steel, 545

Composition: 0.42% C - 0.71% Mn - 0.28% Si - 1.77% Ni - 0.24% Mo

SAE 4815 Steel, 545

Composition: 0.14% C - 0.45% Mn - 0.22% Si - 3.42% Ni - 0.21% Mo

SAE 5140 Steel, 546

Composition: 0.42% C - 0.87% Mn - 0.25% Si - 0.89% Cr

SAE 5160 Steel, 546

Composition: 0.63% C - 0.86% Mn - 0.23% Si - 0.83% Cr

SAE 52100 Steel, 547

Composition: 1.06% C - 0.33% Mn - 0.32% Si - 1.44% Cr

SAE 6115 Steel, 548

Composition: 0.16% C - 0.85% Mn - 0.34% Si - 0.009% P - 0.019% S - 0.92% Cr - 0.15% V

SAE 6135 Steel, 549

Composition: 0.67% Mn - 0.45% Si - 0.98% Cr - 0.23% V

SAE 8620 Steel, 550

Composition: 0.17% C - 0.82% Mn - 0.31% Si - 0.52% Ni - 0.50% Cr - 0.20% Mo

SAE 8620 Steel, 551

Composition: 0.21% C - 0.71% Mn - 0.30% Si - 0.002% P - 0.006% S - 0.63% Ni - 0.49% Cr - 0.17% Mo - 0.014% Cu - 0.014% Al

Composition: 0.21% C - 0.71% Mn - 0.30% Si - 0.002% P - 0.006% S - 0.63% Ni - 0.49% Cr - 0.17% Mo - 0.014% Cu - 0.014% Al

SAE 8630 Steel, 552

Composition: 0.31% C - 0.94% Mn - 0.26% Si - 0.009% P - 0.023% S - 0.59% Ni - 0.53% Cr - 0.21% Mo

SAE 8640 Steel, 553

Composition: 0.37% C - 0.87% Mn - 0.25% Si - 0.56% Ni - 0.44% Cr - 0.18% Mo

SAE 86B40 Steel, 553

Composition: 0.44% C - 0.88% Mn - 0.34% Si - 0.49% Ni - 0.65% Cr - 0.14% Mo, B

SAE 9260 Steel, 554

Composition: 0.57% C - 0.91% Mn - 1.95% Si

SAE 9840 Steel, 554

Composition: 0.43% C - 0.84% Mn - 0.25% Si - 1.00% Ni - 0.81% Cr - 0.23% Mo

AISI 01 Tool Steel, 555

Composition: 0.87% C - 1.21% Mn - 0.28% Si - 0.52% Cr - 0.58% W

AISI S5 Tool Steel, 555

Composition: 0.62% C - 0.72% Mn - 1.72% Si - 0.46% Mo

Fe - 3.8Mn - 0.7Si Steel, 556

Composition: 0.038% C - 3.83% Mn - 0.72% Si - 0.005% P - 0.019% S - 0.04% Ni - 0.02% Cr - <0.005% Mo - 0.04% Cu - 0.080% Al - <0.005% Nb - <0.005% Ti

Fe - 2.9Mn - 0.7Si Steel, 556

Composition: 0.037% C - 2.90% Mn - 0.73% Si - 0.009% P - 0.016% S - 0.02% Ni - 0.04% Cr - <0.005% Mo - 0.03% Cu - 0.033% Al - <0.005% Nb - <0.005% Ti

Mn-Mo-Si-Cr Steels, 557 - 558

Composition: 0.061% C - 1.0% Mn - 1.0% Si

Composition: 0.08% C - 1.17% Mn - 0.70% Si - 0.62% Mo

Composition: 0.061% C - 1.13% Mn - 0.77% Si - 0.28% Cr - 0.30% Mo

Hot-Rolled Dual Phase Steel, 558

Composition: 0.06% C - 1.19% Mn - 0.87% Si - 0.38% Mo - 0.064% Al

C-Mn Steels, 559

Composition: 0.12% C - 1.33% Mn - 0.28% Si - 0.011% P - 0.009% S

Composition: 0.11% C - 1.58% Mn - 0.28% Si - 0.013% P - 0.009% S

Composition: 0.11% C - 1.73% Mn - 0.29% Si - 0.009% P - 0.010% S

Composition: 0.11% C - 1.99% Mn - 0.29% Si - 0.012% P - 0.009% S

Iron-Manganese-Nickel Steel, 559

Composition: 0.11% C - 3.00% Mn - 0.16% Si - 1.70% Ni - 0.25% Mo

HSLA Steels, 560

ASTM A710 Composition: 0.05% C - 0.50% Mn - 0.28% Si - 0.88% Ni - 0.71% Cr - 0.20% Mo - 1.12% Cu - 0.035% Nb

ASTM A710 Mod. Composition: 0.06% C - 1.45% Mn - 0.35% Si - 0.97% Ni - 0.72% Cr - 0.42% Mo - 1.25% Cu - 0.040% Nb

HSLA 80/10 Composition: 0.05% C - 1.00% Mn - 0.34% Si - 1.77% Ni - 0.72% Cr - 0.50% Mo - 1.25% Cu - 0.040% Nb

HSLA 100 Composition: 0.06% C - 0.83% Mn - 0.37% Si - 3.48% Ni - 0.58% Cr - 0.59% Mo - 1.66% Cu - 0.28% Nb

0.24C-Mn-Mo-V Composition: 0.24% C - 1.67% Mn - 0.39% Si - 0.14% Ni - 0.17% Cr - 0.22% Mo - 0.11% V

0.35C-Mn-Mo-V Composition: 0.35% C - 1.40% Mn - 0.76% Si - 0.06% Ni - 0.07% Cr - 0.19% Mo - 0.14% V

Cu-Ni-Mo-Cb Steel, 561

Composition: 0.14% C - 0.98% Mn - 0.35% Si - 0.009% P - 0.012% S - 1.21% Ni - 0.32% Cr - 0.40% Mo - 0.63% Cu - 0.032% Al - 0.014% N - 0.02% Cb

12.0% Cr - 1.0% Mo-V Steel, 561

Composition: 0.20% C - 0.47% Mn - 0.24% Si - 0.026% P - 0.009% S - 0.39% Ni - 11.59% Cr - 0.98% Mo - 0.002% Al - 0.28% V - 0.0323% N

1-1/4Cr - 1/2Mo Steel Plate, 561

Composition: 0.15% C - 0.65% Mn - 0.58% Si - 0.009% P - 0.005% S - 1.40% Cr - 0.59% Mo - 0.027% sol. Al

Composition: 0.16% C - 0.58% Mn - 0.53% Si - 0.009% P - 0.005% S - 1.41% Cr - 0.59% Mo - 0.062% sol. Al - 0.0003% B

Mn-Mo-V-N Steel, 562

Composition: 0.15% C - 1.49% Mn - 0.39% Si - 0.018% P - 0.015% S - 0.50% Mo - 0.16% V - 0.14% N

CrMoZr Structural Steel, 562

Composition: 0.17% C - 0.84% Mn - 0.54% Si - 0.019% P - 0.011% S - 0.89% Cr - 0.40% Mo - 0.031% Al - 0.09% Zr

2-1/4Cr - 1Mo Steel, 563

Composition: 0.09% C - 0.44% Mn - 0.26% Si - 0.008% P - 0.010% S - 2.25% Cr - 0.99% Mo

Composition: 0.11% C - 0.41% Mn - 0.43% Si - 0.012% P - 0.012% S - 0.25% Ni - 2.10% Cr - 1.02% Mo

1Cr-0.5Mo Structural Steel, 564

Composition: 0.19% C - 0.60% Mn - 0.30% Si - 0.023% P - 0.021% S - 1.07% Cr - 0.48% Mo - 0.047% Al

1Cr-0.5Mo-B Structural Steel, 564

Composition: 0.19% C - 0.62% Mn - 0.36% Si - 0.022% P - 0.025% S - 1.03% Cr - 0.49% Mo - 0.006% B - 0.041% Al

2.7Ni-0.9Cr-0.25Mo-B Structural Steel, 565

Composition: 0.19% C - 0.57% Mn - 0.35% Si - 0.018% P - 0.009% S - 2.72% Ni - 0.87% Cr - 0.25% Mo - 0.10% V - 0.0017% B

9Ni-4Co Ultrahigh-Strength Steel, 565

Composition: 0.32% C - 0.13% Mn - 0.15% Si - 0.090% P - 0.005% S - 9.05% Ni - 4.07% Co

