

RAILWAY TRANSPORT OF LONG AND LARGE GOODS IN CHINA

CHANGDA
HUOWU

中国铁路 长大货物运输

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要 录 内

中国铁路长大货物运输

Railway Transport of Long and Large Goods in China

张进德 田葆桢 李代英 王式宏 主编

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内 容 提 要

本书介绍了 50 年来中国铁路的长大货物运输和装备,资料截止时间为 2000 年底。全书共分 4 章:第 1 章简述了铁路长大货物的概念和运输组织;第 2 章介绍了国产、进出口长大货物车的结构,技术性能特点,主要技术参数,试验、过桥情况和使用维护说明等;第 3 章简述了铁路线路桥梁隧道;第 4 章介绍了德国、前苏联和美国的铁路长大货物装备及运输。附录部分有《铁路超限货物运输规则》(摘录)、长大货物车概要表和长大货物运输大事记。全书为中英文对照,插有长大货物车彩色照片 70 余幅,各种图 100 余张。本书可供长大货物车试验研究、设计制造、运用检修人员及电力、冶金、石油化工、外贸及军事运输专业人员和管理人员业务参考,也可供有关院校、研究机构的人员参考学习之用。

ABSTRACT

The long and large goods transport on China Railway as well as the equipment in the recent 50 years is described in this book. Four chapters are divided in the book, whose contents are up to the end of 2000. In Chapter 1, the concept of railway long and large goods and the transport organization are briefly described. In Chapter 2, the structures, technical performance characteristics, main technical parameters, test, bridge passing conditions, operation and maintenance directions of national, imported and exported heavy duty freight cars are described. In Chapter 3, the railway bridges and tunnels are briefly described. In Chapter 4, the railway transport and equipment of long and large goods in Germany, the former Soviet Union and U.S.A. are described. The Appendix includes *Railway Transport Regulations for Out-of-Gauge Goods* (extracts), Outline Table of Heavy Duty Freight Cars and Chronicle of Events in Transport and Equipment of Long and Large Goods. It is a Chinese-English book, which have more than 70 color pictures of heavy duty freight cars and more than 100 drawings. This book can be a reference for staff in test & research, design & manufacture, operation & repair of heavy duty freight cars, as well as special staff and management staff in electricity, metallurgy, petrochemistry, foreign trade and military transport. It is also a reference for staff in relevant colleges and research institutes.

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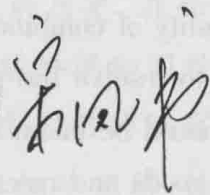
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序

“中国铁路长大货物运输”一书记载了新中国成立以来长大货物运输成长、发展的历史。经过 50 年的历程,中国铁路几代科技工作者依靠自己的聪明智慧,自力更生,奋发图强,积极进取,推动了中国铁路长大货物运输的发展,取得了辉煌的业绩。特别是中国铁路长大货物运输装备,从无到有,由小到大,品种、数量不断增加。建国初期仅有几辆小吨位凹底平车,今天,已经拥有 70 t, 90 t, 110 t, 120 t, 150 t, 180 t, 210 t, 230 t, 250 t, 260 t, 280 t, 300 t, 330 t, 380 t 用于不同用途需要的载重系列,车辆品种有凹底平车、长大平车、落下孔车、双联平车和钳夹车等五大类,全路已配备有 40 余种 440 余辆品类较为齐全的长大货物运输车辆,可分别运输超宽度、超高度、超长度等各类不同的大型货物。与此同时,建立了专门经营铁路大型超限货物运输的中铁特种货物运输中心,制订了一整套完整有效的长大货物运输规章制度和指挥系统,组织改造了 56 辆前期制造的旧杂型车辆,收到了事半功倍的良好效果。中国铁路长大货物运输已成为国家重点项目、工程大型关键设备运输的基础保证。

在国家“十五计划”实施期间,国民经济的发展对铁路将提出更高、更新的要求,中国长大货物运输工作者应开拓设计思路,采用新技术、新材料、新工艺,进一步提高我国长大货物运输装备的技术水平,进一步提高长大货物运输效率,积极探索长大货物运输铁路与公路联运的可行性,实现“门对门”运输。为进一步完善我国长大货物装备的品种系列,解决好长大车辆运用频率低的问题,应考虑发展组合式长大货物车辆,实现灵活、方便运输长大货物,满足国民经济发展的需要。祝愿我国铁路长大货物运输发展更加辉煌。

