Road and Transportation Research Association (FGSV)
Working Group Aggregates, Unbound Pavements

FGSV

TL Gestein-StB 04/23

Technical Delivery Terms for Aggregates in Road Construction

Edition 2004 | Version 2023

R 1

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Preliminary note

The "Technical delivery conditions for aggregates in road construction", Edition 2004/Version 2023 (TL Gestein-StB 04/23) were drawn up by the Road and Transportation Research Association (FGSV) in the working committee on "Aggregates". They replace the "Technical delivery conditions for aggregates in road construction", Edition 2004/Version 2018 (TL Gestein-StB 04).

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1 Introduction

1.1 General

The "Technical delivery conditions for aggregates in road construction" (TL Gestein-StB) contain requirements placed on natural, industrially manufactured and recycled aggregates that are used in the production of pavements made of asphalt, concrete, hydraulically bound and unbound aggregate mixtures, cobble and slab paving, as well as for aggregates as chipping material for slurry surfacing and surface dressing for producing asphalt overlays. The TL Gestein-StB are also to be applied for bituminous construction methods in the area of structural maintenance – spraying and chipping, surface dressing, thin cold mix asphalt overlays, thin hot mix asphalt overlays on a sealing.

By the TL Gestein-StB the following European standards are implemented in Germany

- DIN EN 12620:2008-07 "Aggregates for concrete",
- DIN EN 13043:2002-12 (Corrigendum 2004-12) "Aggregates for bituminous mixtures and surface treatments for roads, airfields and other trafficked areas",
- DIN EN 13242:2008-03 "Aggregates for unbound and hydraulically bound materials for use in civil engineering work and road construction".

Categories from the European standards for the properties of aggregates which are required for application in Germany are specified in the TL Gestein-StB. Annexes E to H only list those properties of the aggregates for which the test value is to be determined. The "Technical test instructions for test equipment monitoring in road construction" (TP Prüfmittelüberwachung-StB) and, in the case of test methods according to the European standards, the specifications of the "Technical test instructions for aggregates in road construction" (TP Gestein-StB) must be considered.

The TL Gestein-StB also contain requirements for environmentally relevant characteristics of industrially manufactured and recycled aggregates. The provisions of the "Substitute Construction Materials Ordinance, for the new version of the Federal Soil Protection Ordinance and for the revision of the Landfill Ordinance and the Commercial Waste Ordinance, Article 1: Ordinance on Requirements for the Installation of Mineral Substitute Construction Materials in Technical Structures)" (Substitute Construction Materials Ordinance (EBV)) are implemented.

Aggregates that have been lawfully manufactured and/or placed on the market in another European Union Member State or in Turkey or that have been lawfully manufactured in an EFTA state that is a contracting

party to the EEA Agreement shall be treated as equivalent in Germany if they permanently guarantee a level of protection that corresponds to the level defined in these TL Gestein-StB.

The notification method for the TL Gestein-StB 04, Edition 2004, was carried out with the European Communities under No. 2004/ 0071/D. The obligations arising from European Parliament and Council Directive 98/34/EC of 22 June 1998, relating to a procedure for the provision of information in the field of technical standards and regulations and of rules on Information Society services (ABI. EC No. L 204 p. 37), amended by Directive 98/48/EC of the European Parliament and of the Council of 20 July 1998 (ABI. EC No. L 217 p. 18) have been observed.

1.2 Scope

The TL Gestein-StB apply to the supply of aggregates as gritting material for slurry surfacing and for producing bituminous mixtures, concrete, hydraulically bound and unbound construction material mixtures, cobble and slab paving for road and path construction and other traffic areas. The TL Gestein-StB are also to be applied for the supply of aggregates for bituminous construction methods in the area of structural maintenance – spraying and gritting, surface treatments, thin cold mix asphalt overlays, thin hot mix asphalt overlays on the road seal.

1.3 Terminology

1.3.1 General

Category: Characteristic level for the quality of an aggregate, expressed as a range of values or a limiting value.

Note: The categories for different properties bear no relationship to one another.

Population: Production quantity, delivery quantity, partial delivery quantity (e.g. goods wagon, truck, shipload) or depot, which have been manufactured during a period of time assuming the same conditions.

Note: In the case of a continuous process, the quantity produced during a defined period should to be taken as the population.

1.3.2 Aggregates

Aggregate: Granular material for use in construction. Aggregates can be manufactured naturally, industrially or consist of recycled material. A distinction is made between coarse aggregates (see Table A), fine aggregates (see Table B) and fillers.

Note: Aggregates that do not meet the definitions for either fine or coarse aggregates (e.g. 1/3; 2/3 or 2/4) are treated as coarse aggregates.

Natural aggregate: Aggregate from mineral deposits that have been subjected to mechanical processing only.

Note: This includes gravel, sand, crushed gravel and crushed solid rock.

Mineral substitute construction material (MEB): Mineral construction material that is produced as waste or as a by-product in processing plants or during construction projects (e.g. deconstruction, demolition, remodelling, new construction and maintenance) and that are suitable and intended for installation in technical structures directly or after processing and that are classified directly or after reconditioning as air-cooled blast furnace slag, granulated blast furnace slag, steel furnace slag, foundry-cupola furnace slag, slag from copper production, recycled foundry sand, boiler slag, hard coal bottom ash, hard coal fly ash, brown coal fly ash, municipal incinerator bottom ash, recycled aggregates, track ballast.

Note: Soils and excavated material are regulated by TL BuB E-StB.

Industrially manufactured aggregate: Aggregate of mineral origin that has been created industrially under the influence of thermal or other processes.

Note: The following are used in Germany: Air-cooled blast furnace slag (HOS), granulated blast furnace slag (HS), steel-making slag (SWS), slag from copper production (CUM), foundry-cupola furnace slag (GKOS), hard coal fly ash (SFA), boiler slag (SKG), bottom ash from coal-fired power plants (SKA), recycled foundry sand (GRS), municipal incinerator bottom ash (HMVA) and aggregates for brightening.

Recycled aggregate: Aggregate created by reconditioning inorganic or mineral materials used previously as construction material. This also includes processed track ballast (GS).

Note: Recycled aggregates can also be manufactured from production residues or non-conforming products, e.g. crushed unused concrete.

Particle size classification: Designation of an aggregate grading employing bottom (d) and top (D) sieve sizes, expressed as d/D.

Note: This designation implies that no particles remain in the top sieve and none fall through the bottom one. The lower sieve size (d) can be zero.

Particle size group/Particle size fraction: Designation of an aggregate grading employing bottom (d) and top (D) sieve sizes, expressed as d/D.

Note: This designation implies that some particles remain in the top sieve (oversized particles) and some fall through the bottom sieve (undersized particles). The lower sieve size (d) can be zero.

Undersized particle: Portion of an aggregate that falls through the smaller sieve characterising the particle size group/particle size fraction (aggregate size).

Oversized particle: Portion of an aggregate that remains in the larger sieve characterising the particle size group/particle size fraction (aggregate size).

Coarse aggregate: Designation of the particle size groups according to Table A.

Table A: Coarse aggregate, designation of the particle size groups with

d	*D*	Comment
≥ 2 mm	≥ 4 mm	Area of application, concrete (pursuant to DIN EN 12620)
≥ 2 mm	≤ 45 mm	Area of application, asphalt (pursuant to DIN EN 13043)
≥ 1 mm	> 2 mm	Area of application, layers without binder, hydraulically bound layers, (pursuant to DIN EN 13242), cobble and slab paving

Fine aggregate: Designation of the particle size groups according to Table B.

Table B: Fine aggregate, designation of the particle size groups with

d	*D*	Comment
–	≤ 4 mm	Area of application, concrete (pursuant to DIN EN 12620)
–	≤ 2 mm	Area of application, asphalt (pursuant to DIN EN 13043)
0 mm	≤ 6.3 mm	Area of application, layers without binder, hydraulically bound layers, (pursuant to DIN EN 13242), cobble and slab paving
Note: Fine aggregates can be produced by natural disintegration or crushing solid rock or gravel as well as processing industrially manufactured aggregates.		

All-in aggregate: Aggregate consisting of a mixture of coarse and fine aggregates.

Note: The mixture can be produced without previous separation into coarse and fine aggregates or by mixing coarse and fine aggregates.

Fines: Particle size classification of an aggregate which passes through the 0.063 mm sieve.

Filler: Aggregate, the major part of which passes through the 0.063 mm sieve.

Mixture filler: Filler of mineral origin which has been mixed with calcium hydroxide.

Foreign filler: Filler of mineral origin which has been specially manufactured.

Particle size distribution: Particle size composition (grading), expressed by the amount of material in % by weight passing through a specified number of sieves.

1.3.3 Further terms (national)

Crushed sand: Fine aggregate produced by artificial crushing processes.

Natural sand: Fine aggregate produced by natural crushing processes.

Gravel: Coarse aggregate produced by natural crushing processes.

Grit: Coarse aggregate ($D \leq 32$ mm) produced by artificial crushing processes.

Road grit: Coarse aggregate ($D \leq 5$ and $d \geq 1$), produced by artificial crushing processes and used as gritting material.

Crushed stone: Coarse aggregate ($d \geq 32$ mm and $D \leq 63$ mm) produced by artificial crushing processes.

Recycled construction material (RC): Recycled aggregate. This does not include processed track ballast (GS).

RC mixture: Construction material mixture consisting of recycled aggregates and natural and/or industrially produced aggregates.

1.4 Basic principles

The limiting values and tolerances stated in the following contain both the scatter for sampling, sample division and the confidence intervals of the test methods (reproducibility) as well as production-related irregularities, insofar as no other arrangement has been made in individual cases.

In the following, when stating the dimension of the values, the "percentage share of the mass" is referred to as "% by weight" and the "percentage share of the volume" as "% by volume".

If conformity with a category is based on a value for a particular property that does not exceed a predefined value, then meeting the requirements for a more stringent category (lower value) automatically implies meeting the requirements for all less stringent categories (i.e. higher values). Conversely, for categories based on a value for a particular property that is not less than a predefined value, meeting the requirements for a more stringent category (higher value) automatically implies meeting the requirements for all less stringent categories (i.e. lower values).

If a value is required for a property, but no limiting values are specified, then it should be referred to as a category $XX_{declared}$, e.g. the value 55 for the flakiness index is expressed by the designation $FI_{declared}55$ (specified category).

2 Requirements for aggregates

2.1 General

The aggregates shall be extracted, processed and stored in such a way that they have consistent properties and meet the requirements set out below.

In the case of municipal incinerator bottom ash (HMVA), batches with too low, i.e. insufficient, burnout are to be excluded from processing. The HMVA must be stored in a moist place for at least three months after processing.

Weathered and contaminated portions of aggregates must be removed. The aggregates must be sufficiently resistant to weathering. They shall not contain material in quantities detrimental to weathering resistance (soundness), or that swells, disintegrates, dissolves or reacts chemically (e.g. marly and clayey particles, certain clay and mica minerals, pyrite, marcasite, gypsum, calcium and magnesium oxides). The particle size groups/particle size fractions may not contain coarse material of organic origin such as wood or plant remains, or impurities such as metals or plastics, in detrimental quantities.

