



Procedural Instructions - VA 918 490

**"Certification of filler metals and welding consumables used for
joint welding and build-up welding on metallic materials
by DB Systemtechnik"**

Release date: March 2018



Application note: **The German text of these Procedural Instructions VA 918 490
will be binding.
The English translation is for information purposes only.**



Foreword and change history

VA 918 490 had to be revised due to the new edition of DIN EN 13479:2017-10.

DIN EN 13479 only still applies to filler metals for fusion welding of metallic structures or composite structures made from metal and concrete in built structures. With the new standard, the chemical composition of the filler metal is the only verifiable product characteristic. The product characteristics dimensions and shape as well as mechanical properties no longer need to be verified.

For the regulated areas of railway bridge construction and other engineering structures, rail vehicle construction work and welding on rails and permanent way components, the following product characteristics still apply to filler metals

- Dimensions and shape of the filler metal,
- Mechanical properties of the weld metal and the welded joint,
- Chemical composition of the filler metal.

The type qualification testing of the filler metals is conducted, as previously, in accordance with DIN EN 14532-1 (for steel filler metals) and DIN EN 14532-3 (for filler metals).

The requirements for factory production control as per the system 2+ are described for the first time in section 3.

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Annex 2	Approval certificate for filler metals and welding consumables
Annex 3	Information on the scope of certified materials
Annex 4	Requirements to be met by filler metals used for joint welding and build-up welding on rail vehicles, railway bridges and other engineering structures
Annex 5	Requirements to be met by filler metals used for rail joint welding and rail resurfacing by welding
Annex 6	Requirements governing the marking/labelling of filler metals

1. General information, Scope

These procedural instructions (hereafter: "PIs") apply to the testing, certification and monitoring of filler metals and welding consumables (excluding shielding gases) by DB Systemtechnik in the sectors:

- **Rail vehicle construction** in accordance with the DIN EN 15085 series of standards, DIN 27201-6 and DB Guidelines 951.0010 and 951.0020,
- **Welding on rails and permanent way components** in accordance with DB Guideline 824,
- **Railway bridge construction work and work on other engineering structures** in accordance with DB Guideline 804.

These PIs contain

- the requirements for the **product certification of filler metals** by DB Systemtechnik (section 2),
- the requirements for the **certification and monitoring of factory production control** (hereafter "FPC") as per the system 2+ in accordance with the Regulation (EU) 305/2011, Annex V, section 1.3,
- the **certification procedure** (section 4),
- the requirements for **marking/labelling of the filler metals** (section 6).

Any references in the following sections to other sets of rules and regulations (e.g. DIN, DIN EN standards) or to annexes to these PIs are references to those sets of rules and regulations or annexes as amended from time to time.

2. Product certification requirements

2.1 Marking/labelling of the filler metals

The filler metals shall be marked/labelled in accordance with the DIN EN filler metal standard that applies to the filler metal. The marking/labelling system "A" applies to steels.

With filler metals for unalloyed steels, the marking/labelling must include the marks for the minimum yield strength, the Charpy V-notch impact energy and the chemical composition.

2.2 Verification of type qualification testing and the factory production control

The following provides the basis for product certification:

2.2.1 Verification of the type qualification testing of the filler metal

- **Steel – filler metals:**
Type qualification testing as per DIN EN 14532-1 - Welding consumables - Test methods and quality requirements - Part 1: Primary methods and conformity assessment of consumables for steel, nickel and nickel alloys as well as for build-up welding
DIN EN 14532-2 - Welding consumables - Test methods and quality requirements - Part 2: Supplementary methods and conformity assessment of consumables for steel, nickel and nickel alloys.
The requirements in **Annex 4** of these PIs also apply to the type qualification testing.
- **Aluminium – filler metals:**
Type qualification testing as per DIN EN 14532-3 - Welding consumables - Test methods and quality requirements - Part 3: Conformity assessment of wire electrodes, wires and rods for welding of aluminium alloys.
The requirements in **Annex 4** of these PIs also apply to the type qualification testing.
- **Filler metals for rail joint welding and rail resurfacing by welding** in accordance with DB Guideline 824:
The requirements in **Annex 5** also apply to the product certification.
Before filler metals are used for work for DB AG, **operational testing** shall be carried out by DB Netz AG in addition to type qualification testing.

2.2.2 Verification of the factory production control

The initial inspection of the FPC as per the system 2+ in accordance with Regulation (EU) 305/2011, Annex V, section 1.3 shall be verified by means of certification by one of the bodies listed under 4.1.2.

3. Factory production control requirements

3.1 Set-up of an FPC

Manufacturer, supplier or trader of filler metals shall create, document and maintain an FPC system to ensure that the marketed products match the stated execution criteria. The FPC shall correspond to the system 2+ in accordance with Regulation (EU) 305/2011, Annex V, section 1.3.

The FPC shall include the work instructions, the regular tests, the analyses and/or the assessments as well as the use of the results in order to monitor raw materials and other incoming materials, the production process and the product.

With regard to the test scope and frequency, DIN EN 14532-1:2004, Annex N (steel filler metals) or DIN EN 14532-3:2004, Annex H (Al filler metals) shall apply. Requirements, limits and tolerances shall correspond to section 3.4 of these Pls.

3.2 Verification of the FPC

The FPC shall be verified via an initial inspection and continuous monitoring (once a year) by one of the certification bodies listed in section 4.1.2.

3.3 Product testing and evaluation

The manufacturer shall create work instructions to ensure that the specified values of all stated properties were met. This involves the following properties:

- Dimensional and shape tolerances,
- Mechanical properties,
- Chemical composition.

Control measures for mechanical properties and for the chemical composition are defined in DIN EN 14532-1:2004, Annex N (steel filler metals) or DIN EN 14532-3:2004, Annex H (Al filler metals). Dimensions and shape must be tested with each batch or each production unit.

3.4 Test requirements

The following requirements apply:

3.4.1 Dimensions and shape

Dimensional and shape tolerances shall meet DIN EN ISO 544

3.4.2 Mechanical properties

The mechanical properties shall meet the specific requirements of the applicable filler metal classifying standard. In those cases where the requirements for the specific properties are not stipulated in the classifying standard, the relevant subsections in DIN EN 14532-1 (steel filler metals) or DIN EN 14532-3 (Al filler metals) shall be followed.

3.4.3 Hazardous substances

All-weld metal must not separate out any hazardous substances, which exceed the permissible limits stated in the applicable European standards for the material or in national guidelines of the respective Member State.

3.4.4 Chemical composition

The chemical composition shall comply with the relevant filler metal classifying standard.

4. Certification procedure

4.1 Certification and testing bodies

4.1.1 The certification body for product certification is:

DB Systemtechnik GmbH
Werkstoff- und Fügetechnik, Fachberatungsstelle Schweißtechnik
Bahntechnikerring 74, 14774 Brandenburg-Kirchmöser, Germany

Head: Mr Kupiec
Tel.: +49 3381/812-576
Mobile: +49 171 2958435
E-mail: sebastian.kupiec@deutschebahn.com
Deputy: Mr Klatt
Tel.: +49 3381/812-626
E-mail: andreas.klatt@deutschebahn.com

4.1.2 The certification bodies for the FPC system and product testing centres are:

- TÜV Nord Hamburg
- TÜV Rheinland Köln
- TÜV Süd München

4.1.3 The product testing centre for filler metals used for permanent way welding work is:

- SLV Hannover
- DB Systemtechnik, Oberbauschweißtechnik

4.2 Initial product certification

Applications for product certification shall be submitted to DB Systemtechnik by the applicant (manufacturer, supplier or trader) using the application form shown in **Annex 1, Part 1**.

The chosen brand name shall **not** be used by another manufacturer, supplier, trader or within a group or its Group subsidiary companies. This also applies where different spellings are used.

Applications shall be accompanied by:

- A description of the product and a current TÜV identification sheet.
- If the product is manufactured under licence: a manufacturer's certificate and a declaration of consent using the pre-printed form in **Annex 1, Part 1**.
- If a filler metal is manufactured in several production facilities:
 - A list of all production facilities using the pre-printed form in **Annex 1, Part 1**.
 - Evidence that all production facilities manufacture the product according to the same specifications.
- Type qualification report and the results for the filler metal.
- Evidence of initial inspection of the FPC system or, if already provided, evidence of monitoring of FPC system (monitoring report).

The application documents shall be **e-mailed** to the e-mail addresses stated in 4.1.1.

Note: all submitted documents shall be submitted in German language version.