铁道部运输局



2001 年 5 月 16 日

FORWORD

The book, *Railway Transport of Loang and Large Goods in China* records the history of the growth and development of long and large goods transport since the foundation of P.R.C.. In the course of 50 years, the China railway technical professionals of several generations, relying on their wisdom, self-dependence and out-and-coming spirits, have promoted the development of long and large goods transport and have made outstanding achievements. Especially, the varieties and quantities of the China railway long and large goods transport equipment have been increased continuously. At the beginning of the foundation of P.R.C., there are only some depressed center flat cars with light duty. At present a series of heavy duty wagons (70 t, 90 t, 110 t, 120 t, 150 t, 180 t, 210 t, 230 t, 250 t, 260 t, 280 t, 300 t, 330 t and 370 t) are manufactured, including depressed center flat car, heavy duty flat car, well car, twinned flat car and schnable car. 440 heavy duty wagons of 50 kinds are equipped to transport over-width, over-height and over-length goods. At the same time, the Ministry of Railway established Zhong Tie Special Freight Transport Center to manage the transport of out-of-gauge goods, and the Center set up complete and effective regulations and command system, organized the alteration of 56 old sundry wagons, and got the twice result with the half effort. Long and large goods transport in China become the national important project and insure the transport of key large-sized equipments.

During the period of national tenth-five plan, with the development of national economy, China Railway will face newer and higher requirements. The personnel engaged in the long and large goods transport career should expand their designing conception, adopt new technology, material and workmanship to improve the technical level of long and large goods transport equipment and advance the transport efficiency. Meanwhile, they should explore the feasibility of combined transport with the highroad to realize the "door to door" transport. In order to resolve the problem of low use frequency, developing the combinatorial heavy duty car should be taken into consideration to realise the flexible and convenient transport of big-sized goods and meet the requirements of national economy development. Wish a success to the development of long and large goods transport in China.

transport Bureau of China Railway Ministry

Song Fengshu

May 16, 2001

前言

运输超限重型货物,如变压器、发电机、轧机牌坊、反应器、高压锅炉等,是一项关系到国家重点建设的艰巨任务。随着我国现代化工业的发展,特别是电力、钢铁、化学工业的发展,中国铁路承担着日益繁忙的特种货物的运输。铁路长大货物车作为运输大型设备的载体,经过近 50 年的发展,以其技术含量高、制造难度大、运输货物种类多,体现了我国长大货物运输装备水平日趋向国际水平接轨。

长大货物运输装备的发展,促进了我国重点建设的发展。我国铁路长大货物运输通过实践、试验、研究,建立了一套完整的规章和有效的运输指挥系统,创建了运输大型设备的行之有效的办法。我国铁路长大货物运输,在完成“七五”、“八五”、“九五”规划重点项目的设备运输任务中,取得了丰硕的成果。同时,积累了经验,提高了技术,掌握了规律,培养了队伍,成为今后三峡电站等国家重点项目大型设备运输的基础。

我国铁路长大货物运输有着光辉灿烂的历史。根据我国长大货物运输装备 50 年的发展历史,我们编写了第一部反映中国铁路长大货物运输的专业性图书——《中国铁路长大货物运输》。全书共分 4 章,第 1 章简述了铁路长大货物的概念和运输组织,由李代英主笔编写;第 2 章详细介绍了 50 年来国产、进出口长大货物车和 20 世纪 90 年代中期进行改造后恢复使用性能的旧型车辆,由田葆栓、邢澍、王式宏主笔编写;第 3 章简述了铁路线路限界、隧道情况,由涂光钧、傅锋主笔编写;第 4 章介绍了德国、前苏联、美国长大货物运输,由田葆栓、邢澍主笔编写;附录 1 摘录了《铁路超限货物运输规则》;附录 2 提供了长大货物车概要表,为了检索方便,分别按时间、载重、类别排序;附录 3 为长大货物运输大事记,记录了我国大件运输的历史。附录部分由王式宏、田葆栓摘录编写。全书英文分别由田葆栓、韩巍、邢澍、郑明达、李业进翻译。

本书记载了建国 50 年来我国铁路长大货物运输成长、发展的历史,在介绍 50 余种长大货车车型的同时,介绍了长大货物运输的有关规章、线路桥梁和国外铁路长大货物运输情况,对我国长大货物运输有重要的参考价值。在本书的编写过程中,得到了铁道部运输局装备部、中铁特种货物运输中心、四方车辆研究所、铁道部科学研究院、齐齐哈尔铁路车辆(集团)有限责任公司、哈尔滨车辆厂、株洲车辆厂、北京二七车辆厂、哈尔滨铁路局绥化车辆段、《铁道车辆》编辑部等单位的关心和支持,在此表示衷心的感谢。

编者

2000.11.7

PREFACE

The transport of out-of-gauge heavy goods, such as transformer, generator, rolling mill arch, reactor, high pressure boiler, is an arduous task related with the key construction in the state. With the development of modern industry in our country, especially the development in electricity, steel and chemical industry, China Railway is undertaking the special goods transport which becomes busier and busier. After 50 years development, as the carrier of large equipment on transport, the level of long and large goods transport equipment is reflected to keep in step with the international level day by day with the high technical contents, large manufacture difficulty, many kinds of goods transported.