The following specifies further properties and their associated requirements for the aggregates specific to the scope of validity of the TL Gestein-StB as well as the associated requirements by naming the categories in the aforesaid standards. The category names are taken directly from the respective standards.

No verification (test) is required for properties for which the category "X_{NR}" is specified. The specified values are to be stated for properties for which the category "$X_{declared}$" is specified.

The necessity of testing the properties results from the requirements of the area of applications (see Annexes E to H).

2.1.1 Material identification

The mineralogical features of the natural aggregates and reconditioned track ballast (GS) are to be determined pursuant to DIN EN 932-3.

For recycled aggregates (with the exception of reconditioned track ballast (GS)), the material composition is to be determined and stated pursuant to DIN EN 933-11. For municipal incinerator bottom ash (HMVA), the material composition is to be determined and stated according to TP Gestein-StB, Part 3.1.4. The requirements in Annex B are to be complied with.

2.1.2 Particle density

If required, the particle density for fine and coarse aggregates or all-in aggregates is to be determined and stated pursuant to DIN EN 1097-6.

If the particle density is required as an input variable for further physical determinations, it shall be determined pursuant to DIN EN 1097-6:2022, Annex A.

Note: Empirical values for the particle size groups/particle size fractions between 2 and 45 mm are stated in Annex A. They do not count as requirements.

The particle density for the particle size group/particle size fractions "Filler" is to be determined pursuant to DIN EN 1097-7 for the particle size classification 0/0.125 mm and stated.

2.1.3 Water absorption

If required, the water absorption for fine and coarse aggregates or all-in aggregates is to be determined and stated pursuant to DIN EN 1097-6.

If water absorption is required as a criterion for testing the resistance to freeze-thaw attack, the test is carried out according to Section 2.2.14.1.

2.1.4 Loose bulk density

If required, the loose bulk density for fine and coarse aggregates or all-in aggregates is to be determined and stated pursuant to DIN EN 1097-3.

2.2 Fine and coarse aggregates, all-in aggregates

2.2.1 Particle size group/Particle size fraction

Particle size groups/Particle size fractions must be specified for aggregates using the sieve sizes stated in Table 1.

Table 1: Sieve sizes for specifying particle size groups/particle size fractions

Sieve size [mm]													
0	1	2	3.15 (3)	4	5.6 (5)	8	11.2 (11)	16	22.4 (22)	31.5 (32)	45	56	63
Note: The rounded sieve sizes in brackets are used for designating aggregates.													

2.2.2 Particle size distribution

The particle size groups according to Table 2 are to be used. Their particle size distribution is to be determined pursuant to DIN EN 933-1 and must meet the requirements in Table 2.

Table 2: General requirements for particle size distribution

Row	Particle size group[a] *d/D* [mm]/[mm]	Category	Sieve passage as % by weight				
		G	*2D*	*1.4D*[e]	*D*[f]	*d*	*d/2*[e]
1	Fillers	see table 26					
2[c]	0/2	G_F85	100	–	85 – 99	–	–
3[b],[c]	2/5	G_C90/10	100	100	90 – 99	0 – 10	0 – 2
4[b],[c]	5/8	G_C90/15	100	98 – 100	90 – 99	0 – 15	0 – 5
5[b],[c]	8/11	G_C90/15	100	98 – 100	90 – 99	0 – 15	0 – 5
6[b],[c]	11/16	G_C90/15	100	98 – 100	90 – 99	0 – 15	0 – 5
7[b],[c]	16/22	G_C90/15	100	98 – 100	90 – 99	0 – 15	0 – 5
8[c]	0/5	G_A85	100	98 – 100	85 – 99	–	–
9[d]	0/5	G_F80	100	98 – 100	80 – 99	–	–
10[c]	5/11	G_C90/20	100	98 – 100	90 – 99	0 – 20	0 – 5
11[d]	5/11	G_C80/20	100	98 – 100	80 – 99	0 – 20	0 – 5
12[c]	11/22	G_C90/20	100	98 – 100	90 – 99	0 – 20	0 – 5
13[d]	11/22	G_C80/20	100	98 – 100	80 – 99	0 – 20	0 – 5
14[c]	22/32	G_C90/20	100	98 – 100	90 – 99	0 – 20	0 – 5
15[d]	22/32	G_C80/20	100	98 – 100	80 – 99	0 – 20	0 – 5
16[c]	32/45	G_C90/20	100	98 – 100	90 – 99	0 – 20	0 – 5
17[d]	32/45	G_C80/20	100	98 – 100	80 – 99	0 – 20	0 – 5
18[c]	45/56	G_C90/20	100	98 – 100	90 – 99	0 – 20	0 – 5
19[d]	45/56	G_C80/20	100	98 – 100	80 – 99	0 – 20	0 – 5
20[b]	0/2	G_F85	100	95 – 100	85 – 99	–	–
20a[d]	0/2	G_F85	100	98 – 100	85 – 99	–	–
21[b]	0/4	G_F85	100	95 – 100	85 – 99	–	–
21a[d]	0/4	G_F85	100	98 – 100	85 – 99	–	–
22[b]	2/4	G_C85/20	100	98 – 100	85 – 99	0 – 20	0 – 5
22a[b]	2/8	G_C85/20	100	98 – 100	85 – 99	0 – 20	0 – 5
23[b]	4/8	G_C85/20	100	98 – 100	85 – 99	0 – 20	0 – 5
24[b],[c]	8/16	G_C85/20	100	98 – 100	85 – 99	0 – 20	0 – 5
25[b],[c]	16/32	G_C85/20	100	98 – 100	85 – 99	0 – 20	0 – 5
26[d]	2/4	G_C80/20	100	98 – 100	80 – 99	0 – 20	0 – 5
27[d]	2/8	G_C80/20	100	98 – 100	80 – 99	0 – 20	0 – 5
28[d]	4/8	G_C80/20	100	98 – 100	80 – 99	0 – 20	0 – 5
29[d]	8/16	G_C80/20	100	98 – 100	80 – 99	0 – 20	0 – 5
30[d]	16/32	G_C80/20	100	98 – 100	80 – 99	0 – 20	0 – 5
31[d]	32/63	G_C80/20	100	98 – 100	80 – 99	0 – 20	0 – 5

Table 2 (continued)

a) The use of the particle size groups is regulated in Annexes E to H.
b) Category from DIN EN 12620
c) Category from DIN EN 13043
d) Category from DIN EN 13242
e) If the sieves calculated from 1.4*D* and *d*/2 do not conform with ISO 565:1990, R20 series exactly, the next largest or smallest sieve opening width must be used instead.
f) If the percentage passing is *D* = 100% by weight, the manufacturer shall document and declare the typical particle size distribution, including the sieves *D, d, d*/2 and the intermediate sieves between *d* and *D* according to Table 1.

Note: For particular areas of application, particle size groups/particle size fractions 1/3; 2/3 and 2/4 mm in category G_C90/10 may be used. The sieve sizes 0.5; 1.0; 2.0; 3.15; 4.0; 4.5; 5.6; 6.3 and 8 mm apply.

For particle size groups of coarse aggregates not listed in Table 2, regardless of how they are produced, the requirements of category G_C90/15 apply to oversized and undersized fractions and the requirements of Table 3 to aggregate passing the intermediate sieve. The manufacturer must record and state the typical amount of material passing this sieve and the selected tolerances from the categories in Table 3.

Table 3: Limits and tolerances for coarse aggregates passing through intermediate sieves

Particle size groups	***D/d***	**Intermediate sieve[a]** **[mm]**	**Limiting value** **% by weight**	**Tolerance, related to the typical passage** **% by weight**	**Category**
Particle size group according to Table 2	No requirement				G_{NR}
Combination of particle size groups according to Table 2	< 4	*D*/1.4	20 to 70	± 15	$G_{20/15}$[b] or $GT_C20/15$[c]
			25 to 70	± 15	G_T15[d]
	≥ 4	*D*/2	20 to 70	± 17.5	$G_{20/17,5}$[b] or $GT_C20/17.5$[c]
			25 to 70	± 17.5	$G_T17.5$[d]
	No requirement				G_{NR}[b] or GT_{NR}[c]

a) If the intermediate sieves calculated and stated above do not conform with ISO 565:1990, R20 series exactly, the next largest or smallest sieve opening width must be used instead.
b) Category from DIN EN 13043
c) Category from DIN EN 13242
d) Category from DIN EN 12620

In addition, the requirements of Table 4 apply to aggregates of the particle size groups/particle size fractions 0/2, 0/4 and 0/5 as well as all-in aggregates 0/8. The manufacturer shall document the typical particle size distribution of these aggregates and state them, if required. The tolerances must correspond to the requirements specified in Table. 4.

Category G_A85 in DIN EN 13043 and/or in DIN EN 13242 is valid for all-in aggregates with $d = 0$ and $D > 8$ mm. Requirements are not specified for material passing the intermediate sieve. The manufacturer shall document the typical particle size distribution of these all-in aggregates and state them, if required.

Table 4: Tolerances for the typical particle size distribution of aggregates 0/2, 0/4, 0/5 and 0/8 is to be declared by the manufacturer

Row	Particle size groups	Tolerance for aggregate passing through in % by weight for particle size [mm]								Category
		8	5	4	2.8	2	1	0.250	0.063	
1	0/2	–	–	–	–	± 5[a]	± 20	± 25	± 5[b]	[c]
2	0/4	–	–	± 5[a]	–	–	± 20	± 20	± 3[b]	
3	0/2	–	–	–	–	± 5[a]	± 10	–	± 3[b]	$G_{TC}10$[d] or GT_A10[e]
4	0/5	–	± 5[a]	–	± 10	–	–	–	± 3[b]	
5	0/8	± 5[a]	–	± 10	–	–	–	–	± 3[b]	
6	0/2 0/5 0/8	No requirement								$G_{TC}NR$[d] or GT_ANr[e]/ GT_FNR[e]

[a] The tolerances of ± 5% by weight are limited by the requirements for the percentage passing D in Table 2.
[b] Does not apply to category f_3 (fines content ≤ 3% by weight) for particle size groups 0/2 to 0/5 in Table 5.
[c] Category from DIN EN 12620
[d] Category from DIN EN 13043
[e] Category from DIN EN 13242

2.2.3 Fines content of fine and coarse aggregates or all-in aggregates

Fines content of fine and coarse aggregates and all-in aggregates determined pursuant to DIN EN 933-1 must meet the requirements of one of the categories of Table 5.

Table 5: Categories for the maximum values of fines content

Row	Particle size groups *d/D* [mm]	Fines % by weight	Category
1	0/2 to 0/5	≤ 3	f_3
2	0/2 to 0/5	≤ 16	f_{16}
3	0/2 to 0/5	> 16	$f_{declared}$
4	2/4 to 32/63	≤ 0.5	$f_{0.5}$
5	2/4 to 32/63	≤ 1	f_1
6	2/4 to 32/63	≤ 1.5	$f_{1.5}$
7	2/4 to 32/63	≤ 2	f_2
8	2/4 to 32/63	≤ 4	f_4
9	2/4 to 32/63	> 4	$f_{declared}$
Note: For particular areas of application, particle size groups/particle size fractions 1/3; 2/3 and 2/4 mm in category $f_{0.5}$, f_1 or fines content ≤ 3% by weight may be used.			