HY-80 Steel, 566

Composition: 0.15% C - 0.32% Mn - 0.31% Si - 2.72% Ni - 1.52% Cr - 0.41% Mo

Composition: 0.19% C - 0.30% Mn - 0.04% Si - 0.007% P - 0.005% S - 3.30% Ni - 1.78% Cr - 0.50% Mo - 0.004% Al

Low C MnNiMoB Steel, 567

Composition: 0.015% C - 1.99% Mn - 0.31% Si - 0.006% P - 0.004% S - 1.00% Ni - <0.01% Cr - 0.29% Mo - 0.017% Al - 0.002% B

HY-80 Steel, 568

Composition: 0.1% C - 0.1% Mn - 0.05% Si - 10.0% Ni - 8.0% Co - 2.0% Cr - 1.0% Mo

V-Mo-Ti Steel, 569

Composition: 0.18% C - 0.81% Mn - 0.26% Si - 0.40% Ni - 0.49% Cr - 0.17% Mo - 0.056% Al - 66 ppm N

Composition: 0.20% C - 0.70% Mn - 0.29% Si - 0.10% Ni - 0.59% Cr - 0.09% Mo - 0.07% V - 0.021% Al - 0.34% Ti - 150 ppm N

Rail Steel, 570

Composition: 0.77% C - 0.95% Mn - 0.22% Si - 0.014% P - 0.017% S - 0.10% Cr

9Ni Steel, 570

Composition: 0.033% C - 0.57% Mn - 0.22% Si - 0.006% P - 0.007% S - 8.63% Ni - 0.13% Cr - 0.02% Mo - 0.032% Al - 0.0083% N₂

9Ni-Mo Steel, 571

Composition: 0.095% C - 0.48% Mn - 0.27% Si - 0.008% P - 0.008% S - 9.30% Ni - 0.17% Cr - 0.51% Mo - 0.045% Al - 0.008% N₂

15Mo3 Steel, 571

Composition: 0.16% C - 0.60% Mn - 0.26% Si - 0.015% P - 0.009% S - 0.31% Mo - 0.03% V - 0.004% Al - 0.009% N

13CrMo 4 4 Steel, 571

Composition: 0.11% C - 0.56% Mn - 0.30% Si - 0.015% P - 0.015% S - 0.07% Ni - 0.84% Cr - 0.48% Mo - 0.01% V - 0.002% Al - 0.011% N

10CrMo 9 10 Steel, 571

Composition: 0.10% C - 0.49% Mn - 0.24% Si - 0.013% P - 0.013% S - 2.43% Cr - 1.06% Mo - 0.01% V - 0.012% N

X12CrMo 7 Steel, 571

Composition: 0.08% C - 0.58% Mn - 0.68% Si - 0.019% P - 0.007% S - 0.29% Ni - 6.31% Cr - 0.51% Mo - 0.04% V - 0.003% Al - 0.015% N

8Cr-2Mo Steel, 572

Composition: 0.19% C - 0.46% Mn - 0.34% Si - 0.019% P - 0.013% S - 0.09% Ni - 7.83% Cr - 2.02% Mo - 0.01% V - 0.005% Al - 0.013% N

X12CrMo 9 1 Steel, 572

Composition: 0.09% C - 0.30% Mn - 0.62% Si - 0.022% P - 0.008% S - 0.14% Ni - 9.29% Cr - 1.01% Mo - 0.04% V - 0.009% Al - 0.018% N

X20CrMoV121 Steel, 572

Composition: 0.20% C - 0.47% Mn - 0.24% Si - 0.026% P - 0.009% S - 0.39% Ni - 11.49% Cr - 0.98% Mo - 0.28% V - 0.002% Al - 0.0323% N

12Cr-1Mo-1W-V-Nb Steel, 572

Composition (approx.): 0.1% C - 0.5% Mn - 0.25% Si - 12.0% Cr - 1.0% Mo - 0.28% V - 0.06% Nb - 1.0% W

18-0-1 Steel, 573

Composition: 0.54% C - 0.44% Mn - 0.33% Si - 0.023% P - 0.023% S - 4.02% Cr - 0.42% Mo - 1.24% V - 7.44% W

6-5-2 Steel, 573

Composition: 0.51% C - 0.40% Mn - 0.41% Si - 0.023% P - 0.030% S - 3.94% Cr - 2.45% Mo - 1.24% V - 1.50% W

2-9-2 Steel, 573

Composition: 0.52% C - 0.42% Mn - 0.47% Si - 0.028% P - 0.030% S - 3.97% Cr - 3.15% Mo - 1.15% V - 0.99% W

1524MoV Steel, 574

Composition: 0.22% C - 1.54% Mn - 0.35% Si - 0.014% P - 0.036% S - 0.11% Mo - 0.11% V - 0.011% N

3.5NiCrMoV Rotor Steel, 574

Composition: 0.25% C - 0.40% Mn - <0.10% Si - 3.50% Ni - 1.50% Cr - 0.50% Mo - 0.10% V

Cr-Mo-V Rotor Steel, 575

Composition: 0.32% C - 0.74% Mn - 0.25% Si - 0.037% P - 0.036% S - 0.34% Ni - 1.04% Cr - 1.20% Mo - 0.24% V

B.S. En 12 Steel, 575

Composition: 0.43% C - 0.95% Mn - 0.21% Si - 0.018% P - 0.024% S - 0.93% Ni - 0.15% Cr - 0.04% Mo

BS En 16 Steel, 576

Composition: 0.33% C - 1.48% Mn - 0.18% Si - 0.028% P - 0.028% S - 0.26% Ni - 0.16% Cr - 0.27% Mo

BS En 17 Steel, 576

Composition: 0.38% C - 1.49% Mn - 0.25% Si - 0.036% P - 0.028% S - 0.24% Ni - 0.10% Cr - 0.41% Mo

BS En 19 Steel, 577

Composition: 0.44% C - 0.60% Mn - 0.22% Si - 0.023% P - 0.023% S - 0.24% Ni - 1.19% Cr - 0.37% Mo

BS En 23 Steel, 577

Composition: 0.32% C - 0.61% Mn - 0.28% Si - 0.018% P - 0.013% S - 3.22% Ni - 0.63% Cr - 0.22% Mo

BS En 26 Steel, 578

Composition: 0.38% C - 0.56% Mn - 0.15% Si - 0.011% P - 0.005% S - 2.42% Ni - 0.74% Cr - 0.46% Mo

BS En 111 Steel, 578

Composition: 0.35% C - 0.65% Mn - 0.13% Si - 0.035% P - 0.032% S - 1.27% Ni - 0.55% Cr

BS En 160 Steel, 579

Composition: 0.41% C - 0.48% Mn - 0.13% Si - 0.016% P - 0.043% S - 1.75% Ni - 0.17% Cr - 0.22% Mo

42Cr Mo4 Steel, 579

Composition: 0.41% C - 0.66% Mn - 0.25% Si - 0.008% P - 0.024% S - 0.31% Ni - 1.03% Cr - 0.17% Mo - 0.28% Cu - 0.01% V

0.27C-1.17Mn-0.31Si-0.48Cr-0.0013B Steel, 580

Composition: 0.27% C - 1.17% Mn - 0.31% Si - 0.48% Cr - 0.0013B

Weld Zone CCTs, 581

Composition: 0.094% C - 1.32% Mn - 0.3% Si

Composition: 0.18% C - 1.3% Mn - 0.27% Si

C-Mn Weld Metals, 582 - 584

Composition: 0.06% C - 0.56% Mn - 0.41% Si - 0.023% P - 0.008% S - 0.05% Ni - 0.01% Mo - 71 ppm N - 411 ppm O

Composition: 0.07% C - 1.35% Mn - 0.52% Si - 0.022% P - 0.005% S - 0.05% Ni - 0.01% Mo - 94 ppm N - 352 ppm O

Composition: 0.07% C - 2.12% Mn - 0.33% Si - 0.023% P - 0.008% S - 0.06% Ni - 0.01% Mo - 81 ppm N - 317 ppm O

C-Mn-Ni Weld Metals, 585 - 588

Composition: 0.05% C - 0.98% Mn - 0.33% Si - 0.017% P - 0.011% S - 0.06% Ni - 0.06% Mo - 45 ppm N - 446 ppm O

Composition: 0.04% C - 1.20% Mn - 0.41% Si - 0.024% P - 0.014% S - 1.10% Ni - 0.07% Mo - 120 ppm N - 430 ppm O

Composition: 0.05% C - 1.18% Mn - 0.38% Si - 0.022% P - 0.010% S - 2.52% Ni - 0.08% Mo - 178 ppm N - 482 ppm O

