US Drop Forge Presents

SPECIFIC ELEMENT DATAS

This information is for general training purposes only and is not Intended for Design Application

For more information call
1-856-467-0500 or visit us
At WWW.USDROPFORGE.COM

BORON (B) ATOMIC NUMBER 5

- Increases depth of hardness
- Intensifies effect of other major elements
- Lowers grain coarsening temperatures

CARBON (C) ATOMIC NUMBER 6

- Increases hardness
- Increases depth of hardening
- Increases tensile strength
- Increases abrasion resistance
- Increases magnetic retentively
- Reduces ductility and toughness
- Reduces thermal conductivity

Nitrogen (N_2) ATOMIC NUMBER 7

- Improves machinability
- Induces work hardening and embrittlement
- Increases stiffness
- Induces strain aging

ALUMINUM (Al) ATOMIC NUMBER 13

- Deoxidizes
- Raises hardness slightly
- Increases strength slightly
- Increases density
- Retards grain growth
- Retards strain aging
- Aids in nitriding
- Promotes graphitization

SILICON (Si) ATOMIC NUMBER 14

- Raises hardness slightly
- Deoxidizes
- Raises yield strength
- Increases tensile strength
- Raises hardening or quenching temperatures
- Favors grain growth
- Increases electrical resistance
- Decreases machinability
- Increases resistance to high temperature scaling
- Promotes graphitization

PHOSPHORUS (P) ATOMIC NUMBER 15

- Strengthens low carbon steel
- Increases depth of hardening
- Increases atmospheric corrosion resistance
- Improves machinability
- Increases hardness
- Increases yield strength
- Increases tensile strength
- Imparts brittleness
- Reduces ductility

SULPHUR (S) ATOMIC NUMBER 16

- Improves machinability
- Decreases ductility
- Decreases toughness
- Decreases weldability
- Decreases corrosion resistance slightly
- Imparts brittleness at red heat when insufficient Manganese is present

TITANIUM (Ti) ATOMIC NUMBER 22

- Deoxidizes and denitrifies
- Retards grain growth
- Retards age hardening
- Restrains embrittlement
- Increases tensile strength
- Reduces ductility and toughness
- Increases creep resistances
- Increases hardenability

VANADIUM (V) ATOMIC NUMBER 23

- Improves hardness retention at elevated temperatures
- Increases depth of hardening
- Increases tensile strength
- Intensifies effect of other major alloys
- Increases resistance to shock and alternating stresses
- Retards grain growth

CHROMIUM (Cr) ATOMIC NUMBER 24

- Increases hardness
- Increases toughness
- Increases depth of hardening
- Increases resistance to corrosion and abrasion
- Increases tensile strength at high temperatures slightly
- Retards grain growth
- Increases resistance to oxidation at high temperatures

MANGANESE (Mn) ATOMIC NUMBER 25

- Increases hardness
- Increases toughness
- Deoxidizes
- Increases depth of hardening
- Increases tensile strength
- Increases abrasion resistance
- Counteracts hot-shortness by combining Sulphur
- Reduces ductility slightly
- Reduces electrical conductivity
- Reduces thermal conductivity

COBALT (Co) ATOMIC NUMBER 27

- Increases hardness
- Increases tensile strength
- Increases density
- Permits higher heat-treating temperatures
- Increases magnetic retentivity
- Decreases hardenability
- Improves hot hardness

NICKEL (Ni) ATOMIC NUMBER 28

- Increases toughness
- Increases tensile strength
- Increases hardness
- Lower transformation temperatures
- Increases corrosion resistance
- Austenite stabilizer

COPPER (Cu) ATOMIC NUMBER 29

- Increases resistance to atmosphere corrosion
- Increases tensile and yield strength
- Decreases ductility slightly
- Increases electrical resistance
- Increases hardenability
- Induces precipitation hardening
- Decreases hot workability

ZIRCONIUM (Zr) ATOMIC NUMBER 40

- Deoxidizes
- Increases depth of hardening
- Counteracts hot-shortness by combining with sulphur
- Retards age hardening

NIOBIUM (Nb) ATOMIC NUMBER 41

- Inhibits intergranular corrosion in certain stainless steels
- Reduces air-hardening tendencies in corrosion resistant chromium steels
- Improves resistance to creep and oxidation at elevated temperatures.

MOLYBDENUM (Mo) ATOMIC NUMBER 42

- Increases hardness
- Increases depth of hardening
- Increases tensile strength
- Increases toughness
- Increases creep resistance at elevated temperatures
- Increases resistance to corrosion and abrasion
- Intensifies effect of other major alloys
- Retards grain growth
- Retards graphitization
- Increases resistance to tampering

TUNGSTEN (W) ATOMIC NUMBER 74

- Increases hardness
- Increases tensile strength
- Increases toughness
- Increases deep hardening at high heat-treating temperatures
- Increases magnetic retentively in high carbon steel
- Increases resistance to tempering
- Increases abrasion resistance by formation of carbides