For combinations of neighbouring particle size groups, the requirement for fines content applies to the coarsest particle size group contained in the combination. For all-in aggregates with $d = 0$ and $D \geq 8$ mm, the manufacturer must state one of the categories in Table 5, rows 4 to 9.

2.2.4 Quality of the fines of fine aggregates and all-in aggregates

No further testing is required if the fines content in fine aggregates and all-in aggregates is not above 3% by weight. If the fines content in fine aggregates and all-in aggregates is > 3% by weight, the quality of the fines must be checked according to Table 6.

The methylene blue test (MB) is determined pursuant to DIN EN 933-9, or the sand equivalent value (SE) is determined pursuant to DIN EN 933-8.

When used in asphalt, the quality of the fines of fine aggregates and all-in aggregates with a fines content > 3% by weight shall be determined according to TP Gestein-StB, Part 6.6.3 for the purpose of experience, and the result shall be stated.

Note 1: For fine aggregates and all-in aggregates, the fines content is to be related to the particle content ≤ 2 mm.

Note 2: Empirical values for the shaking-abrasion method are stated in Annex A.2. They do not count as requirements.

Table 6: Quality of the fines of fine aggregates and all-in aggregates

Row	Use of the aggregate in	Fines content in % by weight	
		> 3 to ≤ 10	> 10
1	Asphalt	TP Gestein-StB, Part 6.6.3	Testing according to section 2.1.2, 2.3.4, 2.3.5 and according to TP Gestein-StB, Part 6.6.3
2	Concrete and layers with hydraulic binder	None	
3	Layers without binder	None	
4	Cobble and slab paving	None	

2.2.5 Particle shape of coarse aggregates and all-in aggregates

The particle shape of coarse aggregates and the coarse fraction of all-in aggregates is determined pursuant to DIN EN 933-4 as the shape index or pursuant to DIN 933-3 as the flakiness index. The test method pursuant to DIN EN 933-3 is the reference test method.

If the flakiness index is determined pursuant to DIN EN 933-3, the requirement of one of the categories in Table 7 must be met.

Table 7: Categories for the maximum values of the flakiness index

Flakiness index	Category *FI*
≤ 15	FI_{15}
≤ 20	FI_{20}
≤ 50	FI_{50}
No requirement	FI_{NR}

If the shape index is determined pursuant to DIN EN 933-4, the requirement of one of the categories in Table 8 must be met.

Table 8: Categories for the maximum values of the shape index

Shape index	Category *SI*
≤ 15	SI_{15}
≤ 20	SI_{20}
≤ 50	SI_{50}
≤ 55	SI_{55}
No requirement	SI_{NR}

2.2.6 Percentage of crushed surfaces in coarse aggregates and all-in aggregates

The percentage of crushed coarse aggregates and all-in aggregates, including completely crushed particles, determined pursuant to DIN EN 933-5 and the percentage of completely rounded particles must meet the requirement of one of the categories in Table 9.

Table 9: Categories for the percentage of crushed surfaces

Percentage of completely crushed particles % by weight	Percentage of completely and partially crushed particles % by weight	Percentage of completely rounded particles % by weight	Category *C*
90 – 100	100	0	$C_{100/0}$ [a]
30 – 100	95 – 100	0 – 1	$C_{95/1}$ [a]
30 – 100	90 – 100	0 – 1	$C_{90/1}$ [a]
–	90 – 100	0 – 3	$C_{90/3}$ [b]
–	50 – 100	0 – 30	$C_{50/30}$ [a][b]
–	–	0 – 70	$C_{NR/70}$ [b]
No requirement			C_{NR} [a][b]

[a] Category from DIN EN 13043
[b] Category from DIN EN 13242

With aggregates made from crushed solid rock, it is to be assumed that they correspond to the area of application pursuant to DIN EN 13043 of category $C_{100/0}$ and to the area of application pursuant to DIN EN 13242 of category $C_{90/3}$ and no testing is required.

The test shall only be carried out on crushed gravel or mixtures of crushed aggregates with gravel.

2.2.7 Flow coefficient of fine aggregates and all-in aggregates

The flow coefficient of fine aggregates and all-in aggregates is determined pursuant to DIN EN 933-6 on the test particle size classification 0.063/2 mm and must meet the requirement of one of the categories in Table 10.

Table 10: Categories for the minimum values of the flow coefficient

Flow coefficient	Category E_{CS}
≥ 35	$E_{CS}35$
≥ 30	$E_{CS}30$
< 30	E_{CS}declared
No requirement	E_{CS}NR

2.2.8 Shell content of coarse aggregates and all-in aggregates

The shell content for coarse aggregates and all-in aggregates is determined pursuant to DIN EN 933-7 and must meet the requirement of one of the categories in Table 11.

Note: The test shall be carried out only on aggregates obtained from the sea.

Table 11: Categories for the maximum values of shell content

Shell content % by weight	Category *SC*
≤ 10	SC_{10}
> 10	$SC_{declared}$
No requirement	SC_{NR}

2.2.9 Resistance to fragmentation of coarse aggregates and all-in aggregates

The aggregates must have sufficient resistance to fragmentation.

The resistance to fragmentation of coarse aggregates and all-in aggregates is determined as the impact value pursuant to DIN EN 1097-2 or as the Los Angeles coefficient pursuant to DIN EN 1097-2. The Los Angeles test method is the reference test method.

When determining the impact value, the requirement of one of the categories in Table 12 must be met.

Note: To determine the net weight for the impact test, the particle density is determined pursuant to DIN EN 1097-6:2022, Annex A.

Table 12: Categories for the maximum values of the impact value

Impact value	Category *SZ*
≤ 18	SZ_{18}
≤ 22	SZ_{22}
≤ 26	SZ_{26}
≤ 32	SZ_{32}
≤ 35	SZ_{35}
No requirement	SZ_{NR}

If the Los Angeles coefficient is determined, the requirement of one of the categories in Table 13 must be met.

Table 13: Categories for the maximum values of the Los Angeles coefficient

Los Angeles coefficient	Category *LA*
≤ 20	LA_{20}
≤ 25	LA_{25}
≤ 30	LA_{30}
≤ 40	LA_{40}
≤ 50	LA_{50}
No requirement	LA_{NR}

For aggregates with a maximum particle size of > 32 mm, the resistance to fragmentation is also to be determined pursuant to DIN EN 1097-2:2020 Annex B.2 or to TP Gestein-StB, Part 5.3.1.2. This is deemed to be representative for all aggregates > 32 mm.

The results of the test for resistance to fragmentation may not exceed the requirement of the category for the respective rock or rock group in Annex A. Insofar as recycled aggregates can be allocated to a type of rock or the material composition permits unambiguous assignment to the types of rock in Annex A, the values stated there may not be exceeded.

2.2.10 Resistance to polishing of coarse aggregates and all-in aggregates

The resistance to polishing of crushed coarse aggregates and all-in aggregates used in pavement surface courses, including road grit and surface treatments, is to be determined as the PSV (polished stone value) pursuant to DIN EN 1097-8.

The PSV must meet the requirement of one of the categories in Table 14.

Table 14: Categories and selected intermediate values for the minimum values of resistance to polishing

Resistance to polishing (PSV)	Category *PSV*
≥ 54	$PSV_{declared}54$
≥ 53	$PSV_{declared}53$
≥ 51	$PSV_{declared}51$
≥ 48	$PSV_{declared}48$
≥ 42	$PSV_{declared}42$
< 42	$PSV_{declared}$
No requirement	PSV_{NR}

2.2.11 Resistance to surface abrasion of coarse aggregates and all-in aggregates

Resistance to surface abrasion (aggregate abrasion value – AAV) of coarse aggregates and all-in aggregates may be determined pursuant to DIN EN 1097-8. No requirements for the resistance to surface abrasion are placed in Table 15.

Table 15: Categories for the maximum values of resistance to surface abrasion

Surface abrasion (AAV)	Category *AAV*
No requirement	AAV_{NR}

2.2.12 Resistance to wear of coarse aggregates and all-in aggregates

The resistance to wear of coarse aggregates and all-in aggregates (Micro-Deval coefficient) may be determined pursuant to DIN EN 1097-1. No requirements for the resistance to wear are placed in Table 16.

Table 16: Categories for the maximum values of resistance to wear

Micro-Deval coefficient	Category M_{DE}
No requirement	M_{DE}NR

2.2.13 Resistance to abrasion from studded tyres of coarse aggregates and all-in aggregates

Resistance to abrasion from studded tyres (Nordic abrasion value AN) of coarse aggregates and all-in aggregates may be determined pursuant to DIN EN 1097-9. No requirements for the resistance to abrasion from studded tyres are placed in Table 17.

Table 17: Categories for the maximum values of resistance to abrasion from studded tyres

Resistance to abrasion from studded tyres	Category *AN*
No requirement	AN_{NR}

2.2.14 Resistance to freezing and thawing of coarse aggregates and all-in aggregates

Proof of sufficient resistance to freezing and thawing of coarse aggregates and all-in aggregates is to be obtained indirectly by determining water absorption and, if required, by subsequently determining the resistance to freezing and thawing.

2.2.14.1 Water absorption as criterion for resistance to freezing and thawing

If water absorption is required as a criterion for testing the resistance to freezing and thawing, it is to be determined and stated pursuant to DIN EN 1097-6:2022, Annex B.

If this water absorption corresponds to the category $WA_{cm}0.5$ specified in Table 18, sufficient resistance of the aggregate to freezing and thawing may be assumed. If the requirement of category $WA_{cm}0.5$ is not complied with, the resistance to freezing and thawing is to be tested according to Section 2.2.14.2.

Table 18: Categories for the maximum values of water absorption

Water absorption % by weight	Category WA_{cm}
≤ 0.5	$WA_{cm}0.5$
Note: Testing water absorption serves no purpose in the case of air-cooled blast furnace slag and other porous aggregates.	

2.2.14.2 Resistance to freezing and thawing

If required, the resistance to freezing and thawing pursuant to DIN EN 1367-1 may be determined. The requirement of one of the categories in Table 19 must be met.

Table 19: Categories for the maximum values of resistance to freezing and thawing

Resistance to freezing and thawing (loss in % by weight)	Category *F*
≤ 1	F_1
≤ 2	F_2
≤ 4	F_4
> 4	$F_{declared}$[a)]
[a)] The regulations of the TL SoB-StB also apply to HMVA and recycled aggregates (RC).	

2.2.14.3 Resistance to freezing and thawing in the presence of salt

If required, the resistance to freezing and thawing in the presence of salt is to be determined and stated pursuant to DIN EN 1367-6.

Note: When determining the resistance to freezing and thawing in the presence of salt directly, the water absorption and the resistance to freezing and thawing are not to be determined.

2.2.14.4 Resistance to magnesium sulphate attack

No requirements for resistance to magnesium sulphate attack pursuant to DIN EN 1367-2 are placed in Table 20.

Table 20: Categories for maximum magnesium sulphate values

Magnesium sulphate value (loss in % by weight)	Category *MS*
No requirement	MS_{NR}

2.2.15 Resistance to thermal shock of coarse aggregates and all-in aggregates

If required, the resistance to thermal shock of coarse aggregates and all-in aggregates is to be determined and stated pursuant to DIN EN 1367-5.

