BS 7079:2009

BSI British Standards

General introduction to standards for preparation of steel substrates before application of paints and related products

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Publishing and copyright information

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Contents

Summary of pages
This document comprises a front cover, an inside front cover, pages i to ii, pages 1 to 12, an inside back cover and a back cover.

Foreword

Publishing information

This British Standard is published by BSI and came into effect on 31 December 2008. It was prepared by Technical Committee STI/21, *Surface preparation of steel*. A list of organizations represented on this committee can be obtained on request to its secretary.

Information about this document

This revision of BS 7079–0 incorporates changes made necessary by the publication of BS EN ISO standards with single identifying numbers, where previously they were dual-numbered.

Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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1 Scope

This British Standard provides a general introduction to all the steel surface preparation standards. It gives general information on all the separate groups of standards, along with a complete listing of all the published standards that cover abrasive blast-cleaning, hand- and power-tool cleaning and flame cleaning of steel substrates.

This British Standard also includes definitions that are applicable to all the standards listed. Additional definitions, specific to certain processes, are given in the respective standards.

To help the user, all of the 'older' BS 7079 references are given so that the new and/or updated standards can easily be found, as (although some remain dual-numbered) many are now only known by their BS EN ISO reference.

Although the surface preparation standards are primarily intended for use with hot-rolled steel, abrasive blast-cleaning methods, in particular, might also be applicable to the surface preparation of cold-rolled steel of sufficient thickness to withstand any deformation caused by the impact of the abrasive.

The standards are not applicable to non-ferrous substrates such as aluminium or galvanized or electroplated steel.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS EN ISO 4618:2006*, Paints and varnishes – Terms and definitions*

3 Terms and definitions

For the purposes of this British Standard, the terms and definitions given in BS EN ISO 4618:2006 and the following apply.

NOTE 1 A confusing aspect of the terminology in this field is the tendency to use the term "coating" in three senses: for the material applied, the action of applying the material, and the resulting film. In this Standard "coating" is used only for the action, "coat" is used for the resulting film and "coating material" for the material used.

NOTE 2 Where" [BS EN ISO <number>]" appears under a definition, it indicates that the definition is taken from BS EN ISO <number>.

3.1 abrasive blast-cleaning
impingement of a high-kinetic energy stream of an abrasive on the surface to be prepared

[BS EN ISO 4618:2006]

NOTE 1 For details on commonly used abrasives (including terms belonging to a full description) see BS EN ISO 8504-2, the BS EN ISO 11124 series and the BS EN ISO 11126 series.

NOTE 2 Main groups of abrasive blast-cleaning methods are dry abrasive blast-cleaning and wet abrasive blast-cleaning. For details see BS EN ISO 8504-2.

3.2 adhesive strength
sum total of the forces of attachment between a dry film and a substrate

[BS EN ISO 4618:2006]

3.3 anti-corrosive paint
coating material used to retard the corrosion of metals

3.4 blast primer
coating material that is applied to a steel substrate directly after abrasive blast-cleaning

[BS EN ISO 4618:2006]

3.5 blistering
formation of dome-shaped projections in the dry film of coating material by local loss of adhesion and lifting of the film from the underlying surface

NOTE Such projections can contain liquid, vapour or gas.

3.6 cleaned surface
surface from which contaminants have been removed

3.7 coat
continuous layer of a coating material resulting from a single application

[BS EN ISO 4618:2006]

3.8 contaminated surface
surface on which foreign matter is present that can be detrimental to the adhesion and/or durability of a protective coating

NOTE Typical contaminants include dust, rust, laminated rust scale, loose mill scale, oil, grease, welding flux, spatter and slag, soluble salts and other chemical contaminants.

3.9 corrosion
process of deterioration by chemical, electrochemical or microbiological reactions resulting from exposure to the environment

[BS EN ISO 4618:2006]

3.10 de-scaling
removal of mill scale or laminated rust from steel substrates

3.11 durability
property of a coating to resist the deleterious effects of its environment

[BS EN ISO 4618:2006]

3.12 feather edging
tapering, by abrading, of the thickness of the edge of a paint film prior to repainting in order to obscure overlaps

[BS EN ISO 4618:2006]

NOTE "Bevelled back" is also used to describe such tapering.