4.3 Transfer of product certification

Product certification can be transferred from **an original manufacturer** to the name of a supplier or trader, provided the following requirements are met:

- The origin and composition of the filler metal or welding consumable for which an application is being made is identical to that at the time of the initial product certification,
- The owner of the initial product certification (original manufacturer) shall provide a declaration of consent stating that the owner agrees with the proposed transfer to the name of the supplier or trader,

- The product to be transferred shall have a brand name different from that of the original product; the chosen brand name shall **not be used autonomously** by the manufacturer, the supplier, the trader or used within a group and of its Group subsidiary companies,

Note: Several original manufacturers cannot be transferred to a single brand name.

Applications for product certification shall be submitted to DB Systemtechnik by the applicant (supplier or trader) using the application form shown in **Annex 1, Part 2**. Applications shall be accompanied by:

- A description of the product and a current TÜV identification sheet.
- Manufacturer's certificate including declaration of consent as per **Annex 1, Part 2**. "Transfer of DB certification".
- Evidence of initial inspection of the FPC system of the supplier's or trader's (certificate, report) or, if already provided, evidence of monitoring of FPC system (monitoring report).

The application documents shall be **e-mailed** to the e-mail addresses stated in 4.1.1.

Note: all submitted documents shall be submitted in German language version.

4.4 Extension of product certification

In order to maintain the validity of a certificate after its period of validity has expired, evidence shall be provided to DB Systemtechnik that the requirements of these PIs are still being met. Applications to extend product certification shall be submitted to DB Systemtechnik **before** the period of validity expires using an application form as shown in **Annex 1, Part 3**. Applications shall be accompanied by:

- A list of all filler metals for which extensions are being sought using the sample form shown in **Annex 1, Part 3** "Extension of DB certification".
- If the applicant is not itself the manufacturer, the manufacturer's declaration of consent shall also be confirmed with the **Annex 1, Part 3**.
- Evidence that the FPC used by the manufacturer, supplier or trader is subject to monitoring.
- The current TÜV identification sheet for each filler metal.

The application documents shall be **e-mailed** to the e-mail addresses stated in 4.1.1.

Note: all submitted documents shall be submitted in German language version.

4.5 Product certification modification/ extension

Applications for product certification shall be submitted to DB Systemtechnik by the applicant (manufacturer) using the application form shown in **Annex 1, Part 4**. Applications shall be accompanied by:

- Current TÜV identification sheet.
- If the product is manufactured under licence: a manufacturer's certificate and a declaration of consent using the pre-printed form in **Annex 1, Part 4**.
- If a filler metal is manufactured in several production facilities:
 - A list of all production facilities using the pre-printed form in Annex 1.
 - Evidence that all production facilities manufacture the product according to the same specifications.
- Type qualification report and the results for the filler metal.
- Evidence of initial inspection of the FPC system (certificate, report) or, if already provided, evidence of monitoring of FPC system (monitoring report).

The application documents shall be **e-mailed** to the e-mail addresses stated in 4.1.1.

Note: all submitted documents shall be submitted in German language version.

4.6 Change of company name

Applications for a change of company name for existing DB certifications shall be submitted to DB Systemtechnik by the applicant (manufacturer) using the application form shown in **Annex 1, Part 5**. Applications shall be accompanied by:

- Evidence of initial inspection of the FPC system (certificate, report) or, if already provided, evidence of monitoring of FPC system (monitoring report).

The application documents shall be **e-mailed** to the e-mail addresses stated in 4.1.1.

Note: all submitted documents shall be submitted in German language version.

4.7 Approval certificate

After examining the documents submitted, DB Systemtechnik shall issue an approval certificate on the basis of these PIs (see sample certificate in **Annex 2**).

The approval certificate is published exclusively via the "online register EN 15085" of SLV Halle (see also section 4.10).

The approval certificate shall include the following information:

- **Manufacturer or supplier or trader.**
- **Filler metal**, specifically:
 - Type of filler metal (covered electrode, GMAW wire electrode, etc.),
 - Brand name.
 - Standardised designation of welding filler metal using the "A" classification system.
- **Approval No.** (see Annex 2 for explanatory notes).
- **Period of validity: 3 years.**
- **Scope of approval certificate**, specifically:
 - Shielding gases as per DIN EN ISO 14175 (see Annex 4, Table 2 for details).
 - Materials group in accordance with CEN ISO/TR 15608 or material; the following additional information is required for:
 - Steels: for higher strength steels, the permissible range for the upper yield strength (R_{eH}) shall also be stated.
 - Aluminium and aluminium alloys: material designation as per DIN EN 573.
 - Welding process in accordance with DIN EN ISO 4063.
 - Welding positions in accordance with DIN EN ISO 6947.
 - Type of current / polarity.
 - Diameter range.
 - Comments / Welding conditions.

Annex 3 contains detailed information about the scope of the approval certificate issued for the certified materials and for other materials considered to be covered by the approval certificate.

4.8 List of code numbers

In order to identify the production facility or facilities, DB Systemtechnik provides a list of code numbers in addition to the information in the approval certificate. This list is supplied only to the applicant together with notification of certification.

The code number issued may be made up of numbers only, letters only or a combination thereof as agreed between the manufacturer and DB Systemtechnik.

The manufacturer, supplier or trader shall display the code number on the label behind the approval number (see also Annex 6).

Note: the code number does not appear on the approval certificate.

4.9 Validity / expiry

The certification applies until it expires and providing the requirements in these PIs are met. If no extension is requested the certification becomes invalid once expired and the DB approval certificates are deleted in the "online register EN 15085" of SLV Halle.

Certification applies only to the manufacturer, supplier or trader stated in the certificate and its certified / monitored production facilities (corresponding to the list of code numbers).

The brand name appearing in the approval certificate can only be used in association with the specified manufacturer, supplier or trader and the DB approval no. / code no.

A DB approval number or brand names shall not be used for any production facility that has not been inspected as part of the DB approval procedure.

The filler metals produced and kept in stock until a certification expires can also be used after the certificate expires. In this case, in addition to the marking/labelling as per Annex 6, the production date must be verified by an inspection certificate as per DIN EN 10204-3.1.

In the event of queries or discrepancies, please contact the e-mail addresses listed in 4.1.1.

4.10 Costs

The costs for certification, modification / extension, transfer, change of company name and extension shall be borne by the applicant. These fees include management of and free access to the online register EN 15085 of SLV Halle.

The costs of carrying out operational testing shall be borne by DB AG.

4.11 Online register of certified filler metals

All of the approval certificates for filler metals issued by DB Systemtechnik are entered into the "online register EN 15085" of SLV Halle.

All approval certificates visible in the online register EN 15085 of SLV Halle are valid. This shall also apply to approval certificates with expired validity; in this case the renewal process is not yet complete. Invalid approval certificates will be deleted immediately.

The approval certificates can be accessed free of charge from the websites "www.en15085.net" or "www.en1090.net" from where they can be downloaded as pdf files.

5. Quality assurance

To verify quality consistency, the FPC system operated by the manufacturer, supplier or trader shall be monitored at least once a year by one of the FPC certification bodies listed in section 4.1.2 and the results documented in a monitoring report for DB Systemtechnik.

If the manufacturer, supplier or trader refuses FPC monitoring, DB Systemtechnik reserves the right to revoke the approval certificates.

6. Product marking/labelling and declaration of conformity

The filler metals shall be clearly marked/labelled in both packed and unpacked states. The standardised designation of the filler metals is based on the "A" classification system.

The manufacturer, supplier or trader shall include the CE mark on the product label to demonstrate the conformity of the filler metal supplied.

Annex 6 contains the requirements governing the marking/labelling of filler metals.

Note regarding supplies in areas subject to technical approval by the building inspectorate:

A declaration of performance in accordance with Regulation (EU) No. 305/2011 shall be drawn up for the filler metal to be supplied and the declaration shall be delivered together with the product.

7. Liability for defects

The "General Terms and Conditions of Procurement of DB AG and its Affiliated Companies" - as amended from time to time - shall apply.