If, after testing pursuant to DIN EN 1367-5, the loss of mass ($I \leq 3\%$ by weight) and the loss of resistance to fragmentation depending on the test method chosen in Section 2.2.9 is ($V_{SZ} \leq 5\%$ by weight or $V_{LA} \leq 8\%$ by weight), it can be assumed from experience that the aggregates have sufficient resistance to thermal shock. Otherwise, in order to assess the resistance to thermal shock, a testing of the aggregate can be carried out in accordance with TP Gestein-StB, Part 6.5.1 after thermal shock in the drying drum.

2.2.16 Affinity between coarse aggregates/all-in aggregates and bitumen

If required, the affinity between coarse aggregates/all-in aggregates and bitumen pursuant to DIN EN 12697-11 using the bitumen 50/70 is to be determined and stated as a value after 6 hours.

2.2.17 "Sonnenbrand" of coarse aggregates and all-in aggregates

If signs of "Sonnenbrand" exist, the loss of mass pursuant to DIN EN 1367-3 and the resistance to fragmentation pursuant to DIN EN 1097-2 are to be determined for coarse aggregates and all-in aggregates with $D \leq 32$ mm. Depending on the test method chosen in Section 2.2.9, the requirements of the corresponding category in Table 21 must be met.

For coarse aggregates and all-in aggregates with $D > 32$ mm, the loss of mass shall be determined according to TP Gestein-StB, Part 6.2 and the resistance to fragmentation pursuant to DIN EN 1097-2:2020 Annex B.2 or according to TP Gestein-StB, Part 5.3.1.2. Table 21 displays empirical values.

Table 21: Categories for the maximum values of testing for "Sonnenbrand"

Test method	Result	% by weight	Category *SB*
Coarse aggregates and all-in aggregates with *D* ≤ 32 mm			
DIN EN 1367-3 and DIN EN 1097-2	Loss of mass after boiling	≤ 1	SB_{SZ}
	Increase of impact value after boiling	≤ 5	
	Loss of mass after boiling	≤ 1	SB_{LA}
	Increase of Los Angeles coefficient after boiling	≤ 8	
Coarse aggregates and all-in aggregates with *D* > 32 mm			
TP Gestein-StB, Part 6.2 and DIN EN 1097-2 or TP Gestein-StB, Part 5.3.1.2	Loss of mass after boiling (IS)	≤ 1	–
	Increase of impact value after boiling (S_{SD})	≤ 5	
	Loss of mass after boiling (IS)	≤ 1	–
	Increase of Los Angeles coefficient after boiling ($S_{LA35/45}$)	≤ 8	

Note: "Sonnenbrand" is a type of the rock disintegration that can occur in some basalts under the influence of the atmosphere. "Sonnenbrand" begins with the appearance of grey and white patches. Normally hairline cracks develop which extend out from these patches and connect them. This reduces the strength of the mineral structure and the rock disintegrates into smaller fragments. Depending on the origin, this process can be complete a few months after being extracted from the quarry or may take decades. In exceptional cases, rapid disintegration leads to the formation of large cracks and fragmentation of the particles.

2.2.18 Content of coarse organic contaminators

If required, the content of coarse organic contaminators is to be determined pursuant to DIN EN 1744-1:2013, Section 14.2. The requirement of one of the categories in Table 22 must be met.

Note: Section 2.2.23 applies in relation to fine organic contaminators.

Table 22: Categories for the maximum values of the content of coarse organic contaminators

Aggregate	coarse organic contaminators % by weight	Category m_{LPC}
Fine aggregates	≤ 0.10	$m_{LPC}0.10$
	≤ 0.25	$m_{LPC}0.25$
	≤ 0.50	$m_{LPC}0.50$
	> 0.50	m_{LPC}declared
Coarse aggregates	≤ 0.05	$m_{LPC}0.05$
	≤ 0.10	$m_{LPC}0.10$
	≤ 0.50	$m_{LPC}0.50$
	> 0.50	m_{LPC}declared

2.2.19 Soundness of air-cooled blast furnace slag, granulated foundry-cupola furnace slag, steel furnace slag, recycled foundry sand and municipal incinerator bottom ash

2.2.19.1 Dicalcium silicate disintegration of air-cooled blast furnace slag and granulated foundry-cupola furnace slag

Aggregates consisting of air-cooled blast furnace slag or granulated foundry-cupola furnace slag shall not exhibit dicalcium silicate disintegration (lime disintegration) in tests pursuant to DIN EN 1744-1:2013, Section 19.1.

2.2.19.2 Iron disintegration of air-cooled blast furnace slag and granulated foundry-cupola furnace slag

Aggregates consisting of air-cooled blast furnace slag or granulated foundry-cupola furnace slag shall not exhibit any iron disintegration in tests pursuant to DIN EN 1744-1:2013, Section 19.2.

2.2.19.3 Soundness of steel furnace slag

The soundness of steelfurnace slag is to be tested pursuant to EN 1744-1:2013, Section 19.3. The requirement of one of the categories in Table 23 is to be met.

Table 23: Categories for the maximum values of soundness of steel furnace slag

Type of steel-making slag	Volume increase in % by volume	Category *V*
Basic oxygen furnace slag (LDS)/ Electric arc furnace slag (EOS)	≤ 3.5	$V_{3.5}$
	≤ 5	V_5
Note 1: If the MgO content determined pursuant to DIN EN 196-2 is ≤ 5% by weight, the test duration is 24 hours. If the MgO content is > 5% by weight, the test duration is 168 hours. Note 2: The total MgO content is used as a reference for estimating the free MgO content, as there is currently no reliable method for determining the free MgO content. Once a reliable method has been developed, the types of slag will be classified according to their free MgO content. The MgO values are given by the steel manufacturers.		

2.2.19.4 Soundness of recycled foundry sand

The requirements listed in Annex B are to be complied with.

2.2.19.5 Soundness of municipal incinerator bottom ash

The requirements listed in Annex B are to be complied with.

2.2.20 Alkali-silica reaction

If required, the alkali-silica reaction of aggregates must be determined according to the TL Beton-StB guideline.

2.2.21 Chlorides

If required, the content of water-soluble chloride ions in aggregates for concrete must be determined pursuant to DIN EN 1744-1:2013, Section 7. The content of water-soluble chloride ions must not exceed 0.04% by weight.

2.2.22 Sulfur containing compounds

2.2.22.1 Acid-soluble sulfate

The acid-soluble sulfate content, calculated as SO_3, must be determined pursuant to DIN EN 1744-1:2013, Section 12 for aggregates and fillers for concrete. The acid-soluble sulphate content must meet the requirement of one of the categories in Table 24.

Table 24: Categories for the maximum values for the content of acid-soluble sulfates

Aggregate	Acid-soluble sulfates % by weight	Category *AS*
All aggregates except HOS	≤ 0.8	$AS_{0.8}$

2.2.22.2 Total sulfur content

The total sulfur content for aggregates and fillers for concrete must be determined pursuant to IN EN 1744-1:2013, Section 11. The total sulfur content must meet the requirement of the category in Table 25.

Table 25: Categories for the maximum values of the total sulfur content

Aggregate	Total sulfur content % by weight
All aggregates except HOS	$S \leq 1$

If pyrrhotine (a non-stable form of iron sulphide FeS) is present in the aggregate, special precautions are necessary. If the presence of this mineral is known, the maximum value for the total sulphur content must be 0.1% by weight.

2.2.23 Constituents affecting setting and hardening

Aggregates and fillers that contain organic or other materials in sufficient quantities to modify the setting and hardening action of hydraulically bound mixtures must be evaluated regarding their effect on setting time and compressive strength in correspondence pursuant to DIN EN 1744-1:2013, Section 15.3.

The amount of such materials may not:

a) delay the setting time of mortar samples by more than 120 minutes,

b) reduce the compressive strength of mortar samples aged 28 days by more than 20%.

The presence of an organic fraction must be determined pursuant to DIN EN 1744-1:2013, Section 15.1 (test with caustic soda). If the results indicate the presence of humic acid, the presence of fulvic acid must be determined pursuant to DIN EN 1744-1:2013, Section 15.2.

If in the test method the supernatant fluid is lighter than the standard colours, it may be assumed that the aggregates are free of organic materials.

Note 1: Some inorganic compounds that colour the supernatant fluid during the test with caustic soda do not impair the setting and hardening time of hydraulically bound mixtures.

Note 2: Sugar does not affect the colour of the supernatant fluid during the test with caustic soda or during the test for fulvic acid. If it is suspected that sugar or materials similar to sugar exist, the aggregate should be tested using mortar samples (see DIN EN 1744-1:2013, Section 15.3). In this case, the aforesaid requirements for setting time and compressive strength should be used as a basis.

2.2.24 Carbonate content of fine aggregates for concrete pavement surface courses

The carbonate content of fine aggregates to be used in concrete pavement surface courses may be determined pursuant to DIN EN 196-2:2005, Section 15. No requirements exist.

2.2.25 Loss on ignition of bottom ash from coal-fired power plants

The loss on ignition of bottom ash is to be determined pursuant to DIN EN 1744-1:2013, Section 17. The loss on ignition must not exceed 15% by weight.

2.3 Fillers

The requirements set out in this section apply to foreign fillers and mixture fillers. The requirements according to Sections 2.1.2, 2.3.4 and 2.3.5 also apply to the particle size group 0/0.125 mm of fine aggregates and all-in aggregates with a fines content of more than 10% by weight (own fillers).

The particle size group 0/0.125 mm, which is used in the tests pursuant to DIN EN 933-9, DIN EN 1097-4, DIN EN 1097-7, DIN EN 1744-1 and DIN EN 13179-1, is gained by dry sieving pursuant to DIN EN 933-1 (but without washing) from a fine aggregate or all-in aggregates with a fines content of more than 10% by weight. Care must be taken to ensure that the entire particle size classification is separated, considering the particle size distribution.

2.3.1 Particle size distribution

The particle size distribution is determined pursuant to DIN EN 933-10 (air jet sieving). The requirements are met if the values specified in Table 26 are not exceeded.

Table 26: Requirements for the particle size distribution of foreign fillers

Sieve size [mm]	Sieve passage as % by weight	Maximum range of the particle size distribution[a] as % by weight
2	100	–
0.125	85 – 100	10
0.063	70 – 100	10

[a] The specified range of particle size distribution is based on at least 20 values (see Annex C, Table C.2, Row 26). 90% of the stated results must lie within this range, while all results have to lie within the range of the particle size distribution (see column 2).

2.3.2 Harmful fines

The harmful fines (e g. swelling clays) are determined as the methylene blue value (MB_F) pursuant to DIN EN 933-9. No requirements exist for the methylene blue value.

2.3.3 Water content

The water content of foreign fillers is determined pursuant to DIN EN 1097-5 must not exceed 1% by weight.

2.3.4 Stiffening properties

2.3.4.1 Voids content of dry compacted filler

The voids content of dry compacted filler according to Rigden is to be determined pursuant to DIN EN 1097-4 and must meet the requirement of one of the categories in Table 27.

Table 27: Categories for void content of dry compacted filler (Rigden)

Void content according to Rigden % by volume	Maximum range of the void content[a] % by volume	Category *V*
28 – 45	4	$V_{28/45}$
44 – 55	4	$V_{44/55}$

[a] The indicated range of void content is based on at least 20 values (see Annex C, Table C.2, Row 28). 90% of the stated results must lie within this range, while all results have to lie within the range of the void content (see column 1).