3.13 flame cleaning
process by which a reducing flame is applied to a surface, followed by manual or mechanical cleaning operations

[BS EN ISO 4618:2006]

3.14 flash rust
rapid formation of a very thin layer of rust on a steel substrate after abrasive blast-cleaning or water jetting

3.15 grit
particles that are predominantly angular, that have fractured faces and sharp edges and that are less than half-round in shape

[BS EN ISO 11124-1:1997, BS EN ISO 11126-1:1997]

3.16 hackles
thin raised slivers of steel, still attached to the substrate, which are caused by the impact of abrasives on a steel surface during blast-cleaning and which sometimes protrude above the other peaks

[BS EN ISO 8503-1:1995]

3.17 hand-tool cleaning
cleaning or preparing steel substrates by the use of hand tools, without power assistance

NOTE Chipping hammers, hand scrapers, hand wire brushes, abrasive papers and plastic fleece with embedded abrasive are generally used. Hand-tool cleaning is sometimes carried out initially in order to remove relatively loose contaminants prior to the use of power tools.

3.18 high-pressure water jetting
water jetting that involves the use of water pressurized to above 70 MPa

NOTE Water jetting using higher pressures might remove loose mill scale from a steel surface, but it does not impart a surface profile to the substrate.

[BS EN ISO 8501-4:2006]

3.19 machine abrading
surface preparation procedure comprising cleaning by thorough mechanical roughening and, if necessary, by rotating wire brushes, possibly supported by the application of needle guns

3.20 mill scale
layer of iron oxides formed during the hot rolling of steel

[BS EN ISO 4618:2006]

3.21 pitting
formation, due to corrosion, of small cavities in a steel substrate

3.22 power-tool cleaning
cleaning or preparing steel substrates by the use of power-assisted hand tools, but excluding blast-cleaning

NOTE Rotary de-scalers, rotary wire brushes, sanding machines, sanding discs, rotary abrasive-coated paper wheels (flap wheels), abrasive grinders, plastic fleece with embedded abrasive, chipping hammers and needle guns, driven by electric or pneumatic power, are examples of equipment generally used.

3.23 pre-fabrication primer
fast-drying primer that is applied to blast-cleaned steel to protect it during fabrication of a structure while still allowing the steel to be welded

[BS EN ISO 4618:2006]

3.24 preparation grade
degree of visual cleanliness of a steel surface after corrosion products and/or contaminants have been removed by a preparation method

[BS EN ISO 4618:2006]

3.25 primary profile
original surface profile prior to surface preparation

3.26 priming coat
first coat of a coating system

[BS EN ISO 4618:2006]

3.27 rogue peaks
isolated peaks, substantially higher than the surrounding peaks, normally caused by the presence of over-sized abrasive in the abrasive mixture used during blast cleaning with grit abrasives

[BS EN ISO 8503-1:1995]

3.28 rust grade
degree of mill scale and rust on a steel surface prior to cleaning

[BS EN ISO 4618:2006]

3.29 secondary profile
surface profile resulting from the effect of surface preparation on the primary profile

3.30 shop primer
protective coating material for application in the workshop to a component that is subsequently to be finished on site

[BS EN ISO 4618:2006]

3.31 shot
particles that are predominantly round, that have a length of less than twice the maximum particle width and that do not have edges, broken faces or other sharp surface defects

[BS EN ISO 11124-1:1997, BS EN ISO 11126-1:1997]

3.32 surface profile
micro-roughness of a surface, generally expressed as the average height of the major peaks relative to the major valleys

3.33 surface profile comparator
specimen surface of known average profile, representing a particular abrasive blast-cleaning process

3.34 water jetting
cleaning a steel substrate by directing a high-speed jet of water onto its surface

NOTE This definition is identical to that in BS EN ISO 8501-4:2006 but the various alternative terms have been omitted.

4 List of standards

The British Standards for preparation of steel substrates before application of paints and related products are listed in Table 1.

Table 1 **STI/21 Standards**

Primary identifier	2nd/old reference	Title (or Part title)
BS 7079:2008	7079-0	Preparation of steel substrates before application of paints and related products – Introduction
BS EN ISO 8501 parts	Preparation of steel substrates before application of paints and related products – Visual assessment of surface cleanliness –	
Part 1:2007	7079-A1, 7079-A1 Supplement 1	Rust grades and preparation grades of uncoated steel substrates and of steel substrates after overall removal of previous coatings
Part 2:2001	7079-A2	Preparation grades of previously coated steel substrates after localized removal of previous coatings
Part 3:2007	7079-A3	Preparation grades of welds, edges and other areas with surface imperfections
Part 4:2006	7079-A4	Initial surface conditions, preparation grades and flash rust grades in connection with high-pressure water jetting

