

Title (en)  
COLD ROLLED STEEL PLATE OF EXCELLENT MOLDABILITY, PANEL SHAPE CHARACTERISTICS AND DENTING RESISTANCE, MOLTEN ZINC PLATED STEEL PLATE, AND METHOD OF MANUFACTURING THESE STEEL PLATES

Title (de)  
KALTGEWALZTE STAHLPLATTE EXZELLENTER FORMBARKEIT, FLACHFÖRMIGEN EIGENSCHAFTEN UND EINDELLWIDERSTAND, FEUERVERZINKTE STAHLPLATTE UND VERFAHREN ZUR DEREN HERSTELLUNG

Title (fr)  
PLAQUE D'ACIER LAMINEE A FROID POSSEDANT D'EXCELLENTE CARACTERISTIQUES D'APTITUDE AU MOULAGE ET DE FORMABILITE EN PANNEAUX, UNE BONNE RESISTANCE A LA CONSTRICTION, PLAQUE D'ACIER A PLACAGE EN ZINC MOULE ET PROCEDE DE FABRICATION DE CES PLAQUES

Publication  
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Application  
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Priority  
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Abstract (en)  
[origin: EP1002884A1] Disclosed is a cold-rolled steel sheet excellent in formability, panel shapeability and dent-resistance, comprising 0.005 to 0.015% by weight of C, 0.01 to 0.2% by weight of Si, 0.2 to 1.5% by weight of Mn, 0.01 to 0.07% by weight of P, 0.006 to 0.015% by weight of S, 0.01 to 0.08% by weight of sol. Al, not higher than 0.004% by weight of N (N  $\leq$  0.004%), not higher than 0.003% by weight of O (O  $\leq$  0.003%), 0.04 to 0.23% by weight of Nb,  $1.0 \leq (\text{Nb}\% \times 12)/(\text{C}\% \times 93) \leq 3.0$ , and a balance of Fe and unavoidable impurities, said cold-rolled steel sheet meeting the relationship given below:  $\epsilon < \epsilon_0$  where  $0.002 < \epsilon \leq 0.096$ ,  $\epsilon$  represents a true strain,  $\sigma_0.2$  represents a 0.2% proof stress, and  $\sigma$  represents a true stress relative to  $\epsilon$ .

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Citation (search report)  
• [X] US 3876390 A 19750408 - ELIAS JAMES A, et al  
• [A] EP 0816524 A1 19980107 - NIPPON KOKAN KK [JP]  
• [A] US 5690755 A 19971125 - YOSHINAGA NAOKI [JP], et al  
• [A] EP 0747495 A1 19961211 - LORRAINE LAMINAGE [FR]  
• [X] US 4750952 A 19880614 - SATO SUSUMU [JP], et al  
• [X] US 4589931 A 19860520 - YASUDA AKIRA [JP], et al  
• [A] US 4504326 A 19850312 - TOKUNAGA YOSHIKUNI [JP], et al  
• [A] US 4586966 A 19860506 - OKAMOTO ATSUKI [JP], et al  
• [A] EP 0444967 A2 19910904 - KOBE STEEL LTD [JP]  
• [A] EP 0421087 A2 19910410 - KOBE STEEL LTD [JP]  
• [A] US 4576656 A 19860318 - SATOH SUSUMU [JP], et al  
• [A] PATENT ABSTRACTS OF JAPAN vol. 1996, no. 07 31 July 1996 (1996-07-31)  
• [AX] PATENT ABSTRACTS OF JAPAN vol. 010, no. 230 (C - 365) 9 August 1986 (1986-08-09)  
• See references of WO 9955927A1

Cited by  
EP1209244A4; EP4079903A4; EP1498507A1; EP2312009A1; EP2312010A1; EP1291448A4; KR20190055150A; JP2019532172A; US7067023B2; US7101445B2; US11453923B2

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