Composition: 0.04% C - 1.29% Mn - 0.38% Si - 0.030% P - 0.017% S - 3.58% Ni - 0.08% Mo - 141 ppm N - 432 ppm O

Ti-Oxide Bearing Steel, 589

Composition: 0.079% C - 1.39% Mn - 0.20% Si - 0.0007% P - 0.0007% S - 0.002% Al - 0.012% Ti - 0.0015% N - 0.0017% O

Composition: 0.092% C - 1.42% Mn - 0.20% Si - 0.0010% P - 0.0008% S - 0.020% Al - 0.0015% N - 0.0020% O

Si-Mn Steel, 590

Composition: 0.09% C - 0.81% Mn - 0.11% Si - 0.017% P - 0.013% S - 0.11% Cu - 0.0050% N - 0.014% O

Si-Mn-Ti-B Steel, 590

Composition: 0.11% C - 1.16% Mn - 0.29% Si - 0.013% P - 0.011% S - 0.08% Mo - 0.10% Cu - 0.043% Ti - 0.0034% B - 0.0057% N - 0.020% O

T1 Steel, 591

Composition: 0.15% C - 1.00% Mn - 0.23% Si - 0.014% P - 0.023% S - 0.94% Ni - 0.53% Cr - 0.45% Mo - 0.34% Cu - 0.004% Ti - 0.0014% B - 0.05% V - 0.008% Sn

SAE 1320 Steel, 591

Composition: 0.24% C - 1.59% Mn - 0.23% Si - 0.024% P - 0.019% S

SAE 1050 Steel, 592

Composition: 0.50% C - 0.91% Mn

SAE 4340 Steel, 592

Composition: 0.42% C - 0.78% Mn - 1.79% Ni - 0.80% Cr - 0.33% Mo

SAE 4142 Steel, 593

Composition: 0.40% C - 0.70% Mn - 0.31% Si - 0.010% P - 0.026% S - 0.16% Ni - 1.11% Cr - 0.16% Mo - 0.15% Cu

SAE 52100 Steel, 594

Composition: 0.99% C - 0.37% Mn - 0.24% Si - 0.011% P - 0.022% S - 0.07% Ni - 1.50% Cr - 0.01% Mo - 0.11% Cu

0.44 C Steel, 595

Composition: 0.44% C - 0.50% Mn - 0.18% Si - 0.42% Ni - 0.22% Cr

0.82 C Steel, 595

Composition: 0.82% C - 0.50% Mn - 0.18% Si - 0.42% Ni - 0.22% Cr

Ni-Cr Steel, 596

Composition: 0.30% C - 0.27% Mn - 0.019% P - 0.019% S - 3.50% Ni - 1.25% Cr

SAE 4337 Steel, 597

Composition: 0.36% C - 1.45% Ni - 1.1% Cr - 0.27% Mo

Fe-0.2C-5Cr Steel, 597

Composition: 0.23% C - 5.1% Cr

Fe-0.2C-1V Steel, 597

Composition: 0.18% C - 1.09% V

Low Alloy Steel, 598

Composition: 0.57% C - 0.82% Mn - 0.30% Si - 0.016% P - 0.019% S - 1.16% Ni - 1.07% Cr - 0.26% Mo

Carbon Steel, 598

Composition: 0.105% C - 0.0035% Si - 0.0015% P - 0.003% S - 0.0005% O

C-Mn Steel, 598

Composition: 0.105% C - 1.53% Mn - 0.0035% Si - 0.0015% P - 0.0017% S - 0.0001% O

Nb Steel, 599

Composition: 0.10% C - 1.54% Mn - 0.0035% Si - 0.0015% P - 0.0012% S - 0.04% Nb - 0.0003% O

Low-Carbon Bainitic Steel, 600

Composition: 0.08% C - 1.57% Mn - 0.28% Si - 0.011% P - 0.002% S - 0.07% V - 0.03% Nb - 0.018% Ti - 0.042% sol. Al - 0.0038% N

Composition: 0.02% C - 1.60% Mn - 0.16% Si - 0.043% Nb - 0.017% Ti - 0.0018% B - 0.0020% N

0.1C-0.24Mo-B Steel, 601

Composition: 0.10% C - 0.87% Mn - 0.33% Si - 0.24% Mo - 0.002% B - 0.005% N - 0.048% Zr

0.1C-0.39Mo-B Steel, 602 - 603

Composition: 0.10% C - 0.88% Mn - 0.34% Si - 0.39% Mo - 0.003% B - 0.005% N - 0.046% Zr

0.1C-0.66Mo-B Steel, 604 - 605

Composition: 0.10% C - 0.88% Mn - 0.35% Si - 0.66% Mo - 0.003% B - 0.005% N - 0.044% Zr

0.2% C - 0.38% Mo-B Steel, 605 - 606

Composition: 0.20% C - 0.87% Mn - 0.30% Si - 0.38% Mo - 0.003% B - 0.006% N - 0.052% Zr

Nb Steel, 607

Composition: 0.16% C - 1.41% Mn - 0.36% Si - 0.018% P - 0.017% S - 0.031% Nb - 0.020% sol. Al - 0.0054% N

TIME-TEMPERATURE PRECIPITATION, 609 - 652**Carbon Steels, 611 - 612**

Composition: 0.23% C - 0.85% V

Composition: 0.20% C - 0.023% Nb - 1.04% V - 15 ppm N - 13 ppm O

Composition: 0.15% C - 0.020% Nb - 0.75% V - 40 ppm N - 41 ppm O

Composition: 0.09% C - 0.016% Nb - 0.48% V - 40 ppm N - 59 ppm O

Composition: 0.04% C - 0.02% Mn - 0.020% Nb - 0.55% V - 5 ppm N - 1 ppm O

Austenitic Steel, 613

Composition: 0.059% C - 1.13% Mn - 0.34% Si - 25.15% Ni - 15.39% Cr - 0.86% Al - 4.30% Ti - 0.01% N

Fe-Nb-C Alloy Steels, 613 - 614

Composition: Fe - 0.07% C - 0.031% Nb

Composition: Fe - 0.09% C - 0.036% Nb - 0.003% B

Composition: Fe - 0.07% C - 1.07% Mn - 0.033% Nb

Composition: Fe - 0.07% C - 0.031% Nb

Fe-V-C Alloy Steel, 615

Composition: 0.12% C - 0.02% Mn - 0.02% Mo - 0.46% V - 0.002% N

Ti Bearing Steels, 615

Composition: 0.072% C - 1.50% Mn - 0.24% Si - 0.005% P - 0.010% S - 0.05% Ti - 0.01% Al - 0.0052% N

Composition: 0.058% C - 1.67% Mn - 0.20% Si - 0.005% P - 0.010% S - 0.11% Ti - 0.03% Al - 0.0062% N

Composition: 0.075% C - 1.51% Mn - 0.30% Si - 0.005% P - 0.010% S - 0.18% Ti - 0.02% Al - 0.0084% N

Composition: 0.050% C - 1.43% Mn - 0.27% Si - 0.005% P - 0.010% S - 0.25% Ti - 0.01% Al - 0.0070% N

3.25% Si Steel, 616

Composition: 0.051% C - 0.21% Mn - 3.44% Si - 0.010% P - 0.011% S

Composition: 0.030% C - 0.08% Mn - 3.30% Si - 0.006% P - 0.012% S

Nb Steels, 617

Composition: 0.06% C - 0.42% Mn - 0.014% Si - 0.002% P - 0.009% S - 0.006% Cu - 0.018% Nb - 0.051% Al - 0.004% N

Composition: 0.05% C - 0.42% Mn - 0.045% Si - 0.002% P - 0.009% S - 0.006% Cu - 0.035% Nb - 0.057% Al - 0.004% N

Nb HSLA Steels, 618

Composition: 0.067% C - 1.23% Mn - 0.20% Si - 0.040% Nb - 0.02% Al - 0.006% (max) N

Composition: 0.065% C - 1.25% Mn - 0.18% Si - 0.045% Nb - 0.08% Al - 0.006% (max) N

HSLA Steels, 619 - 621

Composition: 0.062% C - 1.71% Mn - 0.12% Si - 0.016% P - 0.011% S - 0.02% Mo - 0.074% Nb - 0.025% Al - 0.0060% N

Composition: 0.063% C - 1.71% Mn - 0.11% Si - 0.018% P - 0.011% S - 0.03% Mo - 0.084% Nb - 0.024% Al - 0.0058% N

Composition: 0.060% C - 1.74% Mn - 0.12% Si - 0.017% P - 0.011% S - 0.29% Mo - 0.075% Nb - 0.022% Al - 0.0061% N