2.3.4.2 Softening point Increase "Delta Ring and Ball" of fillers for bituminous mixtures

The softening point increase "Delta Ring and Ball" must be determined pursuant to DIN EN 13179-1 and must meet the requirement of one of the categories in Table 28.

Table 28: Categories for the softening point increase "Delta Ring and Ball"

Softening point increase °C	Category $\Delta_{R\&B}$
8 – 25	$\Delta_{R\&B}8/25$
> 25	$\Delta_{R\&B}25$

2.3.5 Water solubility

The water solubility is to be determined pursuant to DIN EN 1744-1:2013, Section 16 and must meet the requirement of the category in Table 29.

Table 29: Categories for the maximum values of water solubility

Water solubility % by weight	Category *WS*
≤ 10	WS_{10}

2.3.6 Water susceptibility

The water susceptibility of fillers is to be determined pursuant to DIN EN 1744-4 and the result stated.

In the case of cloudiness of the supernatant fluid and/or the presence of filler particles which are not coated with bitumen and/or suspicion of the presence of swelling clay minerals, testing is to take place pursuant to DIN EN 1744-4:2022, Annex A or Annex B.

Note 1: Empirical values for the shaking-abrasion method are stated in Annex A.2. They do not count as requirements.

Note 2: Experience has shown that in the test pursuant to DIN EN 1744:2022, Annex A, the swelling shall not exceed 1.0% by volume.

2.3.7 Calcium carbonate content of limestone fillers

The calcium carbonate content of limestone fillers must be determined pursuant to DIN EN 196-2:2005, Section 15 and must meet the requirement of one of the categories in Table 30.

Table 30: Categories for the minimum values of the calcium carbonate content

Calcium carbonate content % by weight	Category *CC*
≥ 90	CC_{90}
≥ 80	CC_{80}
≥ 70	CC_{70}
Note: In DIN EN 196-2:2005, Section 15, the test result is specified as carbon dioxide content (CO_2). To calculate the calcium carbonate content, multiply the carbon dioxide content by the factor 2.2742.	

2.3.8 Calcium hydroxide content of mixture fillers

The calcium hydroxide content of mixture fillers must be determined pursuant to DIN EN 459-2 and must meet the requirement of one of the categories in Table 31.

Table 31: Categories for the minimum values of the calcium hydroxide content

Calcium hydroxide content % by weight	Category *Ka*
≥ 25	Ka_{25}
≥ 20	Ka_{20}
≥ 10	Ka_{10}
< 10	$Ka_{declared}$
Note: In DIN EN 459-2, the test result is given as calcium oxide content. To calculate the calcium hydroxide content, multiply the calcium oxide content by the factor 1.3213.	

2.3.9 Requirements for the homogeneity of filler production

2.3.9.1 Particle density of foreign fillers

The particle density of foreign fillers is to be determined pursuant to DIN EN 1097-7. The variation range to be stated by the manufacturer shall not be greater than 0.2 Mg/m^3.

2.3.9.2 Loss on ignition of hard coal fly ash

The loss on ignition of hard coal fly ash that is to be used as a filler is to be tested pursuant to DIN EN 1744-1:2013, Section 17. The variation range to be stated by the manufacturer shall not be greater than 6% by weight.

Note: If the filler contains non-volatile oxidising components, the loss on ignition must be corrected pursuant to DIN EN 196-2.

2.4 Environmentally relevant features

In the case of natural aggregates (crushed solid rock, gravel and sand and crushed gravel) environmental compatibility is inherent. Other proof is, therefore, unnecessary.

In the case of industrially manufactured aggregates and recycled aggregates, the requirements of the environmentally relevant features according to Annex D must be complied with.

3 Proof of conformity

3.1 General

The proof of conformity takes place according to system 2+. For this purpose, the manufacturer is required to conduct initial type testing (see Section 3.2) and factory production control – WPK (see Section 3.3) which is certified to ensure that the product corresponds to the requirements of these technical delivery conditions.

3.2 Type testing

Conformity with the specified requirements in the form of a type test is to be determined if:

- material for the production of aggregates must be sourced from a new deposit, or
- there are major changes in the type of raw material, or
- major changes in the processing conditions have occurred.

The result of the type testing must be recorded as the basis for the WPK for the respective product.

3.3 Factory production control

The manufacturer is required to conduct a WPK that corresponds to the requirements of Annex C. The records kept by the manufacturer must state which quality control methods were used during production of the aggregates. The WPK must be certified by a notified body.

4 Declaration of performance

The declaration of performance must be prepared in accordance with Article 6 of the current consolidated edition of Regulation (EU) No. 305/2011 (EU Construction Products Regulation).

Note: For the listed essential characteristics for which no performance is declared, the letters “NPD” (No Performance Determined) shall be indicated.

5 CE marking

The CE marking must be created in accordance with Article 9 of the current consolidated edition of Regulation (EU) No. 305/2011 (EU Construction Products Regulation).

6 Labelling

The delivery note must contain at least the following information:

a) Origin and manufacturer,

b) Designation,

c) Dispatch date,

d) Serial number of the delivery note,

e) Reference to these technical delivery conditions.

Remarks: For MEB, further data must be provided according to EBV.

Annex A.1

Particle density and resistance to fragmentation

Rock group		Rock[b]		Particle density	Resistance to fragmentation[a]			
				ρ_P	*LA* (10/14)	*SZ* (8/12,5)	Gravel impact value (35.5/45) SD	Los Angeles coefficient (35.5/45) LA35/45
				Mg/m³	% by weight	% by weight	% by weight	% by weight
1	Plutonite	a	Granite Granodiorite	2.60 – 2.80	≤ 30	≤ 26	≤ 22	≤ 30
		b	Syenite Anorthosite	2.60 – 2.80	≤ 30	≤ 26	≤ 22	≤ 30
		c	Diorite Gabbrodiorite	2.70 – 3.00	≤ 25	≤ 20	≤ 18	≤ 18
2	Vulcanite	a	Rhyolite Rhyodazite	2.50 – 2.85	≤ 25	≤ 22	≤ 22	≤ 35
		b	Trachyte Phonolite	2.50 – 2.85	≤ 25	≤ 22	≤ 22	≤ 35
		c	Microdiorite Andesite	2.50 – 2.85	≤ 25	≤ 22	≤ 22	≤ 35
		d	Basalt	2.85 – 3.05	≤ 25	≤ 20	≤ 17	≤ 13
		e	Basalt lava	2.40 – 2.85	≤ 25	≤ 22	≤ 20	–
		f	Lava slag	See fact sheet: Lava slag in road and path construction				
		g	Diabase	2.75 – 2.95	≤ 25	≤ 20	≤ 17	≤ 20
3	Sedimentary rocks	a	Limestone Dolomite stone	2.65 – 2.85	≤ 30	≤ 28	≤ 30	≤ 40
		b	Quartz sandstones	2.60 – 2.75	≤ 30	≤ 26	≤ 22	≤ 25
		c	Greywacke					
4	Metamorphic rocks	a	Gneiss Granulite Amphibolite Serpentinite	2.65 – 3.10	≤ 30	≤ 26	≤ 22	≤ 22
		b	Quartzite	2.60 – 2.75	≤ 30	≤ 26	≤ 22	≤ 25
5	Gravel	a	Gravel, crushed	2.60 – 2.75	≤ 30	≤ 26	–	–
		b	Gravel, round	2.55 – 2.75	≤ 40	≤ 35	–	–
6	Manufactured aggregates	a	Non-ferrous metal slag MHS	3.40 – 4.00	≤ 40	≤ 35	≤ 33	≤ 33
		b	Air-cooled blast furnace slag HOS	2.10 – 2.80	≤ 40	≤ 35	≤ 33	≤ 33
		c	Steel furnace slag SWS	3.20 – 3.80	≤ 30	≤ 26	≤ 29	≤ 25
		d	Municipal incinerator bottom ash HMVA	2.20 – 2.70	≤ 45	≤ 40	–	–
7	Recycled aggregates (RC)				≤ 40	≤ 32	≤ 33	≤ 40

[a] Rocks or rock groups that fail to comply with the requirements for resistance to fragmentation may be used if the usability can be proven by an expert opinion or positive experience.

[b] The list of rocks in the groups is not exhaustive. Rocks other than those listed can be classified in one of the groups mentioned, provided that a reasonable classification is proven by an expert opinion.

Annex A.2

Empirical values for shaking abrasion for water susceptibility

The table contains empirical values from which limiting values cannot be derived.

	Rock group	Rock			Fine aggregate				Fillers	
					Series E		Series F			
					Qty.	Shaking abrasion	Qty.	Shaking abrasion	Qty.	Shaking abrasion
					$n^{*)}$	S_A	$n^{*)}$	S_A	$n^{*)}$	S_A
					% by weight		% by weight		% by weight	
1	Plutonite	a	Granite Granodiorite	Mean value	73	36.7	70	19.8	–	–
				Maximum		70.2		42.6		–
				Minimum		12.1		8.5		–
		b	Syenite	Mean value	5	44.2	5	26.0		
				Maximum		55.5		44.3		
				Minimum		33.0		10.7		
2	Vulcanite	a	Rhyolite	Mean value	18	21.8	18	11.0	18	53.5
				Maximum		37.3		20.9		65.7
				Minimum		14.6		5.0		43.8
		c	Microdiorite Andesite	Mean value	69	50.2	69	10.5	6	57.9
				Maximum		100.0		86.6		64.6
				Minimum		43.1		19.3		50.1
		d	Basalt	Mean value	48	22.1	48	14.4	–	–
				Maximum		60.1		52.0		–
				Minimum		9.3		4.8		–
		g	Diabase	Mean value	49	18.7	49	11.7	9	39.6
				Maximum		48.3		38.8		45.3
				Minimum		9.3		4.8		27.1
3	Sedimentary rocks	a	Limestone Dolomite stone	Mean value	73	36.9	72	24.0	132	35.8
				Maximum		98.8		92.1		83.8
				Minimum		3.8		3.4		8.1
		c	Greywacke	Mean value	40	13.9	40	8.8	5	39.4
				Maximum		40.5		23.8		43.4
				Minimum		5.4		1.5		33.9

Annex A.2 (continued)

	Rock group	Rock			Fine aggregate				Fillers	
					Series E		Series F			
					Qty.	Shaking abrasion	Qty.	Shaking abrasion	Qty.	Shaking abrasion
					n*)	S_A	n*)	S_A	n*)	S_A
					% by weight		% by weight		% by weight	
4	Metamorphic rocks	a	Gneiss Granulite Amphibolite	Mean value Maximum Minimum	24	29.6 50.0 17.7	24	16.9 31.0 9.7	6	43.6 48.7 38.6
		b	Quartzite	Mean value Maximum Minimum	24	24.2 50.9 8.2	24	13.5 43.4 7.1		
5	Gravel	a	Gravel, crushed	Mean value Maximum Minimum	465	19.6 76.8 7.8	479	11.6 39.1 1.2		
		b	Gravel	Mean value Maximum Minimum	111	36.2 92.5 8.5	183	17.0 77.6 5.3		
6	Manufactured aggregates	b	HOS	Mean value Maximum Minimum	7	78.4 100.0 52.8	7	36.5 54.5 14.6		
		c	SWS	Mean value Maximum Minimum	41	26.1 95.0 1.5	41	17.5 34.3 8.0		
7	Recycled aggregates (RC)			Mean value Maximum Minimum	24	30.6 89.1 13.5	24	17.3 79.6 7.8	23	29.4 39.0 22.9
8	Mixture fillers			Mean value Maximum Minimum					23	26.6 36.0 11.2

n*) Number of test results

Material composition of recycled aggregates (RC) and HMVA, soundness of recycled foundry sand and HMVA and porosity of air-cooled blast furnace slag

Materials bound with binders containing pitch and tar are to be excluded. Likewise, cohesive soil, weathered and weather-susceptible rocks and similar unsuitable mineral masses are not to be used.