8. Jointly applicable standards, regulations and guidelines

DIN EN ISO 544	Welding consumables - Technical delivery conditions for filler metals and fluxes - Type of product, dimensions, tolerances and markings
DIN EN 14532-1	Welding consumables - Test methods and quality requirements - Part 1: Primary methods and conformity assessment of consumables for steel, nickel and nickel alloys
DIN EN 14532-2	Welding consumables - Test methods and quality requirements - Part 2: Supplementary methods and conformity assessment of consumables for steel, nickel and nickel alloys
DIN EN 14532-3	Welding consumables - Test methods and quality requirements - Part 3: Conformity assessment of wire electrodes, wires and rods for welding of aluminium alloys
DIN EN 15085-4	Railway applications - Welding of railway vehicles and components - Part 4: Production requirements
DIN 27201-6	State of railway vehicles - Basic principles and production technology - Part 6: Welding
DBS 918 005	Technical specifications for the design and construction of railway bridges and other engineering structures
DB Guideline 951.0010	Guideline - Welding of railway vehicles; Regulations governing new builds, vehicle conversion/redesign and spare parts
DB Guideline 951.0020	Guideline - Welding of railway vehicles; Regulations governing welding maintenance work
DB Guideline 824	Guideline - Permanent way maintenance procedures
DB Guideline 804	Guideline - The planning, construction and maintenance of railway bridges (and other engineering structures)



Annex 1, Part 1
DB Systemtechnik
Zertifizierungsstelle für Schweißzusätze
14774 Brandenburg-Kirchmöser, Germany

Application for initial certification of filler metals

Applicant: _____ **Telephone:** _____

Street, No.: _____ **Fax:** _____

Postcode, city: _____ **E-mail:** _____

Queries to: _____ **Telephone:** _____

E-mail: _____

The application for initial certification is made for the following filler metal:

Type of filler metal: _____

Brand designation: ¹⁾ _____

Designation of standard: ²⁾ _____

Area of application applied for:

Materials group pursuant to ISO/TR 15608 or material ³⁾:	
Welding method:	
Welding positions:	
Type of current and polarity:	
Diameter range:	
Remarks / Welding conditions:	

¹⁾ The brand name is linked to the manufacturer / supplier and the DB approval number.

²⁾ Use the mandatory designation of the standard as per the "A" system (yield strength and Charpy V-notch impact energy parameters – as far as specified in the standards – as well as chemical composition). With shielding gas filler metals the shielding gas subgroup as per DIN EN ISO 14175 shall also be stated.

³⁾ For Al alloys, the material shall be stated as per DIN EN 573.

Evidence of origin: ⁴⁾

DB approval no.:	Brand name	Manufacturer (name, address)

Declaration of consent:

We confirm that we supply / manufacture the above-mentioned product(s) to company:

.....

We undertake to inform you of any changes without delay.

.....

Place and date

.....

Signature (manufacturer/supplier) and stamp

The applicant

- undertakes to comply with accepted engineering standards (EN 15085-4 and the valid EN standards for filler metals),
- agrees that the approval certificates can be included in the online register EN 15085 of SLV Halle, viewed in the free access area and downloaded,
- assumes the costs of the certification procedure,
- undertakes to notify any change to the proof of origin without delay.

Enclosures:

- ☐ Product description
- ☐ TÜV identification sheet
- ☐ Manufacturer's certificate / declaration of consent for manufacture under licence
- ☐ Test report concerning suitability testing of the filler metal
- ☐ Test report concerning initial inspection of the FPC
- ☐ Evidence of monitoring the FPC

Place, date

Signature (applicant) and stamp

⁴⁾ Required if the **applicant is not also the production facility.**

**Annex 1, Part 2**

DB Systemtechnik
Zertifizierungsstelle für Schweißzusätze
14774 Brandenburg-Kirchmöser, Germany

Application for transfer of DB certifications

Applicant: _____ **Telephone:** _____

Street, No.: _____ **Fax:** _____

Postcode, city: _____ **E-mail:** _____

Queries to: _____ **Telephone:** _____

E-mail: _____

We hereby apply for transfer of one or more DB certifications for filler metals from the company:

.....

to our brand name for the products listed in the following table.

The applicant

- undertakes to comply with accepted engineering standards (EN 15085-4 and the valid EN standards for filler metals),
- agrees that the approval certificates can be included in the online register EN 15085 of SLV Halle, viewed in the free access area and downloaded,
- assumes the costs of the certification procedure,
- undertakes to notify any change to the proof of origin without delay.

.....
Place, date

.....
Signature (applicant) and stamp

Declaration of consent of the manufacturer/supplier:

We confirm that we supply the above-mentioned product(s) to company:

.....

and accept transfer of the products to the name of the applicant under his brand name given above. We undertake to inform you of any changes without delay.

.....
Place and date

.....
Signature (manufacturer/supplier) and stamp

Enclosures:

- ☐ TÜV identification sheet
- ☐ Evidence of monitoring the FPC

The following filler metals should be transferred:

Our brand name	Manufacturer's brand name	Manufacturer's DB approval no.	Certification body of the FPC

**Annex 1, Part 3**

DB Systemtechnik
Zertifizierungsstelle für Schweißzusätze
14774 Brandenburg-Kirchmöser, Germany

Application for extension of DB certifications

Applicant: _____ **Telephone:** _____

Street, No.: _____ **Fax:** _____

Postcode, city: _____ **E-mail:** _____

Queries to: _____ **Telephone:** _____

E-mail: _____

We hereby apply for the extension of DB certifications for the products listed in the following table.

The applicant

- undertakes to comply with accepted engineering standards (EN 15085-4 and the valid EN standards for filler metals),
- agrees that the approval certificates can be included in the online register EN 15085 of SLV Halle, viewed in the free access area and downloaded,
- assumes the costs of the certification procedure,
- undertakes to notify any change to the proof of origin without delay.

.....
Place, date

.....
Signature (applicant) and stamp

Declaration of consent of the manufacturer/supplier:⁷⁾

We confirm that we still supply the above-mentioned product(s) to company:

.....

and accept extension of the transfer. We undertake to inform you of any changes without delay.

.....
Place and date

.....
Signature (manufacturer/supplier) and stamp

Enclosures:

- ☐ TÜV identification sheet
- ☐ Evidence of monitoring the FPC

⁶⁾ Mandatory designation of the standard as per the "A" system.

⁷⁾ Required if the **applicant is not itself the manufacturer.**

The following filler metals should be extended:

DB approval no.	Brand name	Standard designation ⁶⁾	Original manufacturer

**Annex 1, Part 4**

DB Systemtechnik
Zertifizierungsstelle für Schweißzusätze
14774 Brandenburg-Kirchmöser, Germany

Application for modifying / extending existing DB certifications

Applicant: _____ **Telephone:** _____

Street, No.: _____ **Fax:** _____

Postcode, city: _____ **E-mail:** _____

Queries to: _____ **Telephone:** _____

E-mail: _____

We hereby apply for the modification / extension of an existing DB certification for the products listed in the following table.

The applicant

- undertakes to comply with accepted engineering standards (EN 15085-4 and the valid EN standards for filler metals),
- agrees that the approval certificates can be included in the online register EN 15085 of SLV Halle, viewed in the free access area and downloaded,
- assumes the costs of the certification procedure,
- undertakes to notify any change to the proof of origin without delay.

.....
Place, date

.....
Signature (applicant) and stamp

Declaration of consent of the manufacturer/supplier:⁷⁾

We confirm that we still supply the above-mentioned product(s) to company:

.....
 and accept extension of the transfer. We undertake to inform you of any changes without delay.

.....
Place and date

.....
Signature (manufacturer/supplier) and stamp

Enclosures:

- ☐ TÜV identification sheet
- ☐ Evidence of monitoring the FPC
- ☐ Test report concerning suitability testing of the filler metal

⁶⁾ Mandatory designation of the standard as per the "A" system.

⁷⁾ Required if the **applicant is not itself the manufacturer**.

The following filler metals should be modified / extended:

Brand name	DB approval no.	Modification / extension

**Annex 1, Part 5**

DB Systemtechnik
Zertifizierungsstelle für Schweißzusätze
14774 Brandenburg-Kirchmöser, Germany

Application for name change of the certificate holder of existing DB certifications

Applicant: _____ **Telephone:** _____

Street, No.: _____ **Fax:** _____

Postcode, city: _____ **E-mail:** _____

Queries to: _____ **Telephone:** _____

E-mail: _____

We hereby apply for the change of company name of existing DB certifications.

Applicant (old address):	Applicant (new address):
.....	
.....	

The applicant

- undertakes to comply with accepted engineering standards (EN 15085-4 and the valid EN standards for filler metals),
- agrees that the approval certificates can be included in the online register EN 15085 of SLV Halle, viewed in the free access area and downloaded,
- assumes the costs of the certification procedure,
- undertakes to notify any change to the proof of origin without delay.

.....
Place and date

.....
Signature (applicant) and stamp

Enclosures:

- ☐ Test report concerning initial inspection of the FPC
- ☐ Evidence of monitoring the FPC

Annex 2



DB Systemtechnik
Zertifizierungsstelle für Schweißzusätze
14774 Brandenburg-Kirchmöser
Germany

Zulassungszertifikat für Schweißzusätze und Schweißhilfsstoffe	
Hersteller: Fa. MusterWeld Lichtbogenstraße 1 1000 Berlin	
Schweißzusatz: SG-Drahtelektrode	DB-Zulassungs-Nr.: 42.999.01
Markenbezeichnung: Weld SG 2	Geltungsdauer: 31.05.2018
Normbezeichnung: DIN EN ISO 14341-A-G 42 2 C1 4Si1 DIN EN ISO 14341-A-G 46 4 M21 4Si1	
Geltungsbereich aufgrund der nach VA 918 490 durchgeführten Eignungsprüfung:	
Werkstoffgruppe nach DIN EN ISO/TR 15608¹⁾:	<u>Mit den Schutzgasen nach DIN EN ISO 14175:</u> a) C1, M2, M3: 1.1, 1.2 b) M21: 1.1 bis 2.1
Schweißprozess nach DIN EN ISO 4063:	135
Schweißpositionen nach DIN EN ISO 6947:	PA, PB, PC, PD, PE, PF, PG
Stromart und Polung:	= (+)
Durchmesserbereich:	0,8 – 1,6 mm
Bemerkungen / Schweißbedingungen:	./
Kirchmöser, 21.05.2015 (Leiter der Zertifizierungsstelle)	

¹⁾ For details of other materials covered by the approval certificate: see VA 918 490, Annex 3.