Composition: 0.059% C - 1.70% Mn - 0.12% Si - 0.018% P - 0.011% S - 0.29% Mo - 0.080% Nb - 0.022% Al - 0.0062% N

Composition: 0.062% C - 1.75% Mn - 0.12% Si - 0.018% P - 0.011% S - 0.83% Mo - 0.075% Nb - 0.029% Al - 0.0102% N

0.15C Steel, 622 - 623

Composition: 0.17% C - <0.1% Mn - 0.04% Si - <0.001% P - 0.004% S - <0.1% Ni - <0.01% Cr - <0.1% Mo - <0.017% Al - <0.01% V

Composition: 0.14% C - <0.1% Mn - 0.14% Si - <0.001% P - 0.004% S - <0.1% Ni - <0.01% Cr - <0.1% Mo - 0.013% Al - <0.01% V

Composition: 0.17% C - <0.1% Mn - 0.36% Si - <0.001% P - 0.006% S - <0.1% Ni - <0.01% Cr - <0.1% Mo - <0.005% Al - 0.01% V

Composition: 0.16% C - <0.1% Mn - <0.1% Si - <0.001% P - 0.005% S - 0.94% Ni - <0.01% Cr - <0.1% Mo - 0.007% Al - <0.01% V
Composition: 0.17% C - <0.1% Mn - 0.04% Si - <0.001% P - 0.004% S - <0.1% Ni - <0.01% Cr - <0.1% Mo - <0.017% Al - <0.01% V
Composition: 0.14% C - <0.1% Mn - 0.14% Si - <0.001% P - 0.004% S - <0.1% Ni - <0.01% Cr - <0.1% Mo - 0.013% Al - <0.01% V
Composition: 0.17% C - <0.1% Mn - 0.36% Si - <0.001% P - 0.006% S - <0.1% Ni - <0.01% Cr - <0.1% Mo - <0.005% Al - 0.01% V
Composition: 0.16% C - <0.1% Mn - <0.1% Si - <0.001% P - 0.005% S - 0.94% Ni - <0.01% Cr - <0.1% Mo - 0.007% Al - <0.01% V
Composition: 0.17% C - <0.1% Mn - 0.04% Si - <0.001% P - 0.004% S - <0.1% Ni - <0.01% Cr - <0.1% Mo - <0.017% Al - <0.01% V
Composition: 0.16% C - <0.1% Mn - <0.1% Si - <0.001% P - 0.007% S - <0.1% Ni - <0.01% Cr - <0.1% Mo - 0.039% Al - <0.01% V
Composition: 0.15% C - <0.1% Mn - <0.1% Si - <0.001% P - 0.004% S - <0.1% Ni - <0.01% Cr - <0.1% Mo - 0.078% Al - <0.01% V
Composition: 0.14% C - <0.1% Mn - <0.1% Si - <0.001% P - 0.004% S - <0.1% Ni - <0.01% Cr - <0.1% Mo - 0.15% Al - <0.01% V

Low Carbon Steels, 624 - 625

Composition: 0.05% C - 0.35% Mn - 0.008% Si - 0.013% P - 0.027% S - 0.03% Ni - 0.02% Cr - 0.03% Cu - 0.058% Al - 0.008% Al₂O₃ - 0.0058% acid soluble N
Composition: 0.05% C - 0.35% Mn - 0.008% Si - 0.013% P - 0.027% S - 0.03% Ni - 0.02% Cr - 0.03% Cu - 0.058% Al - 0.008% Al₂O₃ - 0.0058% acid soluble N
Composition: 0.055% C - 0.33% Mn - 0.006% Si - 0.010% P - 0.022% S - 0.020% Al - 0.0088 acid soluble N
Composition: 0.043% C - 0.35% Mn - 0.004% Si - 0.010% P - 0.023% S - 0.079% Al - 0.0072% acid soluble N

Fe-0.07% N Steel, 625

Fe-1.9% N Steel, 625

Fe-2.35% N Steel, 626

3Mn 5B Steel, 626

Composition: 0.089% C - 2.86% Mn - 0.21% Si - 0.014% Al - 0.00018% N - 0.0005% B

3Mn 20B Steel, 627

Composition: 0.061% C - 3.02% Mn - 0.23% Si - 0.008% Al - 0.0009% N - 0.0020% B

HT-50 Steel, 627

Composition: 0.08% C - 1.4% Mn - 0.25% Si - 0.008% P - 0.002% S - 0.04% Al - 0.008% Ti - 0.0030% N - 0.0014% B

Fe-C Alloys, 628 - 629

Composition: 0.05% C - 1.5% Al - 0.0019% N
Composition: 0.02% C - 0.003% Al - 0.0034% N
Composition: 0.02% C - 0.37% Mn - 0.0186% N
Composition: 0.02% C - 1.0% Ni - 0.015% Al - 0.0010% N

Low Carbon Steel, 629

Composition: 0.046% C - 0.35% Mn - 0.020% P - 0.018% S - 0.03% sol. Al, 0.010% insol Al - 0.006% N

Ferritic Steel, 630

Composition: 0.12% C - 0.5% V
Composition: 0.12% C - 1.3% Mo

2-1/4 Cr - 1% Mo Steel, 631 - 632

Composition: 0.15% C - 0.50% Mn - 0.18% Si - 0.018% P - 0.012% S - 0.165% Ni - 2.12% Cr - 0.94% Mo - 0.077% Cu - 0.009% Sn

12% Cr Martensitic Steels, 632

Composition: 0.21% C - 13.2% Cr - 0.024% N
Composition: 0.18% C - 0.58% Mn - 0.31% Si - 0.18% Ni - 11.7% Cr - 0.49% Mo - 0.01% Al - 0.38% V - 0.20% Nb - 0.033% N

Ferritic Stainless Steels, 633

Composition: (A4) 0.06% C - 0.31% Mn - 0.59% Si - 0.026% P - 0.008% S - 0.05% Ni - 24.60% Cr
Composition: (A6) 0.06% C - 0.36% Mn - 0.65% Si - 0.024% P - 0.008% S - 0.08% Ni - 31.00% Cr
Composition: (A7) 0.08% C - 0.72% Mn - 0.80% Si - 0.05% Ni - 33.03% Cr

25Cr-3Mo-4Ni Ferritic Stainless Steel, 633

Composition: 0.014% C - 0.29% Mn - 0.27% Si - 0.019% P - 0.011% S - 3.90% Ni - 24.53% Cr - 3.54% Mo - 0.32% Al - 0.17% Nb
Composition: 0.013% C - 0.29% Mn - 0.27% Si - 0.012% P - 0.009% S - 4.66% Ni - 24.41% Cr - 3.50% Mo - 0.012% Al - 0.32% Nb - 0.08% Ti

Austenitic Cr-Mn-C-N Stainless Steel, 634

Composition: 0.43% C - 13.54% Mn - 0.25% Si - 0.008% P - 0.019% S - 0.17% Ni - 23.23% Cr - 0.46% N

Esshete 1250 Austenitic Steel, 635

Composition: 0.10% C - 6.0% Mn - 0.5% Si - 9.6% Ni - 15.25% Cr - 1.02% Mo - 0.3% V - 1.1% Nb - 0.0066% B

304 Stainless Steel, 635

Composition: 0.05% C - -9.0% Ni - -18.0% Cr
Composition: 0.038% C - -9.0% Ni - -18.0% Cr

Stainless Steels, 636 - 638

304 - Composition: 0.06% C - 0.52% Mn - 0.53% Si - 0.018% P - 0.014% S - 9.14% Ni - 19.17% Cr
347 - Composition: 0.05% C - 1.56% Mn - 0.32% Si - 0.018% P - 0.016% S - 10.30% Ni - 17.86% Cr
316 - Composition: 0.04% C - 1.54% Mn - 0.58% Si - 0.024% P - 0.015% S - 11.96% Ni - 17.27% Cr - 2.47% Mo
309 - Composition: 0.13% C - 1.54% Mn - 0.39% Si - 0.024% P - 0.015% S - 13.40% Ni - 23.21% Cr
310 - Composition: 0.05% C - 1.95% Mn - 0.37% Si - 0.023% P - 0.007% S - 21.09% Ni - 27.23% Cr
446 - Composition: 0.14% C - 0.70% Mn - 0.64% Si - 0.021% P - 0.030% S - 0.30% Ni - 25.51% Cr
Laboratory Experimental Heat. - Composition: 0.04% C - 0.38% Mn - 0.54% Si - 0.024% P - 0.015% S - 0.08% Ni - 27.78% Cr

