

Title (en)
STEEL FOR HIGH-STRENGTH SPRING AND HEAT-TREATED STEEL WIRE FOR HIGH-STRENGTH SPRING

Title (de)
STAHL FÜR HOCHFESTE FEDER UND WÄRMEBEHANDELTEN STAHL DRAHT FÜR HOCHFESTE FEDER

Title (fr)
ACIER POUR RESSORTS À HAUTE RÉSISTANCE ET FIL D'ACIER TRAITÉ THERMIQUEMENT POUR RESSORTS À HAUTE RÉSISTANCE

Publication
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Application
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Abstract (en)
[origin: EP2058411A1] The present invention provides a high strength heat treated steel wire for spring having a tensile strength of 2000 MPa or more which is coiled in the cold state and can achieve both sufficient atmospheric strength and coilability and spring steel used for that steel wire, that is, a high strength heat treated steel wire for a spring characterized by comprising, by mass%, C: 0.5 to 0.9%, Si: 1.0 to 3.0%, Mn: 0.1 to 1.5%, Cr: 1.0 to 2.5%, V: over 0.15 to 1.0%, and Al: 0.005% or less, controlling N to 0.007% or less, further containing one or two of Nb: 0.001 to less than 0.01% and Ti: 0.001 to less 0.005%, and having a tensile strength of 2000 MPa or more, having cementite-based spheroidal carbides and alloy-based spheroidal carbides in a microscopic visual field satisfying an area percentage of carbides with a circle equivalent diameter of 0.2 μm or more of 7% or less and a density of carbides with a circle equivalent diameter of 1 grain/μm² or less, having a prior austenite grain size number of #10 or more, and having retained austenite of 15 mass% or less.

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Citation (search report)

- [X] WO 2006059784 A1 20060608 - NIPPON STEEL CORP [JP], et al
- [X] US 2003201036 A1 20031030 - HASHIMURA MASAYUKI [JP], et al
- [X] US 6338763 B1 20020115 - HASHIMURA MASAYUKI [JP], et al
- [A] EP 0943697 A1 19990922 - NIPPON STEEL CORP [JP]
- [A] EP 1361289 A1 20031112 - NIPPON STEEL CORP [JP], et al
- [A] US 5897717 A 19990427 - HASHIMURA MASAYUKI [JP], et al
- [A] JP 2001288539 A 20011019 - NIPPON STEEL CORP
- [A] EP 1712653 A1 20061018 - KOBE STEEL LTD [JP]
- [A] US 5183634 A 19930202 - ABE TSUYOSHI [JP], et al
- [A] EP 1347072 A1 20030924 - KOBE STEEL LTD [JP], et al & EP 1820869 A1 20070822 - NIPPON STEEL CORP [JP]
- See references of WO 2008056428A1

Cited by
EP2453033A4; CN104745953A; EP2746420A4; CN108350537A; EP3346020A4; US9523404B2; US10844920B2; WO2022064249A1

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