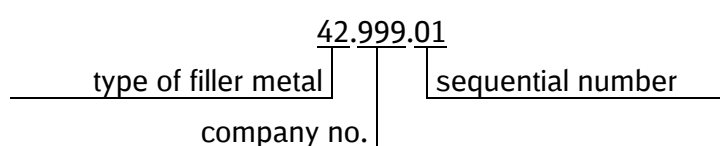
Structure and meaning of the approval number:

The approval number is composed of three blocks:

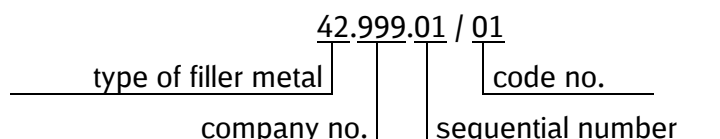
- The first block is a two-digit number that designates the type of filler metal:
 - 10: Covered electrodes for manual metal arc welding of unalloyed and low-alloy steels.
 - 20: Filler metals for build-up welding.
 - 30: Covered electrodes for manual metal arc welding of stainless steels.
 - 4x: Filler metals for gas metal arc welding:
 - 42: for unalloyed and low-alloy steels
 - 43: for stainless steels.
 - 5x: Filler metals for submerged arc welding:
 - 51: Granulated welding flux
 - 52: Wire electrodes, flux-cored electrodes.
 - 6x: Filler metals for non-ferrous metals and cast iron:
 - 61: for aluminium and aluminium alloys
 - 62: for cast iron
 - 63: for copper and copper alloys.
 - 70: Filler metals for oxy-fuel welding.
 - 8x: Filler metals for welding work on the permanent way:
 - 81: for rail joint welding
 - 82: for rail resurfacing by welding
- The second block is a three-digit number that identifies the owner of the certification (manufacturer, supplier or trader).
- The third block is a two-digit sequential number.

Examples:

1. Approval number in the approval certificate:



2. Approval number with code number on label:





Information on the scope of certified materials

1. Certified materials groups and additional materials groups covered in accordance with CEN ISO/TR 15608

In addition to the tested materials groups and/or materials listed under "Scope of approval certificate", the following materials groups and/or materials are also considered to be covered by the approval certificate.

Annex 3, Table 1: Unalloyed and low-alloy steels, cast steel, fine grain structural steels

Certified materials group	Material designation according to selected DIN EN materials standards ¹⁾	Applicable materials groups according to CEN ISO/TR 15608
Materials group 1 as defined in CEN ISO/TR 15608 (unalloyed steels with $R_{eH} \leq 460$ MPa)		
1.1	S235JR to S275J2+N DIN EN 10025-2 S275N DIN EN 10025-3 S275M DIN EN 10025-4	1.1
1.2	S235JR to S355K2 DIN EN 10025-2 S275N to S355N or NL ²⁾ DIN EN 10025-3 S275M to S355M or ML ²⁾ DIN EN 10025-4 GE200, GE240 DIN EN 10293 B500A, B500B DIN 488-1	1.1, 1.2
1.3	S235JR to S355K2 DIN EN 10025-2 S275N to S460N or NL ²⁾ DIN EN 10025-3 S275M to S460M or ML ²⁾ DIN EN 10025-4 GE200, GE240 DIN EN 10293 B500A, B500B DIN 488-1 ⁴⁾	1.1, 1.2, 1.3, 2.1
1.4	S235JR to S355K2 DIN EN 10025-2 S275N to S355N or NL ²⁾ DIN EN 10025-3 S275M to S355M or ML ²⁾ DIN EN 10025-4 S275J0W - S355J2W DIN EN 10025-5 GE200, GE240 DIN EN 10293	1.1, 1.2, 1.4
Materials group 2 as defined in CEN ISO/TR 15608 (Thermomechanically treated fine grain steels with $R_{eH} > 360$ MPa)		
2.1	S420M to S460M or ML ²⁾ DIN EN 10025-4 S355MC to S460MC DIN EN 10149-2	1.1, 1.2, 1.3, 2.1
2.2	S500MC to S700MC DIN EN 10149-2	1.2, 1.3, 2.1, 2.2 ³⁾
Materials group 3 as defined in CEN ISO/TR 15608 (quenched and tempered fine grain steels with $R_{eH} > 360$ MPa)		
3.1	S460Q to S690Q, QL or QL ¹⁾ DIN EN 10025-6	1.2, 1.3, 2.1, 2.2, 3.1 ³⁾
3.2	S890Q to S960Q, QL or QL ¹⁾ DIN EN 10025-6	2.2, 3.1, 3.2 ³⁾
Materials group 11 as defined in CEN ISO/TR 15608 (unalloyed steels with carbon content $> 0.25\%$)		
11	E295 to E360 DIN EN 10025-2 C35 to C60 DIN EN 10083-2 GE300 DIN EN 10293	11

¹⁾ In addition to the steels listed, all unalloyed steels in the same strength class but designated in accordance with another steels standard are also considered to be covered by the approval certificate. This also applies to steels supplied in different delivery conditions (e.g. S690Q DIN EN 10025-6 also includes S700MC DIN EN 10149-2).

²⁾ The approval certificate applies to steels with the delivery condition codes NL, ML or QL only if the required Charpy V-notch impact energy is included as part of the relevant standardised material designation.

³⁾ The approval certificate only applies to materials that lie within the range for the upper yield strength (R_{eH}).

- ⁴⁾ The approval certificate also applies to the welding of load-bearing butt welded joints in reinforcing steel (as specified in DIN EN ISO 17660-1, section 7.2) if in the relevant standardised material designation the code number indicating yield strength is at least "50".

Annex 3, Table 2: Stainless steels

Certified materials group	Material designation according to selected DIN EN materials standards ³⁾	Applicable materials groups according to CEN ISO/TR 15608
Materials group 7 as defined in CEN ISO/TR 15608 (ferritic, martensitic stainless steels)		
7.1	X2CrNi12 (1.4003) DIN EN 10088 X2CrTi12 (1.4512) DIN EN 10088 X5CrNiMoTi 15-2 (1.4589) DIN 5512-3	7.1
Materials group 8 as defined in CEN ISO/TR 15608 (austenitic stainless steels)		
8.1 without Mo	X5CrNi18-10 (1.4301) DIN EN 10088 X2CrNiN18-7 (1.4318) DIN EN 10088 X6CrNiTi18-10 (1.4541) DIN EN 10088 X6CrNiNb18-10 (1.4550) DIN EN 10088	8.1 without Mo
8.1	X5CrNi18-10 (1.4301) DIN EN 10088 X6CrNiTi18-10 (1.4541) DIN EN 10088 X6CrNiNb18-10 (1.4550) DIN EN 10088 X5CrNiMo17-12-2 (1.4401) DIN EN 10088 X6CrNiMoTi17-12-2 (1.4571) DIN EN 10088 X5CrNiMoTi15-2 (1.4589) DIN EN 10088	8.1, 8.1 without Mo

³⁾ In addition to the steels listed, all steels in the same materials group are also considered to be covered by the approval certificate.

