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Distribution list

DBS

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Reference: I.NVT 41 Wi

June 30, 2014

Enactment IK 03/2014
DB Standard 918
New issue of DBS 918 006

Dear Sir or Madam,

DBS 918 006

“Spring Steel Washers”

will come into effect

on August 1, 2014.

This DBS supersedes DBS 918 006, May 2000 edition

The most important changes are as follows:

- Editorial and structural revision
- Reference of technical requirements to national and international standards and regulations
- Update and expansion of technical requirements
- Requirements from UIC Leaflet 864-3 added

Distribution of the DBS via

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DB Netz AG
Registered office: Frankfurt am Main, Germany
Registry court: Frankfurt am Main
Com. Reg. No.: 50 879
VAT ID. No.: DE199861757

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will follow shortly; the same office will make the document available digitally (for internal users via www.dbportal.db.de as a pdf file) in the Central Regulation Database (ZRWD).

The client of Deutsche Bahn AG is permitted to make the DBS available to external users as a pdf file.

When using pdf files, the user must make sure that the files contain the latest version of the DBS.

Sincerely,

DB Netz AG

p.p. *[Signature]*

Dr. Tilman Reisbeck

Head of Track Engineering

p.p. *[Signature]*

Hans Gabler

Head of Permanent Way



Technical specification
Spring steel washers
 for railroad tracks

DBS
918 006

Supersedes edition 05/2000

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Foreword

This Deutsche Bahn Standard (DBS) was prepared by DB Netz AG - I.NVT 41 - Permanent Way Engineering in cooperation with Quality Assurance (TEI 2) on the basis of DBS 918 006, May 2000 edition, and represents the interests of Deutsche Bahn AG. The following changes have been made:

- Editorial and structural revision
- Reference of technical requirements to international standards
- Requirements from UIC Leaflet 864-3V added

Introduction

This DBS governs the qualification and quality assurance of spring steel washers. It takes into account the UIC Leaflet 864-3V and supplements the performance requirements for rail fastening system specified in the standard series DIN EN 13481.

1 Scope

This DBS applies to spring steel washers under the usage conditions of DB AG. It must be used when qualifying new spring washers for DB AG (qualification test) and in the context of quality assurance.

2 Normative references

This DBS contains stipulations from other publications in the form of dated or undated references. These normative references are quoted at the relevant places in the text, and the publications are listed thereafter.

In the case of dated references, subsequent amendments or revisions to these publications only belong to this standard if they have been incorporated by means of amendment or revision. In the case of undated references, the latest version of the referenced publication (including amendments) applies.

UIC 864-3 V	Technical specification for the supply of spring steel washers for use in permanent way
DIN EN 13481	Railway applications - Track - Performance requirements for fastening systems
DIN EN 10089	Hot-rolled steels for quenched and tempered springs - Technical delivery conditions
ISO 6507-1	Metallic materials - Vickers hardness test
ISO 6508-1	Metallic materials - Rockwell hardness test
DIN EN ISO 9227	Corrosion tests in artificial atmospheres - Salt spray tests

3 Technical requirements

3.1 Material

The material must correspond to steel type 38 Si 7 as per DIN EN 10089.

The wire bundles intended for manufacturing the spring washers must be labeled by cast.

3.2 Manufacturing process

The spring washers are manufactured by winding profile steel in a helical fashion; the cross section of the profile steel is specified in the standard drawing of DB AG. The gradient must be without kinks. The spring washers made of profile steel from the same cast must all be manufactured in exactly the same way. If necessary, the profile steel must be normally annealed prior to winding. All necessary measures must be taken to prevent decarburization and scaling.

The inner and outer sides of spring washers with a rectangular cross section must be parallel to the rolling axis when the spring washer is compressed. The cross section must be uniformly thick and rounded slightly at the corners.

The windings of multi-coil spring washers must be positioned vertically on top of each other when the washer is under tension.

The faces must be in a plane that passes through the screw axis.

After winding, the spring washers must be hardened and tempered.

The furnaces must enable regulatable, uniform and monitored heating. The temperature curve in the furnaces and hardening baths must be documented.

3.3 Execution quality

The spring washers must be executed as per the standard drawings of DB AG.

They must have a clean surface and be free of cracks, slivers, burrs, material discontinuities, laps and other flaws.

The spring washers must not be interlocked.