Austenitic Stainless Steels, 639

304 - Composition: 0.05% C - 1.73% Mn - 0.60% Si - 0.028% P - 0.012% S - 9.0% Ni - 18.7% Cr - 0.026% N
316 - Composition: 0.05% C - 1.81% Mn - 0.63% Si - 0.029% P - 0.010% S - 11.9% Ni - 16.6% Cr - 2.3% Mo - 0.024% N
321 - Composition: 0.05% C - 1.76% Mn - 0.59% Si - 0.024% P - 0.008% S - 10.5% Ni - 17.6% Cr - 0.35% Ti - 0.011% N
347 - Composition: 0.05% C - 1.64% Mn - 0.59% Si - 0.019% P - 0.014% S - 10.4% Ni - 17.6% Cr - 0.025% N - 0.87% Nb
Tempaloy A-1 - Composition: 0.07% C - 1.71% Mn - 0.66% Si - 0.028% P - 0.005% S - 9.8% Ni - 18.0% Cr - 0.06% Ti - 0.033% N - 0.13% Nb

316 Stainless Steel, 640

316L Stainless Steel, 640 - 641

Composition: 0.033% C - 1.55% Mn - 0.44% Si - 0.022% P - 0.022% S - 13.6% Ni - 16.4% Cr - 2.12% Mo - 0.025% N - 0.0012% B - 0.18% Co - 0.07% Cu
Composition: 0.021% C - 1.74% Mn - 0.41% Si - 0.030% P - 0.007% S - 12.3% Ni - 17.2% Cr - 2.40% Mo - 0.080% N - 0.0032% B - 0.21% Co - 0.15% Cu
Composition: 0.023% C - 1.74% Mn - 0.73% Si - 13.1% Ni - 17.3% Cr - 2.66% Mo

316 Stainless Steel, 642

Composition: 0.066% C - 1.57% Mn - 0.21% Si - 12.3% Ni - 17.4% Cr - 2.05% Mo
Composition: 0.05% C - 1.68% Mn - 0.44% Si - 0.023% P - 0.012% S - 11.85% Ni - 16.81% Cr - 2.21% Mo - 0.16% Cu - 0.030% Al - 0.007% Sn - 0.002% Pb - 0.002% B

316 Austenitic Stainless Steel, 642

Composition: 0.06% C - 1.72% Mn - 0.40% Si - 0.012% P - 0.007% S - 13.30% Ni - 17.30% Cr - 2.33% Mo - 0.003% Ti

Titanium Modified 316 Stainless Steel, 643

Composition: 0.057% C - 1.41% Mn - 0.03% Si - 0.005% P - 0.004% S - 13.96% Ni - 17.52% Cr - 2.51% Mo - 0.29% Ti - 0.004% N

321 Stainless Steel, 643

Composition: 0.06% C - 1.69% Mn - 0.54% Si - 0.012% P - 0.006% S - 9.58% Ni - 17.48% Cr - 0.50% Ti - 0.011% N

Stainless Steel, 644

Composition: 0.088% C - 1.06% Mn - 0.42% Si - 8.0% Ni - 24.85% Cr - 0.0115% N

308 Stainless Steel, 644

Composition: 0.068% C - 1.61% Mn - 0.49% Si - 0.018% P - 0.012% S - 10.28% Ni - 20.89% Cr - 0.05% Mo - 0.06% V - <0.01% Ti - <0.001% B - 0.10% Cu - 0.039% N₂

308CRE Stainless Steel, 644

Composition: 0.043% C - 1.96% Mn - 0.62% Si - 0.011% P - 0.015% S - 9.98% Ni - 19.96% Cr - <0.01% Mo - 0.04% V - 0.57% Ti - 0.002% B - 0.03% Cu - 0.011% N₂

Austenitic Stainless Steel, 645

Composition: 0.142% C - 1.20% Mn - 0.56% Si - 19.08% Ni - 22.45% Cr

X 5 CrNiMo 17 13 Steel, 645 - 646

Composition: 0.042% C - 1.50% Mn - 0.45% Si - 14.34% Ni - 17.76% Cr - 4.72% Mo - 0.025% N

Composition: 0.048% C - 0.80% Mn - 0.64% Si - 0.017% P - 0.011% S - 13.55% Ni - 16.80% Cr - 4.80% Mo - 0.039% N

Composition: 0.050% C - 0.67% Mn - 0.49% Si - 0.016% P - 0.011% S - 13.45% Ni - 17.05% Cr - 4.73% Mo - 0.145% N

Austenitic Steel, 647

Composition: 0.046% C - 1.14% Mn - 0.36% Si - 25.5% Ni - 15.6% Cr - 4.10% Ti - 0.009% N

310 Stainless Steel, 647 - 648

Composition: 0.11% C - 1.76% Mn - 0.70% Si - 0.02% P - 0.011% S - 19.75% Ni - 24.66% Cr - 0.31% Mo - 0.051% Al - 0.12% Cu - 0.0015% B - 0.005% Pb - 0.004% Sn

Cast 25.7%Cr-22.8%Ni Austenitic Stainless Steel, 648

Composition: 0.24% C - 1.72% Mn - 2.13% Si - 0.008% P - 0.010% S - 22.8% Ni - 25.7% Cr - 0.016% N

316 Stainless Steel, 649

Wrought 316 Stainless Steel and 19-12-3 Weld Metal, 649

Wrought 316 Steel Composition: 0.04-0.10% C - <2.00% Mn - <1.00% Si - <0.045% P - <0.030% S - 10.6-14.0% Ni - 16.0-18.5% Cr - 2.00-3.00% Mo

19-12-3 Weld Metal Composition: <0.08% C - 0.50-2.50% Mn - <1.00% Si - <0.040% P - <0.035% S - 10.0-14.0 Ni - 17.0-20.0 % Cr - 2.5-3.5% Mo

Duplex Stainless Steel, 650

Composition: 0.028% C - 1.63% Mn - 0.45% Si - 0.031% P - 0.012% S - 5.00% Ni - 21.8% Cr - 3.12% Mo - 0.113% N - 0.05% Cu

Uranus 50 Duplex Stainless Steel, 650

Composition: 0.032% C - 0.62% Mn - 0.45% Si - 0.022% P - 0.021% S - 7.38% Ni - 21.08% Cr - 2.39% Mo - 1.33% Cu - 0.003% B - 0.071% N - <0.01% Ti (33% ferrite)

Duplex Stainless Steel, 651

Composition: 0.03% C - 0.7% Mn - 0.6% Si - 5.0% Ni - 26.0% Cr - 1.3% Mo

Composition: 0.02% C - 0.94% Mn - 0.48% Si - 0.02% P - 0.009% S - 6.64% Ni - 25.3% Cr - 2.96% Mo - 0.49% Cu - 0.11% N - 0.32% W

TIME-TEMPERATURE EMBRITTLEMENT, 653 - 700

SAE 1050 Steel, 655

Composition: 0.46% C - 0.75% Mn - 0.02% P - 0.034% S - 0.03% Ni - 0.12% Cr

C-Mn Steel, 655

Composition: 0.26% C - 1.63% Mn - 0.28% Si - 0.021% P - 0.034% S

C-Mn-B Steel, 656

Composition: 0.26% C - 1.67% Mn - 0.32% Si - 0.021% P - 0.032% S - 0.0034% B

SAE 5140 Steel, 657

Composition: 0.45% C - 0.77% Mn - 0.35% Si - 0.015% P - 0.013% S - 0.72% Cr

SAE 4047 Steel, 657

Composition: 0.48% C - 0.83% Mn - 0.28% Si - 0.019% P - 0.015% S - 0.14% Ni - 0.13% Cr - 0.25% Mo

SAE 3140 Steel, 658 - 659

2.25Cr-1Mo Steel, 660

Composition: 0.07% C - 0.50% Mn - 0.38% Si - 0.020% P - 0.023% S - <0.1% Ni - 2.1% Cr - 1.0% Mo

Ni-Cr Steel, 660

Composition: 0.26% C - 0.66% Mn - 0.07% Si - 0.026% P - 0.020% S - 3.53% Ni - 0.84% Cr

Alloy Steel, 661 - 663

Composition: 0.33% C - 0.23% Mn - 0.06% Si - 0.013% P - 0.021% S - 3.78% Ni - 1.79% Cr

Composition: 0.44% C - 1.64% Mn - 0.06% Si - 0.029% P - 0.022% S - 1.84% Ni - 1.64% Cr - 0.40% Mo - 0.15% V

Fe-30Cr (Alloy 90) Steel, 664

Ferritic Stainless Steels, 664 - 665

Composition: 0.002% C - <0.01% Mn - <0.01% Si - 0.001% P - 17.35% Cr - 0.01% Mo - 0.003% N