Annex 3, Table 3: Aluminium and aluminium alloys as per DIN EN 573)

Filler metal as per DIN EN ISO 18273	Certified materials	Other materials covered by the approval cert.	Materials group according to CEN ISO/TR 15608
S Al 5556A (AlMg5Mn) or S Al 5356 (AlMg5Cr(A)) or S Al 5087 (AlMg4,5MnZr) or S Al 5183 (AlMg4,5Mn0,7(A))	EN AW-5083 EN AW-7020	EN AW-5049 [Al Mg2Mn0,8] EN AW-5052 [Al Mg2,5] EN AW-5754 [Al Mg3] EN AW-5083 [Al Mg4,5Mn0,7] EN AW-5019 [Al Mg5] EN AW-6060 [Al MgSi] EN AW-6063 [Al Mg0,7Si] EN AW-6005A [Al SiMg] EN AW-6082 [Al Si1MgMn] EN AW-7020 [Al Zn4,5Mg1]	22.2, 22.3, 22.4 23.1, 23.2
S Al 5754 (AlMg 3)	EN AW-5754	EN AW-5052 [Al Mg2,5] DIN EN AW-5754 [Al Mg3]	22.3
S Al 4043 (AlSi5) or S Al 4043A (AlSi5(A))	EN AW-6005A AlSi casting alloys up to 7% Si	EN AW-6005A [Al SiMg] EN AW-6060 [Al MgSi] EN AW-6063 [Al Mg0,7Si] EN AW-6082 [Al Si1MgMn]	23.1
		AlSi and AlSiMg casting alloys	24.1, 24.2
		Al casting alloys in combination with Al wrought alloys	22.1-22.4 / 24.1-24.2 23.1-23.2 / 24.1-24.2
S Al1450 (Al 99,5Ti)	EN AW-1050A	EN AW-1098 [Al 99,98] EN AW-1080A [Al 99,8] EN AW-1050A [Al 99,5] EN AW-1200 [Al 99,0]	21

Annex 3, Table 4: Group classification for cast iron

Certified materials group	Material designation according to selected DIN EN materials standards	Applicable materials groups as defined in CEN ISO/TR 15608
Materials group 71 as defined in CEN ISO/TR 15608 (lamellar graphite cast iron / grey cast iron)		
71	EN-GJL-100 to DIN EN-GJL-350 DIN EN 1561	71
Materials group 72 as defined in CEN ISO/TR 15608 (spheroidal graphite cast iron)		
72	EN-GJS-350 to DIN EN-GJS-900 DIN EN 1563	72
Materials group 73 as defined in CEN ISO/TR 15608 (malleable cast iron)		
73	EN-GJMW-350 to DIN EN-GJMW-800 DIN EN 1562	73

2 Joints between dissimilar materials

Joints between dissimilar materials between materials made from the same or different materials groups are permissible if:

- The materials groups being welded are listed in the approval certificate (individually or in combination),
or
- With the combination CrNi steels / unalloyed steels, the material combination is listed in the approval certificate.

3 Scope of approval certificate in the case of cold-wire feeder systems and hybrid welding processes

If a certified GMAW wire electrode is fed as "cold wire" (e.g. 52 with cold-wire feeding) or if a hybrid welding process is used (e.g. 52 / 135), the scope of the approval certificate with respect to materials is the same as that for the certified GMAW process.

4 Build-up welding

Approval applies only to the tested material listed under "Scope of approval certificate" or for the specified hardness.

5. Rail steels

5.1 Rail joint welding

In addition to the tested rail steel listed under "Scope of approval certificate" and designated in accordance with the DIN EN 13674-1 standard, all rail steels of lower strength are also considered to be covered by the approval certificate, including rail steels designated in accordance with other relevant standards.

Note:

The final 10 mm below the top of the rail shall be welded with a filler metal that has been approved for build-up welding (rail resurfacing) work on the rail steel.

5.2 Rail resurfacing by welding

Approval applies only to the tested rail steel listed under "Scope of approval certificate" and designated in accordance with the DIN EN 13674-1, including rail steels of the same strength designated in accordance with other relevant standards.

Annex 4



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Requirements to be met by filler metals used for joint welding and build-up welding on rail vehicles, railway bridges and other engineering structures

1. General requirements

All of the filler metals listed in **Table 1** may be certified. The restrictions and/or supplementary requirements listed in **Table 2** also apply.

2. Testing of welded joints and weldability

In contrast to the requirement in DIN EN 14532-1, it is sufficient to test the welded joint in welding position PA.

Testing shall always be carried out to verify suitability for root pass welding as set out in DIN EN 14532-1, section 6.2.3.8.

In addition to the provisions of DIN EN 14532-1 to DIN EN 14532-3, weldability tests shall be performed for all of the welding positions included in the application. It shall be established whether the welding parameters specified by the manufacturer enable a defect-free weld to be achieved. If problems arise in a particular welding position, the welded joint made in that welding position shall be subjected to full testing.

3. Supplementary requirements for unalloyed steels and higher strength fine grain structural steels

- Only similar filler metals and low-alloy filler metals are approved for welding joints between unalloyed steels.
- Depending on the first symbol block within the standardised material designation (indicates upper yield limit of the weld metal), the following materials groups may be licensed as per CEN ISO/TR 15608:

1. First symbol block in the standardised designation of the weld metal	Licensable materials group according to CEN ISO/TR 15608
35 (R_{eL} or $R_{p0.2} \leq 355$ MPa) ¹⁾	1.2
42 (R_{eL} or $R_{p0.2} \leq 420$ MPa) ¹⁾	2.1 with $R_{eH} \leq 420$ MPa
46 (R_{eL} or $R_{p0.2} \leq 460$ MPa) ¹⁾	2.1 ($R_{eH} \leq 460$ MPa)
50 (R_{eL} or $R_{p0.2} \leq 500$ MPa) ¹⁾	3.1 ($R_{eH} \leq 500$ MPa)
55 (R_{eL} or $R_{p0.2} \leq 550$ MPa) ¹⁾	3.1 ($R_{eH} = 420$ to 550 MPa)
62 (R_{eL} or $R_{p0.2} \leq 620$ MPa) ¹⁾	3.1 ($R_{eH} = 500$ to 620 MPa)
69 (R_{eL} or $R_{p0.2} \leq 700$ MPa) ¹⁾	3.1 ($R_{eH} = 550$ to 700 MPa)
89 (R_{eL} or $R_{p0.2} \leq 890$ MPa) ¹⁾	3.2 ($R_{eH} = 690$ to 890 MPa)
96 (R_{eL} or $R_{p0.2} \leq 960$ MPa) ¹⁾	3.2 ($R_{eH} = 890$ to 960 MPa)

¹⁾ The lower yield strength (R_{eL}) applies as per DIN EN ISO 16834-A. If the yield point cannot be clearly identified, the 0.2% offset yield strength ($R_{p0.2}$) shall be used

If different grades of steel are to be joined by welding, the minimum requirement to be met by the weld metal shall be that for the steel grade with the lower yield strength.

4. Supplementary requirements for stainless steel filler metals

Only similar filler metals are approved for welding joints between stainless steels.

The welding consumable "18 8 Mn" is only licensable for "Black / White joints" (materials group 8.1 as defined in CEN ISO/TR 15608 with unalloyed steels).

5. Supplementary requirements for aluminium and aluminium alloys

In addition to the weld testing required by DIN EN 14532-3, the following tests shall also be performed for welded joints on aluminium and aluminium alloys:

- Two bending test specimens for each of face-side bend test and root (reverse-side) bend test, Requirements: see DIN EN ISO 15614-2 section 7.4.3.
- 1 microsection,
Requirements: see DIN EN 14532-1 section 6.2.6.5.

6. Supplementary requirements for build-up welding work on unalloyed steels

In addition to the requirements set out in DIN EN 14532-2, filler metals used for resurfacing work shall also be subjected to the following tests and shall meet the following requirements:

6.1 Preparing the test pieces

Depending on the welding process used, a weld in the form of a two-layer or three-layer build-up shall be prepared on the parent metal for which the application is being made for all covered electrode or filler wire diameters. The following tests shall be performed:

- Determination of weldability.
- Materials testing:
 - ♦ surface crack testing using magnetic-particle inspection,
 - ♦ a hardness test (HV10, after surface grinding of build-up weld, surface hardness measured with at least five indentations);
 - ♦ a macrosection (transverse section) and hardness profile at an angle of 15° to the surface from the HAZ to the surface.
- Chemical composition: to be demonstrated using a specimen of the built-up material as detailed in DIN EN ISO 6847.

6.2 Requirements

Filler metals used for build-up welding shall meet the requirements set out in DIN EN 14700, specifically:

- Designation in accordance with DIN EN 14700, section 10.
- Hardness: in accordance with the classification system in DIN EN 14700, Annex A and the scope of the approval being sought by the manufacturer.
- Chemical composition: designation of alloy type in accordance with DIN EN 14700, Table 2.
- Weldability: defect-free build-up welding shall be possible using the welding parameters provided by the manufacturer.
- Macrosection specimen: no internal defects.

6.3 Monitoring of the manufacturing process

Proper monitoring of the process of manufacturing filler metals (as defined in DIN EN 14700) requires that the following procedures be performed on ten manufactured units within a period of two years:

- Chemical analysis of the all-weld metal;
- Surface hardness of a build-up weld after surface grinding.

7. Testing of filler metals

Table 3 summarises all of the necessary tests on filler metals and lists the relevant standard and the required measuring instruments or equipment.

Depending on the type of filler metal, the tests listed in **Table 4** may also be required.

