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Translation

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Recommendations for the use of rail steel grades

Recommandations pour l'emploi de différentes nuances d'aciers à rails

Empfehlungen für die Verwendung unterschiedlicher Schienenstahlsorten



UNION INTERNATIONALE DES CHEMINS DE FER
INTERNATIONALER EISENBAHNVERBAND
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Summary

The present edition of *UIC Leaflet 721* only refers to steel grades specified in European Standard *EN 13674-1*.

The manufacture and acceptance of rails are the subject of *UIC Leaflet 860*.

A particular point to note is that the names of the steel grades have been altered in European Standard *EN 13674-1*: the reference value used is no longer the tensile strength but the minimum hardness of the running surface.

The aim of *UIC Leaflet 721* is to provide assistance in the selection of rail steel grades so that the most suitable rail is chosen for the specific railway operating conditions in each case.

1 - Introduction

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The aim of *UIC Leaflet 721* is to provide assistance in the selection of rail steel grades so that the most suitable rail is chosen for the specific railway operating conditions in each case.

UIC Leaflet 721 was first published in 1980 and was intended to give recommendations for the use of rails made from hard and extra-hard steel grades.

At the time, steel grades with a minimum tensile strength of 880 N/mm^2 were considered hard and those with a minimum tensile strength of $1\,080 \text{ N/mm}^2$ were considered extra hard.

Increases in railway traffic, heavier axleloads, higher speeds and the introduction of new generations of rolling stock have increased the loadings on rails (in curves especially).

Today, in light of developments in rail manufacture and changing prices for rail steels, most railways now opt for steel grades 260 and, to a very limited degree, 260 Mn (steel grades 900 A and 900 B according to *UIC Leaflet 860*) as standard equipment for their track.

Rails of steel grade 260 and 260 Mn are not exempt from the problems that arise in curves with small and very small radii and/or heavy loadings.

Compared to rails made from inferior steel grades, these lateral and vertical wear problems arise later or in another form (corrugation, head-checking).

A key parameter in the selection of rail steel grades is the procurement and maintenance cost of the rails. It is important to consider whether the higher capital costs of 350 HT, 350 LHT and 320 Cr grades are offset by longer service life and/or lower maintenance outlay.

In small and very small radius curves and/or subject to high loadings, many railways achieve a longer (and therefore more cost-effective) service life by laying rails made from steel grades 350 HT, 350 LHT or 320 Cr.

The corresponding hardness of these rails is obtained either through heat treatment or by the addition of alloys like chromium, with or without structural change.

Timely execution of maintenance measures (grinding and above all lubrication of the rails) has a decisive impact on the service life of rails in curves.

Often, a combination of these two measures (choice of rail steel grade and maintenance) is necessary in order to achieve a cost-effective service life for rails.