Composition: 0.004% C - <0.01% Mn - <0.01% Si - 0.001% P - 17.61% Cr - 2.02% Mo - 0.004% N

Composition: 0.003% C - <0.01% Mn - <0.01% Si - 13.68% Cr - 0.08% Mo - 0.004% N

Composition: 0.002% C - <0.01% Mn - <0.01% Si - 13.60% Cr - 1.88% Mo - 0.004% N

Composition: 0.044% C - 0.64% Mn - 0.31% Si - 18.04% Cr - 0.01% Mo - 0.091% N

Composition: 0.043% C - 0.64% Mn - 0.31% Si - 18.03% Cr - 1.94% Mo - 0.092% N

Composition: 0.044% C - 0.64% Mn - 0.31% Si - 17.94% Cr - 1.93% Mo - 0.052% N - 0.42% Ti

Ti-stabilized Steel - Composition: 0.013% C - 0.45% Mn - 0.27% Si - 0.020% P - 0.011% S - 17.4% Cr - 2.02% Mo - 0.0148% N - 0.24% Ti

Nb-stabilized Steel - Composition: 0.013% C - 0.49% Mn - 0.27% Si - 0.019% P - 0.013% S - 17.4% Cr - 2.00% Mo - 0.0095% N - 0.35% Nb

Duplex Stainless Steels, 666

5Mo Composition: 0.025% C - 0.26% Mn - 0.10% Si - 0.012% P - 0.015% S - 7.38% Ni - 24.49% Cr - 4.99% Mo - 0.36% N

6Mo Composition: 0.018% C - 0.28% Mn - 0.14% Si - 0.011% P - 0.012% S - 9.18% Ni - 23.82% Cr - 5.98% Mo - 0.20% N

ELI Ferritic Stainless Steel, 666

Composition: 0.074% C - 0.12% Si - 0.013% P - 0.002% S - 3.93% Ni - 24.8% Cr - 4.05% Mo - 0.0117% N - 0.51% Nb

Ferritic Cr-Mo-Ni Stainless Steels, 667

29Cr-4Mo Ferritic Stainless Steel, 668

29-4 Ferritic Stainless Steel, 668

Composition: 0.004% C - 0.1% Mn - 0.1% Si - 0.01% P - 0.015% S - 0.1% Ni - 29.0% Cr - 4.0% Mo - 0.012% N

29%Cr-4Mo-2Ni Ferritic Stainless Steel, 669
Composition: 0.0040% C - 0.04% Mn - 0.02% Si - 0.007% P - 0.012% S - 2.17% Ni - 29.5% Cr - 4.0% Mo - 0.0146% N - 0.06% Al - 0.0011% O

Uranus 50 Duplex Stainless Steel, 669
Composition: 0.032% C - 0.62% Mn - 0.45% Si - 0.022% P - 0.021% S - 7.38% Ni - 21.08% Cr - 2.39% Mo - 1.33% Cu - 0.071% N - 0.003% B - <0.01% Ti (33% ferrite)

AL-6X Austenitic Stainless Steel, 669
Composition: 0.02% C - 1.5% Mn - 0.4% Si - 0.02% P - 0.002% S - 24.5% Ni - 20.5% Cr - 6.3% Mo

12% Cr Ferritic Stainless Steel, 670 - 671
Composition: 0.009% C - 12.77% Cr - 0.002% N - 0.15% Ti
Composition: 0.006% C - 12.66% Cr - 0.018% Ni - 0.40% Ti
Composition: 0.002% C - 13.20% Cr - 0.011% Ni - 0.42% Ti

Fe-26Cr Ferritic Stainless Steel, 672
Composition: 0.0023% C - 0.01% Mn - 0.106% Si - 0.018% P - 0.015% S - 0.072% Ni - 25.5% Cr - 0.01% Mo - 0.0083% N

18Cr-2Mo-Ti Stabilized Ferritic Stainless Steel, 672 - 673

Composition: 0.023% C - 0.33% Mn - 0.16% Si - 0.019% P - 0.012% S - 0.33% Ni - 17.15% Cr - 2.23% Mo - 0.04% Cu - 0.05% Co - 0.61% Ti

Austenitic Stainless Steels, 673 - 676
Composition: 0.069% C - 9.4% Ni - 18.6% Cr - 0.002% N
Composition: 0.045% C - 9.51% Ni - 17.22% Cr - 0.003% N
Composition: 0.028% C - 9.2% Ni - 18.5% Cr - 0.010% N
Composition: 0.013% C - 9.5% Ni - 18.5% Cr - 0.010% N
Composition: 0.067% C - 8.76% Ni - 17.67% Cr - 2.0% Mo - 0.035% N
Composition: 0.067% C - 8.80% Ni - 17.65% Cr - 2.03% Mo - 0.096% N
Composition: 0.013% C - 8.49% Ni - 17.30% Cr - 0.037% N
Composition: 0.015% C - 8.77% Ni - 17.96% Cr - 0.097% N
Composition: 0.069% C - 9.4% Ni - 18.6% Cr - 0.002% N
Composition: 0.077% C - 11.6% Ni - 18.08% Cr - 2.0% Mo - 0.097% N
Composition: 0.064% C - 8.53% Ni - 17.38% Cr - 0.124% N
Composition: 0.067% C - 8.80% Ni - 17.65% Cr - 2.03% Mo - 0.096% N
Composition: 0.068% C - 1.89% Mn - 8.67% Ni - 17.72% Cr - 0.091% N
Composition: 0.028% C - 1.64% Mn - 0.34% Si - 0.03% P - 9.78% Ni - 16.29% Cr - 2.53% Mo - 0.078% N
Composition: 0.034% C - 1.51% Mn - 0.64% Si - 0.04% P - 8.83% Ni - 18.02% Cr - 0.002% N
Composition: 0.029% C - 1.54% Mn - 0.52% Si - 0.03% P - 11.88% Ni - 18.13% Cr - 0.13% N
Composition: 0.030% C - 1.6% Mn - 0.38% Si - 0.03% P - 7.88% Ni - 18.58% Cr - 0.108% N
Composition: 0.038% C - 1.59% Mn - 0.49% Si - 0.03% P - 9.52% Ni - 20.22% Cr - 0.083% N

Austenitic Steel, 677 - 678
Composition: 0.030% C - 14.37% Ni - 17.78% Cr - 2.04% Mo - 0.024% N

Composition: 0.025% C - 9.0% Ni - 18.0% Cr
Composition: 0.028% C - 21.65% Ni - 25.29% Cr - 0.041% N
Composition: 0.026% C - 14.97% Ni - 18.02% Cr - 0.027% N
Composition: 11% Ni - 18.5% Cr

304 Stainless Steel, 678
18%Cr-15%Ni Stainless Steel, 678
347 Stainless Steel, 679 - 680

Composition: 0.07% C - 0.38% Si - 1.50% Mn - 0.031% P - 0.008% S - 11.75% Ni - 18.41% Cr - 0.81% Cb - 0.050% N₂
Composition: 0.08% C - 1.28% Mn - 0.41% Si - 0.020% P - 0.022% S - 10.72% Ni - 18.30% Cr - 0.77% Cb - 0.030% N₂

304L Stainless Steel, 681
Composition: 0.022% C - 1.04% Mn - 0.34% Si - 0.021% P - 0.018% S - 9.39% Ni - 19.31% Cr - 0.053% N₂

316L Stainless Steel, 681
Composition: 0.023% C - 1.40% Mn - 0.32% Si - 0.018% P - 0.013% S - 12.62% Ni - 18.42% Cr - 3.00% Mo - 0.020% N₂

304L Stainless Steel, 682
Composition: 0.020% C - 1.40% Mn - 0.41% Si - 0.032% P - 0.013% S - 10.30% Ni - 18.10% Cr - 0.32% Mo - 0.24% Cu - 0.039% N

304 Stainless Steel, 682 - 685
Composition: 0.038% C - 1.60% Mn - 0.45% Si - 0.021% P - 0.019% S - 9.2% Ni - 18.4% Cr - <0.03% Ti - <0.03% Cb+Ta - 0.027% Al+Ta

18%Cr-8%Ni Austenitic Stainless Steel, 685
304 Stainless Steel, 686 - 687

Composition: 0.069% C - 0.01% Si - 0.003% P - 0.009% S - 9.4% Ni - 18.6% Cr - 0.002% N

Composition: 0.063% C - 0.01% Si - 0.060% P - 0.003% S - 9.4% Ni - 17.6% Cr - 0.001% N

Composition: 0.068% C - 0.01% Si - 0.003% P - 0.033% S - 9.6% Ni - 18.6% Cr - 0.002% N