The test results shall be documented in a test report as detailed in DIN EN 14532-1, Annex J or DIN EN 14532-3, Annex D.

Annex 4, Table 1: List of welding filler metal product groups for use in rail vehicle construction

Construction product / Product group	Applicable standard
Welding consumables - Rods, wires and deposits for tungsten inert gas welding of non-alloy and fine grain steels	DIN EN ISO 636: 2017-09
Welding consumables - Covered electrodes for manual metal arc welding of high-strength steels	DIN EN ISO 18275: 2012-07
Welding consumables - Covered electrodes, wires, rods and tubular cored electrodes for fusion welding of cast iron	DIN EN ISO 1071: 2016-05
Welding consumables - Covered electrodes for manual metal arc welding of stainless and heat-resisting steels	DIN EN ISO 3581: 2016-12
Welding consumables - Covered electrodes for manual metal arc welding of non alloy and fine grain steels	DIN EN ISO 2560: 2010-03
Welding consumables - Covered electrodes for manual metal arc welding of creep-resisting steels	DIN EN ISO 3580: 2017-08
Welding consumables - Rods for gas welding of non alloy and creep-resisting steels	DIN EN 12536: 2000-08
Welding consumables - Solid wire electrodes, tubular cored electrodes and electrode/flux combinations for submerged arc welding of non alloy and fine grain steels	DIN EN ISO 14171: 2016-12
Welding consumables - Covered electrodes for manual metal arc welding of nickel and nickel alloys	DIN EN ISO 14172: 2016-02
Welding consumables - Fluxes for submerged arc welding and electrosag welding	DIN EN ISO 14174: 2012-05
Welding consumables - Wire electrodes and weld deposits for gas shielded metal arc welding of non alloy and fine grain steels	DIN EN ISO 14341: 2011-04
Welding consumables - Wire electrodes, strip electrodes, wires and rods for arc welding of stainless and heat resisting steels	DIN EN ISO 14343: 2017-08
Welding consumables - Welding consumables for hard-facing	DIN EN 14700: 2014-07
Welding consumables - Wire electrodes, wires, rods and deposits for gas shielded arc welding of high strength steels	DIN EN ISO 16834: 2012-08
Welding consumables - Tubular cored electrodes for gas shielded and non-gas shielded metal arc welding of non alloy and fine grain steels	DIN EN ISO 17632: 2008-08
Welding consumables - Tubular cored electrodes and rods for gas shielded and non-gas shielded metal arc welding of stainless and heat-resisting steels	DIN EN ISO 17633: 2011-03
Welding consumables - Tubular cored electrodes for gas shielded metal arc welding of creep-resisting steels	DIN EN ISO 17634: 2015-12
Welding consumables - Wire electrodes, wires and rods for welding of aluminium and aluminium alloys	DIN EN ISO 18273: 2014-06
Welding consumables - Solid wire electrodes, solid strip electrodes, solid wires and solid rods for fusion welding of nickel and nickel alloys	DIN EN ISO 18274: 2011-04
Welding consumables - Tubular cored electrodes for gas-shielded and non-gas-shielded metal arc welding of high strength steels	DIN EN ISO 18276: 2017-07
Welding consumables - Wire electrodes, wires, rods and deposits for gas-shielded arc welding of creep-resisting steels	DIN EN ISO 21952: 2012-08
Welding consumables - Solid wire electrodes, tubular cored electrodes and electrode-flux combinations for submerged arc welding of high strength steels	DIN EN ISO 26304: 2011-11
Welding consumables - Solid wires and rods for fusion welding of copper and copper alloys	DIN EN ISO 24373: 2009-08
Welding consumables - Solid wire electrodes, tubular cored electrodes and electrode-flux combinations for submerged arc welding of creep-resisting steels	DIN EN ISO 24598: 2012-08

Annex 4, Table 2: Additional requirements supplementary to those in rail vehicle construction standards

Filler metals	Restrictions / Additional requirements
Covered electrodes	
Covered electrodes for aluminium and aluminium alloys	No approval certification issued for these filler metals.
Deep penetration covered electrodes	
Covered electrodes as per DIN EN ISO 2560 with an electrode efficiency of > 200%	
Coating type "R" and "RC", medium-thick ($D/d < 1.6$) as per DIN EN ISO 2560. ¹⁾ [previously: R3 and R(C)3 as per DIN 1913]	Approval applies only to root pass and light sheet welding ($t \leq 3$ mm) and to welding of reinforcing steel as per DIN EN ISO 17660.
Coating type "RR" with an electrode efficiency $\leq 125\%$ and RC, thick covering ($D/d \geq 1.6$) and a designator for the Charpy V-notch impact energy A or 0 as detailed in DIN EN ISO 2560. ¹⁾ [previously: RR5, RR(C)5, RR6, RR(C)6 as per DIN 1913]	Approval only applies to: • S235 (St 37) with $t \leq 16$ mm and $a \leq 10$ mm • S275 (St 44) with $t \leq 12$ mm and $a \leq 8$ mm • S355 (St 52) with $t \leq 8$ mm and $a \leq 6$ mm.
Coating type "RR" with an electrode efficiency > 125% and RA with an electrode efficiency > 160% as per DIN EN ISO 2560. [previously: RR11 with an efficiency $\geq 150\%$, AR11 with an efficiency $\geq 160\%$ as per DIN 1913]	Approval applies only to fillet welds with $a \leq 10$ mm and to the materials S235 to S355.
¹⁾ D = diameter of electrode covering; d = diameter of core wire	

Annex 4, Table 2 (continued)

Filler metals	Restrictions / Additional requirements
Welding rods, wire electrodes and flux-cored wire electrodes for gas metal arc welding in accordance with DIN EN ISO 636, DIN EN ISO 1071, DIN EN ISO 14341, DIN EN ISO 14343, DIN EN ISO 16834, DIN EN ISO 17632, DIN EN ISO 17633, DIN EN ISO 17634, DIN EN ISO 18273, DIN EN ISO 18274, DIN EN ISO 18276, DIN EN ISO 21952	
For unalloyed steels and fine grain construction steels up to $R_{eH} \leq 500$ MPa	Approval for welding rods, wires and flux-cored wires covers the scope specified in the approval certificate in combination with the tested shield gas(es) as set out in DIN EN 14532-1, Table 4 ²⁾ . The shielding gas main group listed in the approval certificate is designated in accordance with DIN EN ISO 14175. The wall thickness limits in DIN EN ISO 14532-1 do not apply.
For stainless steels, quenched and tempered fine grain construction steels with $R_{eH} > 500$ MPa	Approval for welding rods, wires and flux-cored wires covers the scope specified in the approval certificate in combination with the tested shield gas(es) as set out in DIN EN 14532-1, Table 4 ²⁾ . Shielding gas subgroup listed in the approval certificate is designated in accordance with DIN EN ISO 14175. The wall thickness limits in DIN EN ISO 14532-1 do not apply.
For aluminium and aluminium alloys	Approval for welding rods, wires and flux-cored wires covers the scope specified in the approval certificate in combination with the tested shield gas as set out in DIN EN 14532-3. The shielding gas main group listed in the type-approval certificate is designated in accordance with DIN EN ISO 14175.
For cold-wire laser welding and hybrid laser welding	Approval for GMAW wire electrodes also covers: – welding process 52 with cold-wire feeding – the combined welding processes 52 / 135 or 52 / 131.
Granulated flux and wire electrodes for submerged arc welding in accordance with DIN EN ISO 14171, DIN EN ISO 14174, DIN EN ISO 16834, DIN EN ISO 26304, DIN EN ISO 24598	
Granulated welding flux	Approval for granulated flux applies to the wire electrodes for submerged arc welding (SAW) listed in the scope of the approval certificate and designated in accordance with the relevant standard for SAW wire electrodes. The wall thickness limits in DIN EN ISO 14532-1 do not apply.
Wire electrodes for submerged arc welding	Approval for a SAW wire electrode applies to all approved granular fluxes whose scope of approval contains the relevant SAW wire electrode.
²⁾ If type qualification testing is carried out with shielding gases from two different main groups or subgroups, the testing shall also cover the intermediate gas main groups or subgroups.	