The development of long and large goods transport equipment has promoted the development of key construction in our country. By practice, test and research, a set of complete regulations and effective railway transport command system in China have been set up for railway transport of long and large goods in our country, and the effective method to transport large equipment has been created. During the equipment transport in key project of the seventh, eighth and ninth five-year-plan, great success has been obtained in railway transport of long and large goods. In the mean time, the experiences have been accumulated, the technology has been improved, the regulations have been mastered, and the staff have been trained. They have become the basis of transport of large equipment in such key state projects as Sanxia Power Station.

The railway transport of long and large goods in China has a glorious history. On the basis of the development history of long and large goods transport equipment in the 50 years in our country, we have compiled a special reference book, *Railway Transport of Long and large Goods in China*, which is the first one to reflect railway transport of long and large goods in China. Four chapters are divided in the book. In Chapter 1, the concept of long and large goods and transport organization are briefly described, which is compiled by Li Daiying. In Chapter 2, the national, imported and exported heavy duty freight cars in the 50 years and the old type cars which were reformed to recover the functions in the middle of 1990s are described in detail, which is compiled by Tian Baoshuan, Xing Shu and Wang Shihong. In Chapter 3, the railway gauge and tunnels are briefly described, which is compiled by Tu Guangjun and Fu Feng. In Chapter 4, the transport of long and large goods in Germany, the former Soviet Union and U.S.A. are described, which is compiled by Tian Baoshuan and Xing Shu. The Appendix 1 extracts *Rules on Transport of Out-or-Gauge Goods on Railway*. The Appendix 2 provides the Outline Table of Heavy Duty Freight Cars, whose sequence is arranged by time, load and category respectively for convenience of searching. The Appendix 3 is the chronicle of events in transport of long and large goods, which records the history of transport of long and large goods. The appendixes are compiled and extracted by Wang Shihong and Tian Baoshuan. The English version of the whole book is translated by Tian Baoshuan and Han Wei respectively. The book is edited by the Editorial Department of Rolling Stock.

The book records the growing and developing history of railway transport of long and large goods in China since P.R.C. was founded. About 50 types of long and large freight cars are introduced, at the same time, the regulations about long and large goods transport, lines and bridges, and transport of long and large goods by railway abroad. All these are important references for transport of long and large goods in China. In the compiling process of the book, care and support have been given by Equipment Department of Transport Bureau in the Ministry of Railway, Zhong Tie Railway Special Freight Transport Center, Sifang Rolling Stock Research Institute of the Ministry of Railway, Science Academy of the Ministry of Railway, Qiqihar Rolling Stock (Group) Co. Ltd., Harbin Rolling Stock Works, Zhushou Rolling Stock Works, Beijing Erqi Rolling Stock Works, Suihua Depot of Harbin Railway Bureau, Editorial Department of Rolling Stock, etc.. We express our sincere gratitude here.

Editor

November 7, 2000

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第1章 铁路长大货物的概念与运输组织

CHAPTER 1 CONCEPT AND TRANSPORT ORGANIZATIONS OF LONG AND LARGE GOODS ON RAILWAY



1 长大货物的基本概念

随着我国国民经济的迅速发展，特别是改革开放以来，冶金、电力、石油化工及军事装备等事业呈现了高速发展的局面。一些大型的机械设备和军事装备在铁路运输中运量不断增长，这些设备及装备

外型复杂、体积庞大、重量达几百吨，见图 1-1。这些货物在铁路运输中统称为长大货物。长大货物在铁路运输中又分为超长货物、超限货物、集重货物。



图 1-1 D₃₂ 型(32 轴)钳夹车装运体积庞大、重达几百吨的发电机定子
Fig. 1-1 D₃₂ type (32-axled)schnable transports the electric stator which has large volume, and whose weight can reach several hundred of tons