Composition: 0.022% C - 0.01% Si - 0.004% P - 0.006% S - 9.2% Ni - 18.5% Cr - 0.01% N

Composition: 0.022% C - 0.01% Si - 0.060% P - 0.006% S - 9.2% Ni - 18.2% Cr - 0.01% N

Composition: 0.005% C - 0.030% S - 9.5% Ni - 18.5% Cr
Composition: 0.078% C - 1.12% Mn - 0.41% Si - 0.025% P - 0.027% S - 8.49% Ni - 18.1% Cr - 0.21% Cu

316 Stainless Steel, 687
Composition: 0.057% C - 0.54% Si - 1.67% Mn - 0.035% P - 0.025% S - 12.77% Ni - 17.14% Cr - 2.21% Mo - 0.31% Cu

20% Cr and 12 to 46% Ni Stainless Steels, 688
316 Stainless Steel, 689

Composition: 0.057% C - 1.65% Mn - <0.07% Si - <0.025% P - 0.007% S - 12.44% Ni - 16.62% Cr - 2.32% Mo - 0.135% Cu - <0.01% Ti - <0.01% Nb

Austenitic 308 Stainless Steel, 689
Composition: 0.040% C - 1.76% Mn - 0.41% Si - 0.016% P - 0.008% S - 9.82% Ni - 20.95% Cr

Duplex 308 Stainless Steel, 689 - 690
Composition: 0.040% C - 1.76% Mn - 0.41% Si - 0.016% P - 0.008% S - 9.82% Ni - 20.95% Cr

AIISI 321 Stainless Steel, 690 - 692
Composition: 0.09% C - 1.17% Mn - 0.37% Si - 13.4% Ni - 18.1% Cr - 0.51% Ti - 0.017% N

Rolled Stainless Steel and 18Cr-10Ni Weld Metal, 692 - 693

Composition: 0.039% C - 0.69% Mn - 0.72% Si - 10.57% Ni - 18.63% Cr - <0.01% Mo, Ferrite content = 0.5%

Composition: 0.023% C - 0.70% Mn - 0.74% Si - 10.62% Ni - 19.09% Cr - <0.01% Mo, Ferrite content 1.1%

Composition: 0.016% C - 0.72% Mn - 0.80% Si - 11.09% Ni - 19.28% Cr - <0.01% Mo, Ferrite content = 0.7%

Rolled Stainless Steel and 18Cr-12Ni-2.8Mo Weld Metal, 693

Composition: 0.025% C - 0.69% Mn - 0.72% Si - 12.84% Ni - 18.44% Cr - 2.75% Mo, Ferrite content 0.3%

Rolled Stainless Steel and 18Cr-10Ni Weld Metal, 694

Rolled Stainless Steel and 18Cr-12Ni-2 to 3Mo Weld Metal, 694

Austenitic Cr-Ni-Mo Steel X 5 CrNiMo 17 13, 694

Composition: 0.042% C - 1.50% Mn - 0.45% Si - 14.34% Ni - 17.76% Cr - 4.72% Mo - 0.025% N

Alloy 800, 695 - 699

Composition: 0.019% C - 1.21% Mn - 0.49% Si - 33.5% Ni - 20.6% Cr - 0.01% Cu - 0.51% Al - 0.46% Ti - 0.027% N
Composition: 0.029% C - 0.63% Mn - 0.48% Si - 0.007% P - 0.011% S - 33.40% Ni - 21.30% Cr - 0.07% Cu - 0.41% Ti - 0.18% Al - 158 ppm N
Composition: 0.028% C - 0.56% Mn - 0.46% Si - 0.008% P - 0.004% S - 33.20% Ni - 21.50% Cr - 0.07% Cu - 0.50% Ti - 0.05% Al - 150 ppm N
Composition: 0.030% C - 0.60% Mn - 0.39% Si - 0.008% P - 0.005% S - 33.80% Ni - 21.75% Cr - 0.07% Cu - 0.55% Ti - 0.19% Al - 154 ppm N
Composition: 0.029% C - 0.59% Mn - 0.45% Si - 0.008% P - 0.012% S - 33.25% Ni - 21.75% Cr - 0.07% Cu - 0.50% Ti - 0.28% Al - 150 ppm N
Composition: 0.030% C - 0.61% Mn - 0.49% Si - 0.007% P - 0.005% S - 33.25% Ni - 21.85% Cr - 0.07% Cu - 0.20% Ti - 0.20% Al - 150 ppm N
Composition: 0.029% C - 0.61% Mn - 0.47% Si - 0.007% P - 0.005% S - 33.45% Ni - 21.40% Cr - 0.06% Cu - 0.31% Ti - 0.19% Al - 151 ppm N

Carpenter 20Cb-3 Stainless Steel Strip, 699 - 700

Composition: 0.036% C - 0.23% Mn - 0.38% Si - 0.020% P - 0.004% S - 33.70% Ni - 19.76% Cr - 2.25% Mo - 3.14% Cu - 0.79% Cb

Duplex Stainless Steels, 700

Composition: 0.030% C - 1.29% Mn - 0.78% Si - 0.022% P - 0.014% S - 5.14% Ni - 24.75% Cr - 1.80% Mo - 0.071% N
Composition: 0.020% C - 1.19% Mn - 0.31% Si - 0.027% P - 0.009% S - 5.52% Ni - 21.90% Cr - 2.97% Mo - 0.151% N

IRONS, 701 - 766

Gray Cast Irons, 703 - 704

Composition: 3.68% C - 2.92% GC* - 0.71% GC** - 0.53% Mn - 1.75% Si - 0.56% P - 0.10% S
Composition: 3.68% C - 2.56% GC* 1.12% CC** - 0.37% Mn - 1.20% Si - 0.28% P - 0.11% S - 2.03% Ni
Composition: Fe - 1.17% C - 0.75% Mn - 2.0% Si - 0.30% Mo - 0.60% Cu

Malleable Irons, 704 - 705

Composition: Fe - 2.60% C - 0.42% Mn - 1.43% Si - 0.017% Mo - 0.002% B
Composition: Fe - 2.58% C - 0.42% Mn - 1.37% Si - 0.15% Mo - 0.001% B
Composition: Fe - 2.58% C - 0.40% Mn - 1.44% Si - 0.32% Mo - 0.001% B
Composition: Fe - 2.57% C - 0.48% Mn - 1.44% Si - 0.27% P - 0.11% S - 0.05% Cr - 0.008% Al - 0.0028% B

White Irons, 706

Composition: 2.75% C - 0.13% Mn - 1.21% Si - 0.008% S
Composition: 2.71% C - 0.44% Mn - 1.22% Si - 0.007% S
Composition: 2.70% C - 0.72% Mn - 1.24% Si - 0.007% S
Composition: 2.73% C - 0.03% Mn - 1.25% Si - 0.015% S
Composition: 2.73% C - 0.02% Mn - 1.23% Si - 0.064% S
Composition: 2.83% C - 0.03% Mn - 1.23% Si - 0.123% S
Composition: 2.71% C - 0.02% Mn - 1.20% Si - 0.275% S

White Cast Irons, 707 - 753

Composition: 2.93% C - 0.78% Mn - 0.60% Si - 17.4% Cr - 0.04% Mo
Composition: 2.90% C - 0.75% Mn - 0.56% Si - 17.6% Cr - 0.48% Mo
Composition: 2.93% C - 0.76% Mn - 0.59% Si - 17.5% Cr - 1.59% Mo
Composition: 2.91% C - 0.76% Mn - 0.59% Si - 17.5% Cr - 2.89% Mo
Composition: 2.89% C - 1.56% Mn - 0.60% Si - 17.4% Cr - 1.49% Mo