Table 1 **STI/21 Standards** *(continued)*

Primary identifier	2nd/old reference	Title (or Part title)
BS EN ISO 8502 parts	Preparation of steel substrates before application of paints and related products – Tests for the assessment of surface cleanliness –	
Part 2:2005	7079-B2	Laboratory determination of chloride on cleaned surfaces
Part 3:2000	7079-B3	Assessment of dust on steel surfaces prepared for painting (pressure-sensitive tape method)
Part 4:2000	7079-B4	Guidance on the estimation of the probability of condensation prior to paint application
Part 5:2004	7079-B5	Measurement of chloride on steel surfaces prepared for painting (ion detection tube method)
Part 6:2006	7079-B6	Extraction of soluble contaminants for analysis – The Bresle method
Part 8:2004	7079-B8	Field method for the refractometric determination of moisture
Part 9:2001	7079-B9	Field method for the conductometric determination of water-soluble salts
Part 11:2006	7079-B11	Field method for the turbidimetric determination of water-soluble sulfate
Part 12:2004	7079-B12	Field method for the titrimetric determination of water-soluble ferrous ions
BS EN ISO 8503 parts	Preparation of steel substrates before application of paints and related products – Surface roughness characteristics of blast-cleaned steel substrates –	
Part 1:1995	7079-C1	Specifications and definitions for ISO surface profile comparators for the assessment of abrasive blast-cleaned surfaces
Part 2:1995	7079-C2	Method for the grading of surface profile of abrasive blast-cleaned steel – Comparator procedure
Part 3:1995	7079-C3	Method for the calibration of ISO surface profile comparators and for the determination of surface profile – Focusing microscope procedure
Part 4:1995	7079-C4	Method for the calibration of ISO surface profile comparators and for the determination of surface profile – Stylus instrument procedure
Part 5:2004	7079-C5	Replica tape method for the determination of the surface profile
BS EN ISO 8504 parts	Preparation of steel substrates before application of paints and related products – Surface preparation methods	
Part 1:2001	7079-D1	General principles
Part 2:2001	7079-D2	Abrasive blast-cleaning
Part 3:2001	7079-D3	Hand- and power-tool cleaning

Table 1 **STI/21 Standards** *(continued)*

Primary identifier	2nd/old reference	Title (or Part title)
BS EN ISO 11124 parts	Preparation of steel substrates before application of paints and related products – Specifications for metallic blast-cleaning abrasives –	
Part 1:1997	7079-E1	General introduction and classification
Part 2:1997	7079-E2	Chilled-iron grit
Part 3:1997	7079-E3	High-carbon cast-steel shot and grit
Part 4:1997	7079-E4	Low-carbon cast-steel shot
BS EN ISO 11125 parts	Preparation of steel substrates before application of paints and related products – Test methods for metallic blast-cleaning abrasives –	
Part 1:1997	7079-E6	Sampling
Part 2:1997	7079-E7	Determination of particle size distribution
Part 3:1997	7079-E8	Determination of hardness
Part 4:1997	7079-E9	Determination of apparent density
Part 5:1997	7079-E10	Determination of percentage defective particles and of microstructure
Part 6:1997	7079-E11	Determination of foreign matter
Part 7:1997	7079-E12	Determination of moisture
BS EN ISO 11126 parts	Preparation of steel substrates before application of paints and related products – Specification for non-metallic blast-cleaning abrasives –	
Part 1:1997	7079-F1	Group F: Non-metallic blast-cleaning abrasives – Part F1:General introduction and classification
Part 3:1998	7079-F3	Copper refinery slag
Part 4:1998	7079-F4	Coal furnace slag
Part 5:1998	7079-F5	Nickel refinery slag
Part 6:1998	7079-F6	Iron furnace slag
Part 7:2001	7079-F7	Fused aluminium oxide
Part 8:1998	7079-F8	Olivine sand
Part 9:2004	7079-F9	Staurolite
Part 10:2004	7079-F10	Almandite garnet
BS EN ISO 11127 parts	Preparation of steel substrates before application of paints and related products – Test methods for non-metallic blast-cleaning abrasives –	
Part 1:1998	7079-F11	Sampling
Part 2:1998	7079-F12	Determination of particle size distribution
Part 3:1998	7079-F13	Determination of apparent density
Part 4:1998	7079-F14	Assessment of hardness by a glass slide test
Part 5:1998	7079-F15	Determination of moisture
Part 6:1998	7079-F16	Determination of water-soluble contaminants by conductivity measurement
Part 7:1998	7079-F17	Determination of water-soluble chlorides
DD ISO/TR 15235:2001	—	Preparation of steel substrates before application of paints and related products – Collected information on the effect of levels of water-soluble salt contamination

NOTE The dates above were correct at the time of publication; users are reminded to check if they are the latest edition.