1.1 超长货物

一车负重，突出车端，需要使用游车或跨装运输的货物，称为超长货物。超长货物的装载方法有 2 种：一种为 1 车负重加挂游车；另一种为 2 车或 2 车以上跨装。

1.2 超限货物

一件货物装上铁路货车后，在以下情况超出铁路规定的限制或限制尺寸的货物。

- (1) 停在平直线上时，货物本身的高度和宽度有任何部位超过机车车辆限界。
- (2) 停在平直线上虽不超限，但当车辆行经半径为 300 m 曲线时，货物的内侧或外侧的计算宽度仍超过机车车辆限界。
- (3) 虽不属以上 2 种情况，但超过特定区段的

装载限制。

1.2.1 超限货物的分类

超限货物根据其超限部位，按装车站最初挂运列车的运行方向分为左侧超限和右侧超限。如货物两侧均超出机车车辆限界时，为两侧超限。两侧超限按其对称性又分为对称超限和非对称超限。

根据超限货物在高度方面的不同，又可分为：

- (1) 上部超限：货物在距轨面 3 600 mm 以上高度处的超限。
- (2) 中部超限：货物在距轨面 1 250 mm ~ 3 600 mm 高度之间，有任何部位超限者。
- (3) 下部超限：货物在距轨面 150 mm ~ 未 1 250 mm 高度之间，有任何部位超限者。

1.2.2 超限货物的等级

超限货物的等级就是指超限货物超限的程度。根据超限货物超出机车车辆限界部位的不同程度分

1 Fundamental Concept of Long and Large Goods

With the rapid development of the national economy in our country, especially after the reform and opening, the industries of metallurgy, electricity, petroleum chemistry and military equipment have been developed rapidly. The transport of some large mechanical and military equipment has been increased continuously, these equipment have complex outline, large volume, and the weight can reach several hundred of tons. See Fig.1 - 1. These goods are called long and large goods in the railway transport, and they are classified into super long goods, out-of-gauge goods and goods with concentrated weight.

1.1 Goods of projected loading

If the length of a piece of goods exceeds the length of the car, and a runner car or the overpassing transport is needed, it shall be called super long goods. There are two ways to transport the super long goods: one is one load carrying car plus a runner car, the other is overpassing load on two cars or more than two cars.

1.2 Out-of-gauge goods

When a piece of out-of-gauge goods is loaded on a railway freight car, the regulated restrictions or restricted dimensions are exceeded in the following situations.

(1) While staying on a tangent line, the height and width of any part of the goods exceeds the rolling stock gauge.

(2) While staying on a tangent line, the gauge is not exceeded, but when negotiating a curve with a radius of 300 m, the calculation width of the inner side or outer side of the goods exceeds the rolling stock gauge.

(3) Not belong to the two situations above, but the transport restrictions in special sections are exceeded.

1.2.1 Classification of out-of-gauge goods

According to the out-of-gauge part of the out-of-gauge goods, on the basis of the running direction of the train at the initial beginning station, the goods are classified into left side out-of-gauge and right side out-of-gauge. If both sides of the goods exceed the rolling stock gauge, it is called two sides out-of-gauge. On the basis of the symme-

try, the two sides out-of-gauge is classified into symmetrical out-of-gauge and unsymmetrical out-of-gauge.

On the basis of the different heights of the out-of-gauge goods, they can be classified into:

(1) Upper part out-of-gauge: the gauge is exceeded at more than 3 600 mm above rail level.

(2) Middle part out-of-gauge: any part of the goods exceeds the gauge between 1 250 mm ~ 3 600 mm above rail level.

(3) Lower part out-of-gauge: any part of the goods exceeds the gauge between 150 mm ~ less than 1 250 mm above rail level.

1.2.2 Grade of out-of-gauge goods

The grade of out-of-gauge goods refers to the out-of-gauge degree of the goods. On the basis of the different out-of-gauge degrees of the goods, they are classified into first grade out-of-gauge, second grade out-of-gauge and super grade out-of-gauge. The upper or middle part out-of-gauge is classified into the first grade, second grade and super grade. The lower part out-of-gauge is fairly dangerous, and is only classified into the second grade and super grade out-of-gauge.

For the goods passing or reaching the stations within the special section, though the rolling stock gauge is not exceeded, the loading gauge of the special section is exceeded, the out-of-gauge grades are determined as follows:

(1) If the loading gauge of the special section is exceeded, but the gauge of the first grade out-of-gauge is not exceeded, it is regarded as the first grade.

(2) If the gauge of the first grade out-of-gauge is exceeded, the out-of-gauge grade should be determined on the basis of the out-of-gauge degree.

1.2.3 Determination method of the grade of out-of-gauge goods

The grade of out-of-gauge goods is determined mainly on the basis of the actually measured width or the calculation width of the rating section calculation point of the goods.

Rating section The section on which the calculation