Annex 4, Table 3: Summary of tests to be performed

Parameter / quantity under test	Type of inspection	Relevant standard	Measuring instruments / equipment ¹⁾	Comments
Dimensions - Diameter - Coating thickness - Length - Grain size	Dimensional measurement Dimensional measurement Dimensional measurement Dimensional measurement	DIN EN ISO 544 - DIN EN ISO 544 DIN EN ISO 14174	Vernier callipers Vernier callipers Measuring rod Test sieve	. / .
Physical condition - Adhesion of electrode coating - Clamping surface, ignition surface - Electrode efficiency - Adhesion of copper coat (or similar) - Spools, cast, helix - Surface roughness	Visual inspection Visual inspection, dimensional measurement Dimensional measurement Coiling test, visual inspection Dimensional measurement Visual inspection	- DIN EN ISO 544 DIN EN 22401 - DIN EN ISO 544 DIN EN 14532-3	Visual inspection Visual inspection, measuring rod Scales, vernier callipers, measuring rod Visual inspection, magnifying glass Visual inspection, plane table, measuring rod magnifying glass, microscope	for aluminium only
Marking	Visual inspection	DIN EN ISO 544	Visual inspection	. / .
Chemical composition - Analysis of rod and wire materials - Analysis of weld metal	Analysis Analysis	Handbuch f. d. Eisenhüttenlaboratorium [Lab Manual for Ferrous Metallurgy] also: DIN EN ISO 6847	Chemical laboratory (wet chemical analysis, spectral analysis)	. / .
Weldability	Electrode acceptance test	. / .	Visual inspection	[previously: E DIN 1913-101]
Weld metal - Mechanical properties	Tensile strength tests ²⁾ Notched-bar impact tests	DIN EN ISO 15792-1 DIN EN ISO 5178 DIN EN ISO 6892-1 DIN EN ISO 148-1 DIN EN ISO 9016	Tensile testing machine, pendulum impact tester, cooling equipment, thermometer	. / .
Delta ferrite content	Dimensional measurement	DIN EN ISO 8249	Annex E (EN14532) Metallographic lab	For CrNi alloys only

Annex 4, Table 3: Summary of tests to be performed (continued)

Parameter / quantity under test	Type of inspection	Relevant standard	Measuring instruments / equipment ¹⁾	Comments
Weld - Mechanical properties	Visual inspection Tensile strength testing Bending test ²⁾ Notched-bar impact test	DIN EN ISO 17637 DIN EN ISO 15792-2 (steel) DIN EN ISO 4136 DIN EN ISO 5173 DIN EN ISO 148-1 DIN EN ISO 9016	Visual inspection Tensile testing machine, Bending machine, pendulum impact tester, cooling equipment, thermometer	. / .
- Hardness profile	Hardness testing	DIN EN ISO 9015-1 DIN EN ISO 6507-1 DIN EN ISO 6506-1	Hardness tester after Brinell or Vickers	. / .
- Weld structure / bead sequence	Macrosection Microsection	DIN EN ISO 17639	Metallographic lab	. / .
Susceptibility to hot cracking ³⁾	Double fillet weld test specimen	DIN EN ISO 17641-2	Magnifying glass, surface inspection tools	. / .
Internal defects	Fillet weld test specimen (FW) Butt weld (BW)	DIN EN ISO 15792-3 DIN EN 12517	Destructive and non-destructive testing equipment	. / .
Hydrogen content	Measurement of hydrogen content in weld metal	DIN EN ISO 3690	Lab equipment to determine hydrogen content	. / .
IGC resistance	Cross-over joint test	DIN EN ISO 3651-2	Lab equipment for corrosion testing	. / .

1) In addition to the test instruments and equipment listed, welding equipment may also be needed to make the requisite test pieces / specimens from the particular filler metal under test.

2) Testing in untreated state within 72 hours of the start of the manufacturing process. This test shall be carried out for all ferritic covered electrodes, flux-cored wire electrodes and granulated welding flux with the exception of hydrogen-controlled electrodes of type H5 or H10.

3) Only required for "CrNi alloys with FN<3".

Annex 4, Table 4: Scope of initial testing of welding filler metals

Test	Covered electrodes	GMAW wire and rod electrodes			GMAW flux-cored wire electrodes	Filler metals for SAW		Comments
		for steels	for Al and Al alloys	nickel-based		for unalloyed steels	for CrNi alloys	
Dimensions, physical condition and marking/labelling DIN EN ISO 544 and DIN EN ISO 14174	X	X	X	X	X	X	X	-
Chemical composition DIN EN 14532-1 or -3 and relevant product standards for filler metals	X (weld metal)	X (weld metal, wire electrode)	X (wire electrode)	X (weld metal, wire electrode)	X (weld metal)	X (weld metal, wire electrode)	X (weld metal, wire electrode)	-
Weldability	X	X	X	X	X	X	X	Suppl. test
Weld metal test specimen DIN EN 1597 DIN EN 14532-1 or -3 product standards for filler metals	X	X	X (NDT: RT)	X	X	X	X	-
Weld specimen 1) DIN EN 14532-1 or -3	X	X 2)	X	X	X	X	X	-
Weld structure / bead sequence, hardness profile DIN EN 1043-1	X 3)	X 3)	X 3)	X	X 3)	X	X 3)	-
Susceptibility to cracking DIN EN 14532-1 and DIN EN ISO 17641-2	X CrNi alloy FN<3	-	-	X	X CrNi alloy FN<3	-	X CrNi alloy FN<3	-
Internal defects DIN EN 1435 External defects DIN EN 970	X X	X X	X -	X X	X X	X X	X X	-
Hydrogen test	Only required for hydrogen-controlled filler metals as defined in the relevant product standard or manufacturer's specification.							
IGC resistance	CrNi alloy if specified	CrNi alloy if specified	-	-	CrNi alloy if specified	-	X if specified	Suppl. test
Delta ferrite content DIN EN ISO 8249	CrNi alloy if specified	CrNi alloy if specified	-	-	CrNi alloy if specified	-	X if specified	-

- 1) For X120Mn12 / GJS 400 or S355J2: see Table 5
- 2) For quenched and tempered fine grain steels with $R_{eH} > 500$ MPa, testing of the shielding gas subgroup as per DIN EN ISO 14175 is required in addition to the provisions of DIN EN 14532-1, Table 4. If there are more than two shielding gas subgroups, testing shall be carried out with the shielding gas subgroups with the highest and lowest degree of burn-off.
- 3) The hardness profile does not apply to steels in materials group 8 according to ISO / TR 15608 and Al alloys (21-23 according to materials group ISO / TR 15608).

Annex 4, Table 5: Extent of a weld metal test specimen X120Mn12 (1.3401) with the materials group 72 or 1.2 according to CEN ISO / TR 15608

For the weld specimen X120Mn12 / GJS 400 or X120Mn12 / S355J2 an overlap (X120Mn12, t = 4 – 8 mm) shall be welded as a weld sample, each with a single-layer and multi-layer fillet weld. The scope of testing is given in the following table.

Parameter / quantity under test	Type of inspection	Relevant standard	Measuring instruments / equipment ¹⁾
- Surface inspection	Dye penetrant testing (PT)	DIN EN ISO 3452-1	Penetrant system
- Hardness profile	Hardness testing from the middle macrosection	DIN EN ISO 9015-1 DIN EN ISO 6507-1 DIN EN ISO 6506-1	Hardness tester after Brinell or Vickers
- Weld structure / bead sequence	Three macrosections (beginning, middle, end of weld metal test specimen)	DIN EN ISO 17639	Metallographic lab

Annex 5

DB Systemtechnik
Zertifizierungsstelle für Schweißzusätze
14774 Brandenburg-Kirchmöser, Germany

Requirements to be met by filler metals used for rail joint welding and rail resurfacing by welding

1. Fundamental requirements

Detailed specifications regarding the use of filler metals for resurfacing welding work on rails and other parts of the permanent way and for the welding of rail joints are provided in DB Guideline 824.

Certification of the filler metals is carried out by DB Systemtechnik. The scope of type qualification testing shall be agreed between the **certification body for product certification** and the **product testing centre** (see section 4.1). The certification body for product certification shall specify the product testing centre to be used following consultation with the applicant. Before filler metals are used for work for DB AG, **operational testing** shall be carried out by **DB Netz AG** in addition to type qualification testing.

2. Supplementary requirements to be met by filler metals used for rail joint welding

2.1 Fundamental requirements:

Welded rail joints between rails of R260 grade steel (as defined in DIN EN 13674-1) with a minimum tensile strength of 880 MPa shall exhibit a minimum fatigue strength of 200 MPa (relative to rail foot).

The fatigue strength of welded rail joints shall be determined by means of a flexural fatigue strength test as set out in DIN 50100. Testing shall be carried out on a critical rail joint (critical in terms of the rail profile and the rail material) for which certification is sought.

The manufacturing quality of the weld being tested shall correspond to the subsequent actual state (manufacture in the track/workshop).

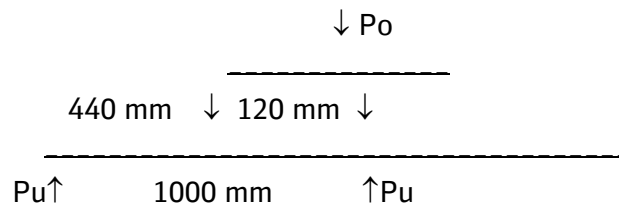
Mechanical aftertreatment of the butt weld interfaces, contrary to any standard aftertreatment, is not permitted.