5 Further information

5.1 The BS EN ISO 8501 series

5.1.1 General

The standard comprises four separate parts describing and illustrating the results of cleaning new steelwork and previously coated steel by a range of methods before application of protective coatings.

The standard covers the preparation of surface imperfections, the removal of millscale, rust and previous paint coatings by blast cleaning, or hand- or power-tool cleaning, or flame cleaning or machine abrading; and the removal of rust and previous paint coatings by high-pressure water jetting.

Each of the standards covering paint, rust and millscale removal describes and illustrates a range of initial conditions and the corresponding range of differing degrees of cleanliness. The part covering surface imperfections describes and illustrates imperfections encountered in steelwork and specifies grades for their preparation.

This ISO 8501 series will be of use to contractors, specifiers, paint suppliers and inspectors in a range of industries who are responsible for defining the degree of surface preparation needed to meet the performance requirements of the specified paint system.

5.1.2 BS EN ISO 8501-1

This part of the standard describes blast cleaning, hand- and power-tool cleaning, and flame cleaning as methods of preparing steel surfaces prior to the application of a protective coating system and this standard specifies a series of preparation grades utilizing written descriptions and photographic examples.

The standard comprises an A5 book describing and illustrating four initial surface conditions (A, B, C, and D) of steel with varying degrees of rust and millscale. There are four preparation grades by blast cleaning for initial surface conditions B, C, and D, and two for initial surface condition A. There are two preparation grades by hand- and power-tool cleaning for initial surface conditions B, C, and D, and one preparation grade by flame cleaning for initial surface conditions A, B, C, and D. In total, there are twenty eight photographic examples.

Different abrasives used for blast cleaning can impart a change in colour and appearance to the steel. A series of photographs depicting the preparation grade C Sa 3 are included for six different abrasives to illustrate the effect.

The standard will be of use to contractors, specifiers, paint suppliers and inspectors in a range of industries who are responsible for defining the degree of surface preparation needed to meet the performance requirements of the specified paint system.

5.1.3 BS EN ISO 8501-2

This part of the standard describes blast cleaning, hand- and power-tool cleaning, and machine abrading as methods of preparing steel surfaces prior to the application of a protective coating system and this standard specifies a series of preparation grades utilizing written descriptions

and photographic examples. It supplements ISO 8501-1 by dealing with localized removal of previous paint coatings typified in maintenance painting operations.

The standard comprises an A5 book describing three preparation grades by blast cleaning, two for hand- and power-tool cleaning, and one for machine abrading. Photographic examples are shown to illustrate the general surface appearance before and after localized preparation by blast cleaning and by machine abrading. The fourteen photographs are typical examples of instances encountered in practice and are described fully in the text.

The standard will be of use to contractors, specifiers, paint suppliers and inspectors in a range of industries who are responsible for defining the degree of surface preparation needed to meet the performance requirements of the specified paint system.

5.1.4 BS EN ISO 8501-3

This part of the standard describes imperfections at welds, cut edges and other areas of steel substrates which are generally starting points for corrosion. This part of ISO 8501 defines certain imperfections and preparation grades for such areas.

The standard lists three preparation grades for making steel surfaces with imperfections suitable for application of paints and related products. Requirements for each of the preparation grades are tabulated for commonly found imperfections. Six types of imperfection on welds, three types of imperfection at edges and six types of imperfection on steel surfaces generally are contained in the table and illustrated with line drawings.

The standard will be of particular interest to inspectors, when approving surface preparation before and/or after an abrasive blast-cleaning process. It will also be of general interest to specifiers, contractors and paint suppliers.

5.1.5 BS EN ISO 8501-4

This part of the standard has been published in A5 format and is intended to be a tool for the visual assessment of initial surface conditions, preparation grades and flash rust grades in connection with high-pressure water jetting.

The standard specifies a series of preparation grades for steel surfaces after removal/partial removal of water-soluble contaminants, rust, previous coatings and foreign matter by high-pressure water jetting. The various grades are defined by written descriptions, together with photographs that are representative examples within the tolerances for each grade as described in words. Twenty-three representative photographic examples have been included.

Five initial surface conditions are defined; three of them applicable to degraded paint coatings and two applicable to damaged pre-fabrication primers. Three preparation grades for each initial surface condition, after partial or full removal of previous paint coatings by high-pressure water jetting, indicate the degree of cleaning required. Three flash rust grades, after pretreatment by high-pressure water jetting, are also specified.

The standard provides instruction on the procedure for visual assessment and will be of use to inspectors in a range of industries

who are responsible for approving the degree of surface preparation needed to meet the performance requirements of the specified paint system. The standard will also be of interest to specifiers, contractors and paint suppliers.