Composition: 2.89% C - 3.08% Mn - 0.61% Si - 17.0% Cr - 1.49% Mo

Composition: 2.94% C - 0.78% Mn - 0.58% Si - 1.16% Ni - 17.6% Cr - 0.54% Mo

Composition: 2.93% C - 0.76% Mn - 0.56% Si - 2.07% Ni - 17.5% Cr - 0.45% Mo

Composition: 2.90% C - 0.76% Mn - 0.55% Si - 0.61% Ni - 17.4% Cr - 1.43% Mo

Composition: 2.93% C - 0.76% Mn - 0.55% Si - 1.10% Ni - 17.4% Cr - 2.43% Mo

Composition: 2.91% C - 0.77% Mn - 0.58% Si - 17.4% Cr - 0.56% Mo - 1.02% Cu

Composition: 2.93% C - 0.77% Mn - 0.55% Si - 17.5% Cr - 0.56% Mo - 1.95% Cu

Composition: 2.96% C - 0.79% Mn - 0.52% Si - 17.5% Cr - 1.55% Mo - 0.98% Cu

Composition: 2.88% C - 0.78% Mn - 0.60% Si - 16.9% Cr - 1.52% Mo - 1.74% Cu

Composition: 2.96% C - 0.79% Mn - 0.93% Si - 17.5% Cr - 1.55% Mo - 0.98% Cu

Composition: Fe - 2.19% C - 11.65% Cr - 0.02% Mo

Composition: Fe - 2.13% C - 11.30% Cr - 1.41% Mo

Composition: Fe - 1.95% C - 10.8% Cr - 3.80% Mo

Composition: Fe - 2.65% C - 12.65% Cr - 0.02% Mo

Composition: Fe - 2.55% C - 12.40% Cr - 1.25% Mo

Composition: Fe - 2.41% C - 12.15% Cr - 2.45% Mo

Composition: Fe - 3.51% C - 12.20% Cr - 0.02% Mo

Composition: Fe - 3.39% C - 11.95% Cr - 1.36% Mo

Composition: Fe - 3.25% C - 11.80% Cr - 2.60% Mo

Composition: Fe - 2.08% C - 15.85% Cr - trace level Mo

Composition: Fe - 2.05% C - 15.60% Cr - 0.81% Mo

Composition: Fe - 1.96% C - 15.40% Cr - 2.20% Mo

Composition: Fe - 2.67% C - 14.95% Cr - trace level Mo

Composition: Fe - 2.67% C - 15.20% Cr - 1.09% Mo

Composition: Fe - 2.60% C - 15.20% Cr - 1.95% Mo

Composition: Fe - 3.58% C - 14.45% Cr - trace level Mo

Composition: Fe - 3.58% C - 14.65% Cr - 0.52% Mo

Composition: Fe - 3.56% C - 14.60% Cr - 1.47% Mo

Composition: Fe - 4.10% C - 15.10% Cr - trace level Mo

Composition: Fe - 3.96% C - 11.80% Cr - 1.45% Mo

Composition: Fe - 3.81% C - 14.75% Cr - 2.50% Mo

Composition: Fe - 4.13% C - 18.22% Cr - 0.05% Mo

Composition: Fe - 4.08% C - 18.00% Cr - 1.14% Mo

Composition: Fe - 3.96% C - 17.55% Cr - 2.53% Mo

Composition: Fe - 2.08% C - 20.55% Cr - <0.01% Mo

Composition: Fe - 2.04% C - 20.55% Cr - 0.61% Mo

Composition: Fe - 1.98% C - 20.25% Cr - 2.14% Mo

Composition: Fe - 2.67% C - 20.75% Cr - <0.01% Mo

Composition: Fe - 2.54% C - 20.22% Cr - 1.52% Mo

Composition: Fe - 2.45% C - 19.82% Cr - 2.94% Mo

Composition: Fe - 3.62% C - 20.35% Cr - <0.01% Mo

Composition: Fe - 3.51% C - 20.10% Cr - 1.37% Mo

Composition: Fe - 3.40% C - 19.85% Cr - 3.40% Mo

Composition: Fe - 2.95% C - 25.82% Cr - 0.02% Mo

Composition: Fe - 2.87% C - 25.50% Cr - 1.22% Mo

Composition: Fe - 2.72% C - 25.15% Cr - 2.52% Mo

Composition: Fe - 3.70% C - 25.32% Cr - 0.02% Mo

Composition: Fe - 3.66% C - 24.95% Cr - 1.53% Mo

Composition: Fe - 3.52% C - 24.65% Cr - 2.67% Mo

Composition: Fe - 4.31% C - 24.80% Cr - 0.02% Mo

Composition: Fe - 4.10% C - 23.67% Cr - 1.32% Mo

Composition: Fe - 3.94% C - 23.45% Cr - 2.94% Mo

Ductile Irons, 754 - 766

Ni-Mo alloyed ductile iron

Composition: Fe - 3.37% C - 2.62% Si - 0.31% Mn

Composition: Fe - 3.33% C - 0.32% Mn - 2.69% Si - 0.25% Mo

Composition: Fe - 3.32% C - 0.31% Mn - 2.58% Si - 0.49% Mo

Composition: Fe - 3.37% C - 0.31% Mn - 2.62% Si - 0.022% P - 0.009% S

Composition: Fe - 3.34% C - 0.32% Mn - 2.65% Si - 0.022% P - 0.008% S - 0.20% Mo

Composition: Fe - 3.33% C - 0.32% Mn - 2.69% Si - 0.022% P - 0.008% S - 0.25%

Composition: Fe - 3.32% C - 0.31% Mn - 2.58% Si - 0.024% P - 0.008% S - 0.49% Mo

Composition: Fe - 3.33% C - 0.31% Mn - 2.57% Si - 0.024% P - 0.008% S - 0.75% Mo

Composition: Fe - 3.47% C - 0.33% Mn - 2.47% Si - 0.022% P - 0.011% S - 0.05% Ni - 0.50% Mo - 0.044% Mg

Composition: Fe - 3.39% C - 0.32% Mn - 2.45% Si - 0.023% P - 0.011% S - 0.61% Ni - 0.50% Mo - 0.041% Mg

Composition: Fe - 3.36% C - 0.32% Mn - 2.46% Si - 0.023% P - 0.011% S - 1.17% Ni - 0.49% Mo - 0.044% Mg

Composition: Fe - 3.33% C - 0.32% Mn - 2.40% Si - 0.024% P - 0.008% S - 2.37% Ni - 0.50% Mo - 0.038% Mg

Composition: Fe - 3.24% C - 0.31% Mn - 2.36% Si - 0.024% P - 0.008% S - 4.82% Ni - 0.49% Mo - 0.034% Mg

Composition: Fe - 3.47% C - 0.33% Mn - 2.47% Si - 0.05% Ni - 0.50% Mo

Composition: Fe - 3.39% C - 0.32% Mn - 2.45% Si - 0.61% Ni - 0.50% Mo

Composition: Fe - 3.62% C - 0.32% Mn - 2.46% Si - 1.17% Ni - 0.49% Mo

Composition: Fe - 3.59% C - 0.29% Mn - 2.71% Si - 0.024% P - 0.007% S - 0.04% Cr - 0.03% Ni - 0.02% Mo - 0.024% Mg

Composition: Fe - 3.60% C - 0.37% Mn - 3.68% Si - 0.022% P - 0.007% S - 0.04% Cr - 0.03% Ni - 0.03% Mo - 0.027% Mg

Composition: Fe - 3.61% C - 0.20% Mn - 2.83% Si - 0.022% P - 0.009% S - 0.04% Cr - 0.04% Ni - 0.02% Mo - 0.025% Mg

Composition: Fe - 3.54% C - 0.31% Mn - 3.45% Si - 0.024% P - 0.005% S - 0.04% Cr - 0.04% Ni - 0.02% Mo - 0.023% Mg

Composition: Fe - 3.87% C - 0.44% Mn - 2.32% Si - 0.040% P - 0.011% S - 0.02% Cr - 0.01% Mo - 0.094% Mg

Composition: Fe - 3.79% C - 0.42% Mn - 2.75% Si - 0.039% P - 0.010% S - 0.02% Cr - 0.04% Mo - 0.050% Mg

Composition: Fe - 3.86% C - 0.43% Mn - 2.31% Si - 0.039% P - 0.012% S - 0.02% Cr - 0.37% Mo - 0.042% Mg

Composition: Fe - 3.77% C - 0.42% Mn - 2.74% Si - 0.038% P - 0.011% S - 0.02% Cr - 0.43% Mo - 0.047% Mg

Composition: Fe - 3.60% C - 0.38% Mn - 2.61% Si - 0.005% S - 0.02% Cr - 0.01% Mo - 0.01% Cu - 0.025% Al - 0.041% Mg - 0.0027% B

Composition: Fe - 3.62% C - 0.37% Mn - 2.70% Si - 0.005% S - 0.02% Cr - 0.08% Mo - 0.08% Cu - 0.021% Al - 0.043% Mg - 0.0023% B

Composition: Fe - 3.61% C - 0.35% Mn - 2.75% Si - 0.003% S - 0.07% Cr - 0.24% Mo - 0.07% Cu - 0.020% Al - 0.040% Mg - 0.0024% B

Composition: Fe - 3.58% C - 0.32% Mn - 2.69% Si - 0.004% S - 0.02% Cr - 0.46% Mo - 0.06% Cu - 0.017% Al - 0.040% Mg - 0.0008% B