3.4 Distortion

The distortion test must be performed as per section 5.2. The test pieces must not exhibit cracks after the distortion test.

3.5 Structure

The test piece must be notched and broken. The fracture surface must have a uniform, fine, velvety appearance and must not exhibit cracks. The evaluation is performed with the naked eye.

3.6 Hardness

The hardness must be between 430 and 515 for Vickers (HV 30) and between 43 and 49 for Rockwell (HRC). The test must be performed according to ISO 6507-1 (Vickers hardness test) or ISO 6508-1 (Rockwell hardness test).

3.7 Spring release distance

The spring release distance must not be less than the minimum value specified in the respective standard drawing. The spring release distance must be determined as per section 5.1. After full release, the height of the spring washer must not be less than the minimum value specified in the respective standard drawing.

3.8 Shape and dimensions

The shape and dimensions of the spring washers shall be taken from the corresponding standard drawing.

3.9 Corrosion protection

Unless otherwise agreed, products should not be supplied with corrosion protection. Any corrosion protection to be applied shall be specified in the order documents. The spring washers are only permitted to be provided with coatings if it can be ensured that the requirements for the spring washer as per DBS 916 006 are not impaired when creating the coating and no hydrogen embrittlement occurs on the surface.

The effectiveness of the corrosion protection process must be verified once as per DIN EN ISO 9227 over a period of 300 h. The corrosion protection may exhibit a max. rust grade of 3% after the test when performed in the context of the certificate testing.

4 Qualification and quality assurance

4.1 Qualification of the product

As part of the qualification test, all requirements listed in section 3 must be performed on each of three products. The test results for each single tested product must meet the requirements.

The DB AG department with technical responsibility (see cover sheet) can specify additional requirements and tests. DB AG reserves the right to waive tests if, for example, the product properties do not require certain tests or if material properties are already well known.

The qualification tests may only be carried out by test centers recognized by DB AG. The manufacturer shall bear the cost of the qualification test.

4.2 Qualification of the manufacturer

For certain products (see products requiring quality inspection - permanent way material), the manufacturer must provide verification in the form of a "Manufacturer-related product qualification (MPQ)" that it can produce the product as stipulated in the contract. This must be provided before delivering to DB AG for the first time. A part of the MPQ is the qualification test as per section 4.1. The MPQ is performed by the Quality Assurance department of DB AG. The costs for the MPQ are borne by the manufacturer/supplier.

4.3 Quality assurance by the manufacturer

The manufacturer shall ensure the quality of the products by means of an appropriate statistical process control. The tests and test scopes specified in table 1 apply as a minimum requirement; independently of this requirement, each product must comply with the technical requirements as per section 3. The unit responsible for technical aspects at DB AG may set additional tests.

Table 1: Minimum requirements for tests and scope of testing relating to quality assurance

Testing	Minimum scope of testing
Dimensions and execution quality (see sections 3.3 and 3.8)	One specimen per 1,000 products, minimum 10 specimens per production batch ¹⁾
Distortion and spring release distance (see sections 3.4 and 3.7)	One specimen per 10,000 products, at least 3 specimens per production batch ¹⁾
Hardness measurement	3 hardness measurements per furnace batch ²⁾

¹⁾ The specimens are taken from the beginning, middle and end of a production batch.

²⁾ A hardness measurement consists of 3 hardness marks each. In multi-purpose chamber furnaces, the specimens must be taken from the middle and edge of the furnace batch. In a conveyor or pusher-type furnace, the specimens are taken from the beginning, middle and end of the furnace batch.

Adherence to the requirements stipulated in this DB Standard must be ensured on the basis of the test procedure and/or test plans and presented to DB AG on request.

5 Testing methods

5.1 Spring release distance

Each spring washer is compressed between two parallel, hardened plates at 40 kN. After being compressed in this state for 10 s, it is slowly released to 10 kN. During release, the release spring distance must be measured. Then the spring washer is fully released. The height of the spring washer is measured.

5.2 Distortion

The cold test piece is bent open in such a way that one half-winding is positioned perpendicular to the plane of the neighboring winding. In case of multi-coil spring washers, the bent half-winding must then be rotating by 90° inward. Both deformations must be performed slowly and steadily.

6 Label

Spring washers must be labeled with the manufacturer sign and the last two digits of the year of manufacturer. The position of the label and the type face used can be found in the standard drawing.