2.2 Test implementation:

- Test equipment: Servo-hydraulic testing machine
- Position of rails: As determined by existing track geometry
- Transmission of test forces: Via double-roller die
- Load cycle frequency: 60 Hz
- Maximum applied force, minimum applied force, number of load cycles:

Rail profile	Steel grade as per DIN EN 13674-1	Maximum applied force (Po)	Minimum applied force (Pu)	No. of load cycles
UIC	R260, R350HT	- 340 kN	+ 10 kN	2 x 10 ⁶
S 54	R260, R350HT	- 250 kN	+ 10 kN	2 x 10 ⁶
S 49	R260	- 225 kN	+ 10 kN	2 x 10 ⁶

➤ Schematic loading diagram:



3. Supplementary requirements to be met by welding filler metals used in rail resurfacing work

Resurfacing welds on the rail steel included in the application shall meet the following hardness requirements, which depend on the strength of the parent rail steel:

- | | |
|---|--------------|
| - Steel grade R350HT / LHT DIN EN 13674-1 (≤ 1175 MPa): | 350 - 390 HB |
| - Steel grade R320Cr DIN EN 13674-1 (≤ 1080 MPa): | 320 - 360 HB |
| - Steel grade R260 DIN EN 13674-1 (≤ 880 MPa): | 260 - 300 HB |
| - Steel grade R220 DIN EN 13674-1 (≤ 770 MPa): | 220 - 260 HB |
| - Steel grade R200 DIN EN 13674-1 (≤ 680 MPa): | 200 - 240 HB |

To test the filler metal, a stepped three-layer weld shall be built-up on the rail head rail made from the rail steel included in the application, whereby at least 4 beads shall be applied next to each other (see Figure 1).

If the build-up weld necessitates use of a buffer electrode, this shall be applied accordingly under the layers of the build-up weld.

When manufacturing the test specimen a non-overlapped area of min. 70 mm shall be implemented on the first and second layer.

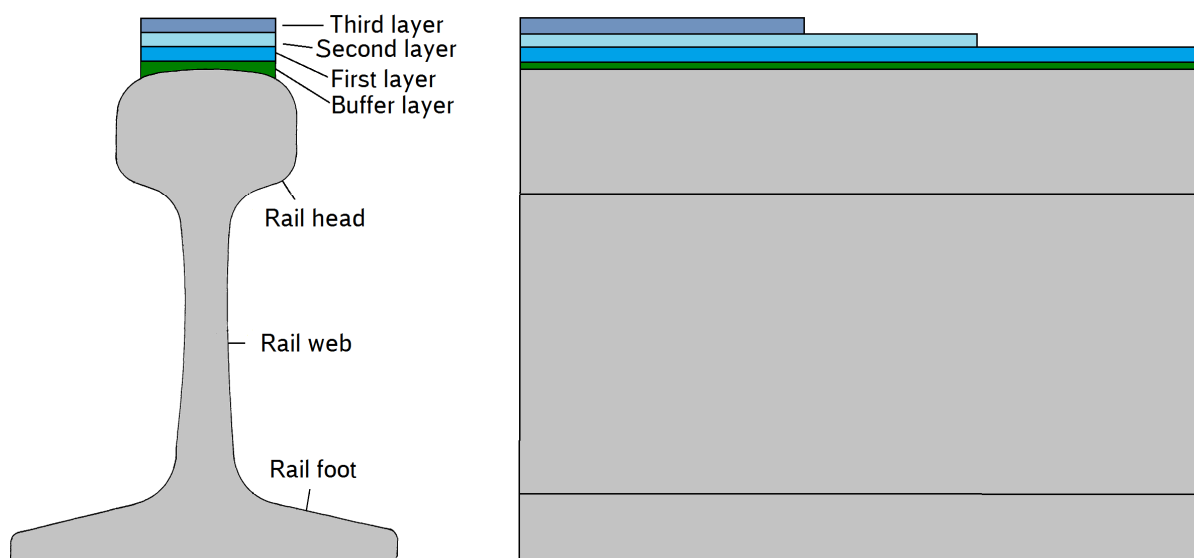


Figure 1 Test specimen for the material examination of welding filler metals

The following tests are to be performed:

- Determination of weldability, flow behaviour and slag formation in the welding positions PA and PC.
- Materials testing
 - Surface crack testing using magnetic-particle inspection,
 - A hardness test HB (after surface grinding of built-up weld),
 - Depending on the number of layers, a macrosection (transverse section) through the rail head for testing of
 - deep penetration and internal defects,
 - hardness profile, HV 10, three rows vertically (weld – HAZ – parent metal); one row laterally along the HAZ, and in the parent metal of the rail head,
 - surface hardness using three hardness indentations after Brinell (HB).
 - One microsection in each case on the microstructure transition of the individual layers with corresponding microstructure description as proof.
- Chemical composition of the weld metal
 - Weld metal specimen (8-layer weld build-up on S235) based on specs in DIN EN 26 847.

4. Operational testing of welding filler metals used in rail resurfacing work

Operational tests are carried out to determine the usability of the filler metals and welding consumables for rail resurfacing work.

Filler metals used in rail resurfacing work shall produce defect-free welds under normal operating conditions and during adverse weather and these surface welds shall exhibit the required hardness under varying loads relative to the parent rail material.

In sections of track that are subject to heavy loading $\geq 60,000$ tonnes of load, three built-up welds shall be made under normal operating conditions (mixed operations) at each of the following locations: in the switch, at common crossings and on the track.

The following material tests shall be carried out:

- a.) After making the test welds:
 - Ultrasonic testing to detect weld defects.
- b.) After a total gross load of 30 million tonnes has been reached
 - Ultrasonic testing to detect internal defects,
 - Examination of wear behaviour (ruler, feeler gauge – indication of length and max. depth of wear),
 - Redetermination of hardness profiles (Equotip, test impactor G).

Annex 6

DB Systemtechnik
Zertifizierungsstelle für Schweißzusätze
14774 Brandenburg-Kirchmöser, Germany

Requirements governing the marking/labelling of filler metals

The following information is to be clearly and durably marked on the smallest possible packaging unit to be supplied:

- Manufacturer, supplier or trader
- Brand name,
- Standardised designation using the classification system "A" for unalloyed and low-alloy steels including classification symbols for yield strength and Charpy V-notch impact energy,
- Dimensions of filler metals,
- Weight or quantity,
- Batch number or production unit,
- CE mark in accordance with DIN EN 13479:2005-03 (see **Fig. 1**), or
CE mark with declaration of performance in accordance with Regulation (EU) No 305/2011 (CPR) (see **Fig. 2**).
- DB approval number,
- Code number identifying the production facility, to be displayed after the DB approval number (see also **Fig. 1** and **Fig. 2**).

If wire electrodes are supplied without packaging (e.g. in mesh boxes), the full designation including CE mark shall be displayed on each spool.

Examples of smallest allowed packaging units: spool for wire electrodes, smallest pack of electrodes.

Fig. 1: Sample label, without reference to a declaration of performance

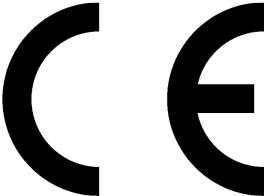
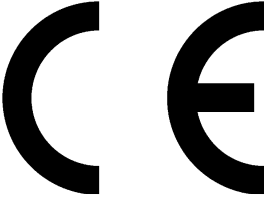
  0035 05 0035-CPD-12345 DIN EN 13479 + DIN EN ISO 14341	<i>Sample brand 100</i>		
	MAG wire electrode for welding unalloyed and low-alloy steels DIN EN ISO 14341-A - G 46 4 M 3Si1 Shielding gas as per DIN EN ISO 14175 - M 21 Approvals: TÜV (00000); GL, DB approval no.: 42.999.01/01 = +  <i>MusterWeld Schweißtechnik KG, 1000 Berlin, Lichtbogenstr. 1</i>		
Weight 15 kg	Serial no. 47111	Ø 1.2 mm	

Fig. 2: Sample label with indication of declaration of performance

  0035 05 Ref. MM100-2013-06 DIN EN 13479 For use in metallic structures or in composite metal and concrete structures	Sample brand 100	
	MAG wire electrode for welding unalloyed and low-alloy steels DIN EN ISO 14341-A - G 46 4 M21 3Si1 Shielding gas as per DIN EN ISO 14175 - M 21 Approvals: TÜV (00000); GL, DB approval no.: 42.999.01/01   MusterWeld Schweißtechnik KG, 1000 Berlin, Lichtbogenstr. 1 www.musterweld.de	
	Weight 15 kg	Serial no. 47111
	Ø 1.2 mm	