Table B.1: Requirements for the material composition of recycled aggregates (RC)

Constituents in fraction > 4 mm	% by weight	Category
Concrete, concrete products, concrete masonry units, hydraulically bound aggregate	Value to be indicated	$R_{c\ NR}$
Solid rock, gravel	Value to be indicated	$R_{u\ NR}$
Slag (blast furnace, steel furnace and non-ferrous metal slag)	Value to be indicated	$R_{u\ NR}$
Sand-lime brick, brick, tile and stoneware	≤ 30	R_{b30-}
Plasters and similar materials	≤ 5	R_{bk5-} *)
Mineral light-weight construction and insulating materials such as aerated autoclaved concrete and pumice concrete	≤ 1	R_{bm1-} *)
Bitumen-bound construction materials	≤ 30	R_{a30-}
Glass	≤ 5	R_{g5-}
Non-floating impurities, such as wood, rubber, plastics, textiles, cardboard, paper	≤ 0.2	$X_{0.2-}$
Construction materials containing gypsum	≤ 0.5	$R_{y0.5-}$ *)
Ferrous and non-ferrous metals	≤ 2	X_{i2-}
Component	**cm³/kg**	**Category**
Floating material	–	FL_{NR}
*) Specification of the category pursuant to DIN EN 13242		

Table B.2: Requirements for the material composition of HMVA

Component	% by weight
Metals	≤ 5.0
Unburnt	≤ 0.5

Soundness of recycled foundry sand (GRS)

The test method for determination of the CBR pursuant to DIN EN 13286-47 is used to evaluate the soundness of GRS for base courses without binders. If GRS is used alone, the linear swell value is not allowed to exceed 2%. In addition, the CBR value following determination of the swell value (CBR_W) must reach 80% of the original CBR value (CBR_0). The swell value of the GRS shall not exceed 4% when used as an additional component with at most 15% by weight in the construction material mixture. The CBR value after water retention is also to be determined for the construction material mixture.

If GRS is used in asphalt base courses, soundness is tested pursuant to DIN EN 1744-4, Annex A. The asphalt composition intended for use in road construction is tested. The swelling should not exceed 1.3% by volume.

Soundness of municipal incinerator bottom ash (HMVA)

The two methods according to TP Gestein-StB, Part 6.7.7 and TP Gestein-StB, Part 6.7.8 are to be applied for the evaluation of the soundness of HMVA.

For use in unbound mixtures, HMVA can be described as sufficiently sound, if

- during the heave test the decisive heave after 30 days is ≤ 3‰ and for the mineralogical investigation (X-ray) the calcite intensity is ≥ 140 counts and the anhydrite intensity ≤ 40 counts,
- exceedance of the decisive heave after 30 days is > 3‰ and < 5‰. In this case, the decisive heave after 120 days is ≤ 5 ‰.

The vapour test according to TP Beton-StB, Annex 2, is to be used for evaluating the soundness of HMVA for courses with hydraulic binders. A requirement value does not exist.

Porosity of air-cooled blast furnace slag

If, as criteria for the porosity of air-cooled blast furnace slag, the water absorption under atmospheric pressure and the loose bulk density are to be determined, the water absorption WA_{cm} is determined pursuant to DIN EN 1097-6:2022, Annex B, and the loose bulk density ρ_b is determined pursuant to DIN EN 1097-3.

Table B.3: Characteristic values for the porosity of air-cooled blast furnace slag

Porosity class	Water absorption*) WA_{cm} [%]	Loose bulk density*) ρ_b [Mg/m³]
A	≤ 4	≥ 1.2
B	≤ 6	≥ 1.0
C	≤ 8	≥ 0.9
*) Test particle size classification 8/11 or particle size fraction		

Factory production control

For mineral substitute construction materials, the provisions of the "Ordinance to introduce a Substitute Construction Materials Ordinance, for the new version of the Federal Soil Protection Ordinance and for the revision of the Landfill Ordinance and the Commercial Waste Ordinance, Article 1 Ordinance on Requirements for the Installation of Mineral Substitute Construction Materials in Technical Structures)" (Substitute Construction Materials Ordinance(EBV)) must be observed.

C.1 Introduction

This Annex specifies requirements for the system of factory production control for manufacturers of aggregates. This ensures that all aggregates manufactured comply with this TL Gestein-StB in terms of their declared properties.

The performance of factory production control is to be assessed according to the principles specified in this Annex.

C.2 Organisation

C.2.1 Responsibility and authority

The responsibilities, competencies and mutual relationships of the whole staff who manage, perform and review activities relevant to quality are to be specified. This also applies to staff that require organisational freedom and powers to:

- initiate action to prevent the occurrence of product non-conformity,
- identify each quality departure, record it and introduce appropriate measures.

C.2.2 Representative of the factory or executive management for factory production control

At every site where aggregates are produced, the manufacturer must name a person who possesses the appropriate competencies to ensure that the requirements specified in this Annex are introduced and maintained.

C.2.3 Assessment by the factory or management board

Factory production control must be checked and evaluated after suitable time intervals by the factory or management board to ensure that it is continually suitable and effective in meeting the requirements of this Annex. Records are also to be kept.

C.3 Control method

C.3.1 Manual

The manufacturer must prepare and maintain a factory production control manual which specifies the methods by which the requirements of factory production control are met.

C.3.2 Managing documents and data

Management of the documents and data must include those documents and records which are of importance to the requirements of this TL Gestein-StB. This includes records on purchasing, processing, product monitoring and the specifications of the system for factory production control.

The manual for factory production control is to contain a method for managing the documents and data which regulates the responsibilities for approving, issuing, distributing and administrating internal and external documents and data, as well as the preparation, issue and documentation of changes to the documents.

C.3.3 Allocation of subcontracts

If the manufacturer commissions subcontractors with some of these activities, a mechanism to control these activities must be created. The manufacturer must still retain overall responsibility for all parts of the work performed by subcontractors.

C.3.4 Information on raw materials

Detailed documentation must be available that reproduces the individual details on the nature of the raw material and the deposit. If appropriate, the documentation must also contain one or more maps detailing the deposit and the mining plan.

In the case that damaging substances are determined to be present, the manufacturer is responsible for ensuring that their contents do not exceed the limiting values applicable at the location where the aggregate is used.

Note: As a rule, most dangerous substances defined in European Parliament and Council Directive (EC) 1907/2006 do not occur in deposits of aggregates with mineral origin. Nevertheless aggregate manufacturers are referred to the note under ZA.1 in the Annexes of DIN EN 12620, DIN EN 13043 and DIN EN 13242.

C.4 Production control

Factory production control must meet the following requirements:

a) Methods for identifying and controlling the products must be specified.

Note: This can include methods for performing maintenance and adjustments on the processing plants, for surveillance or testing samples taken during reconditioning or for changing the process in the case of bad weather, etc.

b) Methods must be specified that regulate the identification of all dangerous substances named in accordance with C.3.4, and dealing with them, so that their content does not exceed the limiting values applicable at the location where the aggregate is used.

c) Methods must be specified that ensure that the products are stored in a controlled manner, and that the depots and stored products are labelled.

d) Methods must be specified that ensure that the quality of the products removed from depots is not changed in such a manner that their conformity is at risk.

e) The products must be traceable in terms of type and origin until their sale.

C.5 Monitoring and testing

C.5.1 General

The manufacturer must supply all the test equipment and correspondingly trained personnel for performing the requisite monitoring and tests.

The environmentally relevant features must be determined by a notified body (accredited pursuant to DIN EN ISO/IEC 17025).

C.5.2 Test equipment

The manufacturer is responsible for controlling, calibrating and maintaining the monitoring, measuring and test devices.

Accuracy and frequency of the calibrations must comply with DIN EN 932-5.

The test equipment must be used corresponding to the documented method.

The test equipment must be clearly labelled.

Calibration records must be archived.

C.5.3 Frequency and location of monitoring, sampling and testing

The production control records must contain the frequency and type of monitoring. The frequency of the sampling and, if required, the tests to be performed must comply with the specifications in Tables C.1, C.2 and C.3 that correspond to the respective properties.

Note 1: In general, the frequency of testing is related to the production period and/or the production quantity. The following regulations apply pursuant to DIN EN 13285:

- Week of production week: Five days of production within a maximum period of three months
- Month of production month: 20 days of production within a maximum period of six months
- Six month of production: 120 days of production within a maximum period of two years
- Year of Production: At least one day of production within a maximum period of 12 months. One year of production corresponds to one calendar year.

Note 2: The requirements for factory production control can include visual inspections. Every deviation revealed by these checks can lead to an increase in testing frequency.

Note 3: If the measured value is very close to the specified limiting value, it may be necessary to increase the frequency.

Note 4: Under certain conditions, the testing frequencies as stated in Tables C.1, C.2 and C.3 may be lowered. This could include the following cases:

a) Highly automated production equipment,
b) Long-term experience with consistancy of certain properties,
c) sources that are highly homogeneous,
d) Operation of a quality management system with additional tests for monitoring and controlling the production process.

The manufacturer must prepare a testing frequencies schedule which takes account of the minimum requirements of Tables C.1, C.2 and C.3.

The reasons for a reduction in testing frequency must be given in the factory production control documents.

C.6 Records

The results of factory production control must be recorded in a suitable manner. Location, date and time of day of the sampling and tested product are to be recorded, along with additional relevant information, such as the weather conditions, if needed.

Note 1: Several features can be the same for different products. In this case, the manufacturers, based on their experience, may come to the conclusion that it is possible to use the results of a test for more than one product. This is especially the case if a product is a combination of two or more particle size groups. The properties may be unchanged, but the particle size distribution or purity should be checked however.

If a tested or monitored product fails to correspond to the specified requirements, or if there are signs that this could be the case, the records must state which steps have been taken to deal with the problem (e.g. performance of a new test and/or remedial measures in the production process).

All the records required in the various sections of this Annex must be part of the records as a whole.

The records must at least be kept for the period prescribed by law.

Note 2: The "period prescribed by law" is the period of time during which the records have to be kept according to the regulations applicable at the production location.

C.7 Managing faulty products

If monitoring or testing reveals that a product fails to meet the requirements, the product concerned must be:

a) reprocessed or

b) used for a different purpose for which it is suitable, or

c) refused and labelled as non-compliant.

All errors which occur must be recorded by the manufacturer and investigated and corrective measures taken, if necessary.