5.2 The BS EN ISO 8502 series

This standard comprises nine separate parts describing test methods to determine the cleanliness of a steel substrate prior to the application of paint and related products.

The test methods describe procedures for the extraction of soluble salts and the determination of ferrous ions, chloride ions, and sulphate ions in the field (in the case of chloride ions a laboratory determination is also provided). The test methods utilise titration, ion detection tubes, conductivity, refractometry, and turbidimetric techniques. Other parts in the series provide a guide to the estimation of the probability of moisture, a method for the determination of moisture, and a method for the assessment of dust on a steel surface.

Soluble salts, dust and moisture on a steel surface immediately prior to painting are some of the principal contaminants that can significantly influence the performance of protective coatings of paint and related products. By utilising the test methods incorporated in this standard the paint supplier, contractor, end user, and other interested parties should be able to ascertain whether the requirements of the specification, in respect of surface contaminants, have been achieved.

5.3 The BS EN ISO 8503 series

This standard, which consists of five separate parts, describes field methods for assessing the grade of the surface profile produced on steel substrates by abrasive blast-cleaning, prior to the application of paints and related products. The field methods use either surface profile comparators or replica tape and a micrometric gauge.

The series specifies two ISO surface profile comparators (one for grit-blasted surfaces and one for shot-blasted surfaces), sets out the procedure for their use and defines two laboratory methods for their calibration. Also described is the replica tape method for determination of surface profile.

The ISO 8503 series will be of particular use not only to inspectors required to determine the surface profile of blast-cleaned steel substrates but also to instrument manufacturers and test houses offering calibration services.

5.4 The BS EN ISO 8504 series

This standard comprises three parts describing surface preparation methods. These cover general principles to be considered and in more detail abrasive blast-cleaning and hand- and power-tool cleaning.

The parts are applicable to new steelwork and previously coated steel. They describe the effectiveness of each method and give information on their fields of application.

The parts contain information on features that should be taken into account both before the preparation method is selected and before the preparation grade is specified.

By using these parts of the standard, specifiers, paint suppliers, end-users, contractors and other interested parties are able to select the most appropriate methods to achieve the best performance for each paint system, considering the conditions, requirements and restrictions that might apply.

5.5 The BS EN ISO 11124 series

This standard describes a range of metallic blast-cleaning abrasives for the preparation of steel substrates before the application of paints or related products. It specifies the characteristics of each metallic abrasive and also the abbreviation for each product to be used for identification and specification purposes.

5.6 The BS EN ISO 11125 series

This standard describes a range of methods dealing with the sampling and testing of metallic abrasives used in blast cleaning applications.

5.7 The BS EN ISO 11126 series

This standard describes a range of non-metallic blast-cleaning abrasives for the preparation of steel substrates before the application of paints or related products. It specifies the characteristics of each non-metallic abrasive and also the abbreviation for each product to be used for identification and specification purposes.

5.8 The BS EN ISO 11127 series

This standard describes a range of methods dealing with the sampling and testing of non-metallic abrasives used in blast cleaning applications.

Bibliography

For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies. The documents below are specifically referenced in the text (for example, in Clause **3**).

BS EN ISO 4618:2006*, Paints and varnishes – Terms and definitions*

BS EN ISO 8501-4:2006*, Preparation of steel substrates before application of paints and related products. Visual assessment of surface cleanliness – Part 4: Initial surface conditions, preparation grades and flash rust grades in connection with high-pressure water jetting*

BS EN ISO 8503-1:1995, BS 7079-C1:1989*, Preparation of steel substrates before application of paints and related products – Surface roughness characteristics of blast-cleaned steel substrates – Part 1: Specifications and definitions for ISO surface profile comparators for the assessment of abrasive blast-cleaned surfaces*

BS EN ISO 8504-2:2001, BS 7079-D2:2000*, Preparation of steel substrates before application of paints and related products – Surface preparation methods – Part 2: Abrasive blast-cleaning*

BS EN ISO 11124 series*, Preparation of steel substrates before application of paints and related products – Specifications for metallic blast-cleaning abrasives*

BS EN ISO 11124-1:1997*, Preparation of steel substrates before application of paints and related products – Specifications for metallic blast-cleaning abrasives – Part 1: General introduction and classification*

BS EN ISO 11126 series*, Preparation of steel substrates before application of paints and related products – Specifications for non-metallic blast-cleaning abrasives*

BS EN ISO 11126-1:1997, BS 7079-F1:1997*, Preparation of steel substrates before application of paints and related products – Group F: Non-metallic blast-cleaning abrasives – Part F1: General introduction and classification*

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