Note: Corrective measures can include:
a) Investigation of the reason why the error occurred, including examination of the execution of the test itself and execution of the necessary readjustments
b) Analysis of the processes, working methods, internal quality audits, operating reports and customer complaints to reveal possible reasons for the fault and rectify them
c) Instigation of preventative measures to counteract problems in one of the potential risks in a suitable manner
d) Application of controls to ensure that the remedial measures take place and that they are effective
e) Introduction and recording of process changes that result from corrective measures.

C.8 Handling, storage and treatment at the production site

The manufacturer must meet the requisite precautions for maintaining product quality during handling and storage.

Note: These precautions should take the following points in account:
a) Avoiding contamination of the product
b) Avoiding segregation
c) Cleanliness of tools and storage areas.

C.9 Transport and packaging

C.9.1 Transport

The manufacturer's factory production control must specify the scope of responsibility in relation to storage and dispatch.

Note: If aggregates are transported as bulk goods, it may be necessary to cover them or put them in containers to reduce contamination.

C.9.2 Packaging

If aggregates are packed, the methods and materials used shall not contaminate or segregate the aggregates to such an extent that their properties are changed significantly before removal of the packaging. All precautionary measures required to achieve this during handling and storage of the packed aggregates must be noted on the packaging and accompanying documents.

C.10 Training personnel

The manufacturer must set up and maintain methods for training all personnel involved in factory production control. Appropriate training records must be kept.

Table C.1: Minimum testing frequencies for the properties of aggregates for concrete (pursuant to DIN EN 12620)

No.	Property[a)]	Section	Explanation	Test method	Minimum testing frequency
	General data				
1	Material identification	2.1.1		DIN EN 932-3	all 3 years
			RC	DIN EN 933-11	Once a month
2	Environmental aspects	2.4	CUM, GKOS, GRS, HOS, HS, SFA, BFA, SKG, SKA	Annex D	Six times a year[1)]
			RC, GS	Annex D	Once a month[2)]
3	Particle density	2.1.2	Coarse and fine aggregates or all-in aggregates	DIN EN 1097-6 Annex A	Once a year
			Fillers	DIN EN 1097-7	
4	Loose bulk density	2.1.4		DIN EN 1097-3	If required
	Coarse and fine aggregates				
5	Particle size distribution	2.2.2		DIN EN 933-1	Once a week
6	Oversized and undersized particles	2.2.2		DIN EN 933-1	Once a week
7	Material passing the intermediate sieve	2.2.2		DIN EN 933-1	Once a week
8	Fines content	2.2.3		DIN EN 933-1	Once a week
9	Particle shape of coarse aggregates and all-in aggregates	2.2.5	Testing frequency applies to crushed aggregates. Testing frequency for uncrushed gravel depends on the deposit and may be reduced.	DIN EN 933-3 DIN EN 933-4	Once a month

a) Testing is not required for properties specified as category "X_{NR}" in the TL Gestein-StB.
1) At least every 10,000 t or part thereof; max. 18 times a year
2) At least every 5,000 t or part thereof; max. 36 times a year

For members of a quality control association recognised by the competent authority according to the Substitute Construction Materials Ordinance (EBV), the testing frequency of footnotes 1 and 2 can be reduced in accordance with the Substitute Construction Materials Ordinance (EBV) Annex 4.

Table C.1 (continued)

No.	Property[a)]	Section	Explanation	Test method	Minimum testing frequency
	Coarse and fine aggregates				
10	Percentage of crushed particle surfaces in coarse aggregates and all-in aggregates	2.2.6	Only for aggregates made of crushed gravel	DIN EN 933-5	Once a month
11	Shell content of coarse aggregates and all-in aggregates	2.2.8	For coarse aggregates extracted from the sea	DIN EN 933-7	Once a year
12	Resistance to fragmentation of coarse aggregates and all-in aggregates	2.2.9		DIN EN 1097-2	Twice a year
13	Resistance to polishing of coarse aggregates and all-in aggregates	2.2.10		DIN EN 1097-8	Once a year
14	Water absorption as criterion for resistance to freezing and thawing	2.2.14.1		DIN EN 1097-6 Annex B	Once a year
15	Resistance to freezing and thawing	2.2.14.2		DIN EN 1367-1	Once every two years
16	Resistance to freezing and thawing in the presence of salt	2.2.14.3		DIN EN 1367-6 Annex B	Once every two years
17	Content of coarse organic contaminators	2.2.18	In cases of doubt	DIN EN 1744-1 Section 14.2	Twice a year
18	Dicalcium silicate disintegration of HOS and GKOS	2.2.19.1		DIN EN 1744-1 Section 19.1	Twice a year
19	Iron disintegration of HOS and GKOS	2.2.19.2		DIN EN 1744-1 Section 19.2	Twice a year

Table C.1 (continued)

No.	Property[a)]	Section	Explanation	Test method	Minimum testing frequency
	Coarse and fine aggregates				
20	Alkali-silica reaction	2.2.20	Insofar as required and in cases of doubt	Alkali guideline	
21	Chlorides	2.2.21	For aggregates extracted from the sea	DIN EN 1744-1 Section 7	Once a week
			For aggregates not extracted from the sea		Once every two years
22	Sulfur containing compounds	2.2.22	All aggregates except air-cooled blast furnace slag	DIN EN 1744-1 Section 11 and Section 12	Once a year
23	Constituents affecting setting and hardening	2.2.23		DIN EN 1744-1 Section 15.1, Section 15.2 and Section 15.3	Once a year
	Fillers				
24	Particle size distribution	2.3.1		DIN EN 933-10	Once a week

Table C.2: Minimum testing frequencies for the properties of aggregates for asphalt and surface treatments (pursuant to DIN EN 13043)

No.	Property[a)]	Section	Explanation	Test method	Minimum testing frequency
	General data				
1	Material identification	2.1.1		DIN EN 932-3	all 5 years
2	Environmental aspects	2.4	CUM, GKOS, GRS, HOS, HS, BFA, SWS, SKG, SKA	Annex D	Six times a year[1)]
			GS	Annex D	Once a month[2)]
3	Particle density	2.1.2	Coarse and fine aggregates or all-in aggregates	DIN EN 1097-6	Once every two years
			Fillers	DIN EN 1097-7	Twice a year
4	Loose bulk density	2.1.4		DIN EN 1097-3	If required
	Coarse and fine aggregates				
5	Particle size distribution	2.2.2		DIN EN 933-1	Once a week
6	Oversized and undersized particles	2.2.2		DIN EN 933-1	Once a week
7	Material passing the intermediate sieve	2.2.2		DIN EN 933-1	Once a week
8	Fines content	2.2.3		DIN EN 933-1	Once a week
9	Quality of the fines contents of fine aggregates and all-in aggregates	2.2.4	Only if the fines content exceeds 3% by weight for fine aggregates and all-in aggregates	TP Gestein-StB, Part 6.6.3	Twice a year

a) Testing is not required for properties specified as category "X_{NR}" in the TL Gestein-StB.
1) At least every 10,000 t or part thereof; max. 18 times a year
2) At least every 5,000 t or part thereof; max. 36 times a year

For members of a quality control association recognised by the competent authority according to the Substitute Construction Materials Ordinance (EBV), the testing frequency of footnotes 1 and 2 can be reduced in accordance with the Substitute Construction Materials Ordinance (EBV) Annex 4.

Table C.2 (continued)

No.	Property[a)]	Section	Explanation	Test method	Minimum testing frequency
	Coarse and fine aggregates				
10	Particle shape of coarse aggregates and all-in aggregates	2.2.5	Testing frequency applies to crushed aggregates. Testing frequency for uncrushed gravel depends on the deposit and may be reduced.	DIN EN 933-3 DIN EN 933-4	Once a month
11	Percentage of crushed particle surfaces in coarse aggregates and all-in aggregates	2.2.6	Only for aggregates made of crushed gravel	DIN EN 933-5	Once a month
12	Flow coefficient of fine aggregates and all-in aggregates	2.2.7		DIN EN 933-6	Once a month
13	Resistance to fragmentation of coarse aggregates and all-in aggregates	2.2.9		DIN EN 1097-2	Once a year
14	Resistance to polishing of coarse aggregates and all-in aggregates	2.2.10		DIN EN 1097-8	Once a year
15	Water absorption as criterion for resistance to freezing and thawing	2.2.14.1		DIN EN 1097-6 Annex B	Once every 2 years
16	Resistance to freezing and thawing	2.2.14.2		DIN EN 1367-1	Once every 2 years
17	Resistance to freezing and thawing in the presence of salt	2.2.14.3		DIN EN 1367-6	Once every 2 years

Table C.2 (continued)

No.	Property[a)]	Section	Explanation	Test method	Minimum testing frequency
	Coarse and fine aggregates				
18	Resistance to thermal shock of coarse aggregates and all-in aggregates	2.2.15		DIN EN 1367-5	Once a year
19	Affinity between coarse aggregates/ all-in aggregates and bitumen	2.2.16		DIN EN 12697-11	Once a year
20	"Sonnenbrand" of coarse aggregates and all-in aggregates	2.2.17	In cases of doubt, if signs of "Sonnenbrand" exist	DIN EN 1367-3 DIN EN 1097-2	Twice a year
21	Content of coarse organic contaminators	2.2.18	In cases of doubt	DIN EN 1744-1 Section 14.2	Once a year
22	Dicalcium silicate disintegration of HOS and GKOS	2.2.19.1		DIN EN 1744-1 Section 19.1	Twice a year
23	Iron disintegration of HOS and GKOS	2.2.19.2		DIN EN 1744-1 Section 19.2	Twice a year
24	Soundness of steel furnace slag	2.2.19.3	Only for steel furnace slag	DIN EN 1744-1 Section 19.3	Twice a year
25	Soundness of recycled foundry sand	2.2.19.4		DIN EN 1744-4 Annex A	Twice a year
	Fillers				
26	Particle size distribution	2.3.1		DIN EN 933-10	Once a week
27	Water content	2.3.3		DIN EN 1097-5	Twice a week
28	Stiffening properties	2.3.4	Void content of dry compacted filler (Rigden)	DIN EN 1097-4	Twice a year
			"Delta Ring and Ball"	DIN EN 13179-1	

Table C.2 (continued)

No.	Property[a)]	Section	Explanation	Test method	Minimum testing frequency
	Fillers				
29	Water solubility	2.3.5		DIN EN 1744-1 Section 16	Once every two years
30	Water susceptibility	2.3.6		DIN EN 1744-4	Once every two years
31	Calcium carbonate content of lime-stone fillers	2.3.7		DIN EN 196-2	Once a year
32	Calcium hydroxide content of mixture fillers	2.3.8		DIN EN 459-2	Once a year
33	Uniformity of filler production	2.3.9			–

Table C.3: Minimum testing frequencies for the properties of aggregates for unbound and hydraulically bound construction material mixtures (pursuant to DIN EN 13242)

No.	Property[a)]	Section	Explanation	Test method	Minimum testing frequency
	General data				
1	Material identification	2.1.1		DIN EN 932-3	all 5 years
			RC, HMVA	DIN EN 933-11	Once a month
2	Environmental aspects	2.4	CUM, GKOS, GRS, HOS, HS, SFA, BFA, SWS, SKG, SKA	Annex D	Six times a year[1)]
			RC, HMVA, GS	Annex D	Once a month[2)]
3	Particle density	2.1.2	Coarse and fine aggregates or all-in aggregates	DIN EN 1097-6	Once a year
4	Loose bulk density	2.1.4		DIN EN 1097-3	If required
	Coarse and fine aggregates				
5	Particle size distribution	2.2.2		DIN EN 933-1	Once a week
6	Oversized and undersized particles	2.2.2		DIN EN 933-1	Once a week
7	Material passing the intermediate sieve	2.2.2		DIN EN 933-1	Once a week
8	Fines content	2.2.3		DIN EN 933-1	Once a week

a) Testing is not required for properties specified as category "X_{NR}" in the TL Gestein-StB.
1) At least every 10,000 t or part thereof; max. 18 times a year
2) At least every 5,000 t or part thereof; max. 36 times a year

For members of a quality control association recognised by the competent authority according to the Substitute Construction Materials Ordinance (EBV), the testing frequency of footnotes 1 and 2 can be reduced in accordance with the Substitute Construction Materials Ordinance (EBV) Annex 4.

Table C.3 (continued)

No.	Property[a)]	Section	Explanation	Test method	Minimum testing frequency
	Coarse and fine aggregates				
9	Particle shape of coarse aggregates and all-in aggregates	2.2.5	Testing frequency applies to crushed aggregates. Testing frequency for uncrushed gravel depends on the deposit and may be reduced.	DIN EN 933-3 DIN EN 933-4	Once a month
10	Percentage of crushed particle surfaces in coarse aggregates and all-in aggregates	2.2.6	Only for aggregates made of crushed gravel	DIN EN 933-5	Once a month
11	Resistance to fragmentation of coarse aggregates and all-in aggregates	2.2.9		DIN EN 1097-2	Twice a year
12	Water absorption as criterion for resistance to freezing and thawing	2.2.14.1	The testing frequency depends on the particle size of the aggregates	DIN EN 1097-6 Annex B	Once a year
13	Resistance to freezing and thawing	2.2.14.2		DIN EN 1367-1	Once every two years
14	Resistance of HMVA to freezing and thawing	2.2.14.2		DIN EN 1367-1	Twice a year
15	Resistance of recycled aggregates to freezing and thawing	2.2.14.2		DIN EN 1367-1	Twice a year
16	"Sonnenbrand" of coarse aggregates and all-in aggregates	2.2.17	In cases of doubt, if signs of "Sonnenbrand" exist	DIN EN 1367-3 DIN EN 1097-2 TP Gestein-StB, Part 6.2	Twice a year
17	Dicalcium silicate disintegration of HOS and GKOS	2.2.19.1		DIN EN 1744-1 Section 19.1	Twice a year

Table C.3 (continued)

No.	Property[a)]	Section	Explanation	Test method	Minimum testing frequency
	Coarse and fine aggregates				
18	Iron disintegration of HOS and GKOS	2.2.19.2		DIN EN 1744-1 Section 19.2	Twice a year
19	Soundness of steel-furnace slag	2.2.19.3	Only for steel furnace slag	DIN EN 1744-1 Section 19.3	Twice a year
20	Soundness of recycled foundry sand	2.2.19.4		DIN EN 13286-47	Twice a year
21	Constituents affecting setting and hardening	2.2.23		DIN EN 1744-1 Sections 15.1, 15.2 and 15.3	Once a year

Annex D

Environmental aspects (Type testing and factory production control)

For mineral substitute construction materials, the provisions of the "Ordinance to introduce a Substitute Construction Materials Ordinance, for the new version of the Federal Soil Protection Ordinance and for the revision of the Landfill Ordinance and the Commercial Waste Ordinance, Article 1 Ordinance on Requirements for the Installation of Mineral Substitute Construction Materials in Technical Structures)" (Substitute Construction Materials Ordinance (EBV)) must be observed.

For air-cooled blast furnace slag (HOS), granulated blast furnace slag (HS), steel furnace slag (SWS), slag from copper production (CUM), boiler slag (SKG), hard coal fly ash (SFA), bottom ash from coal-fired power plants (SKA), municipal incinerator bottom ash (HMVA), recycled foundry sand (GRS), granulated foundry-cupola furnace slag (GKOS), brown coal fly ash (BFA) and recycled aggregates (RC, GS), the limiting values for environmentally relevant parameters specified in Tables D.1 and D.2 are to be complied with.

Note: In individual cases, the application tables of the RuA specify more stringent requirements for the environmentally relevant features for the specific intended use.

The subdivision into various material classes in Tables D.1 and D.2 for air-cooled blast furnace slag, steel furnace slag, slag from copper production, municipal incinerator bottom ash and recycled aggregates (RC, GS) is permitted by their different application from a hydrogeological perspective.

With regard to testing eluates, only the comprehensive column test pursuant to DIN 19528:2009-01 is to be used as part of type testing. Factory production control can be carried out pursuant to DIN 19528:2009-01 (comprehensive column test or rapid column test) or DIN 19529:2015-12 (shaking test).

The limiting values – with the exception of "pH value" and "electrical conductivity" – are deemed to be complied with during type testing if the measured concentration or the measured substance content of a parameter is equal to or lower than the corresponding limiting value.

The limiting values – with the exception of "pH value" and "electrical conductivity" – are deemed to be complied with during factory production control if the respective limiting value is only exceeded once for a measured value when performing five consecutive tests. The measured value that exceeds the limiting value must be smaller than the reference value. The reference value is the sum of the respective limiting value and the permissible exceedance of this limiting value according to Table D.3.

To verify compliance with the limiting values of the sum parameters, the concentrations of the specified individual substances are added together. Individual substance concentrations below the analytical detection limit are excluded and concentrations above the detection limit but below the quantification limit are included in the sum calculation at half the value of the quantification limit.

The “pH value” and “electrical conductivity” are orientation values. The pH value is a limiting value only for recycled foundry sand (GRS). If the pH value deviates by more than 0.5 units or the electrical conductivity deviates by more than 10%, the causes of these deviations must be determined. For freshly crushed recycled aggregates (RC) whose material group “concrete, concrete products, concrete masonry units, hydraulically bound aggregate” is at least 90% by weight, the “pH value” and the “electrical conductivity” can be disregarded if the limiting values for sulphate and the other limiting values for recycled aggregates (RC) of the respective material class are complied with.

During type testing, the parameters of Table D.2 that are not material values must be verified. They must be documented with the measured concentration values.

Footnotes for Table D.1: Material values for substitute construction materials

1) Only for GRS limiting value, otherwise substance-specific orientation value; in the case of deviations, the cause must be determined.
2) Substance-specific orientation value; in the case of deviations, the cause must be determined.
3) PAH_{15}: PAH_{16} without naphthalene and methylnaphthalene.
4) PAH_{16}: Representing the group of polycyclic aromatic hydrocarbons (PAHs), 16 selected PAHs are analysed according to the list of the Environmental Protection Agency (EPA): Acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene and pyrene.
5) Individual values for dimefuron, flazasulfuron, flumioxazin, ethidimuron, thiazafluron and for newly approved active substances.
6) To be determined during type testing.

Table D.1: Material values for substitute construction materials

Construction materials / Parameter		RC-1	RC-2	RC-3	HOS-1	HOS-2	HS	SWS-1	SWS-2	GKOS	CUM-1	CUM-2	GRS	SKG	SKA	SFA	BFA	HMVA-1	HMVA-2	GS-0	GS-1	GS-2	GS-3
pH value[1]	–	6 – 13	6 – 13	6 – 13	9 – 12	9 – 12	8 – 12	9 – 13	9 – 13	7 – 12	6 – 10	6 – 10	> 9	6 – 10	7 – 12	8 – 13	11 – 13	7 – 13	7 – 13	6.5 – 10	6.5 – 10	6.5 – 10	5 - 12
Electrical conductivity[2]	µS/cm	2 500	3 200	10 000	5 000	7 000	4 000	10 000	10 000	1 500	300	300	2 700	10 – 60	2 100	10 000	15 000	2 000	12 500	500	500	500	1 000
Chloride	mg/L	6)	6)	6)	6)	6)		6)	6)	6)	6)	6)		6)	6)	6)	6)	160	5 000				
Sulphate	mg/L	600	1 000	3 500	1 300	3 600	350	6)	6)	6)	6)	6)		6)	600	4 500	2 500	820	3 000	6)	6)	6)	6)
Fluoride	mg/L							1.1	4.7	6)	6)	6)	8.7			6)	6)						
DOC	mg/L	6)	6)	6)	6)	6)	6)	6)	6)	6)	6)	6)	30	6)	6)	6)	6)	6)	6)	6)	6)	6)	6)
PAH_{15}[3]	µg/L	4.0	8.0	25									6)							0.3	2.3	42	50
PAH_{16}[4]	mg/kg	10	15	20																			
MKW	µg/L	6)	6)	6)																150	160	310	500
Phenols	µg/L	6)	6)	6)																6)	6)	6)	6)
Antimony	µg/L	6)	6)	6)	6)	6)	6)	6)	6)	6)	25	25	6)	6)	6)	6)	6)	10	60	6)	6)	6)	6)
Arsenic	µg/L	6)	6)	6)	6)	6)	6)	6)	6)	6)	55	65	65	6)	6)	6)	6)	6)	6)	6)	6)	6)	6)
Lead	µg/L	6)	6)	6)	6)	6)	6)	6)	6)	90	6)	6)	90	6)	6)	6)	6)	6)	6)	6)	6)	6)	6)
Cadmium	µg/L	6)	6)	6)	6)	6)	6)	6)	6)	6)	6)	6)	6)	6)	6)	6)	6)	6)	6)	6)	6)	6)	6)
Chrome, total	µg/L	150	440	900	6)	6)	6)	110	190	150	6)	6)	110	6)	6)	1 000	150	150	460	6)	6)	6)	6)
Copper	µg/L	110	250	500	6)	6)	6)	6)	6)	6)	55	110	110	6)	6)	6)	6)	110	1 000	6)	6)	6)	6)
Molybdenum	µg/L	6)	6)	6)	6)	6)	6)	55	400	6)	110	110	55	6)	400	7 000	400	55	400	6)	6)	6)	6)
Nickel	µg/L	6)	6)	6)	6)	6)	6)	6)	6)	30	6)	6)	30	6)	6)	6)	6)	6)	6)	6)	6)	6)	6)
Vanadium	µg/L	120	700	1 350	6)	6)	55	180	450	55	6)	6)	200	6)	230	300	6)	55	150	6)	6)	6)	6)
Zinc	µg/L	6)	6)	6)	6)	6)	6)	6)	6)	6)	6)	6)	160	6)	6)	6)	6)	6)	6)	6)	6)	6)	6)
Atrazine	µg/L																			0.2	0.7	3.5	14
Bromacil	µg/L																			0.2	0.4	1.2	5.3
Diuron	µg/L																			0.1	0.2	0.8	4.6
Glyphosate	µg/L																			0.2	1.7	17	27
AMPA	µg/L																			2.5	4.5	17	50
Simazine	µg/L																			0.2	1.5	12	27
Other herbicides[5]	µg/L																			0.2	2.1	17	27

Table D.2: Monitoring values (solid content) for recycled aggregates (RC)[1)]

Construction materials Parameter		RC
Arsenic	mg/kg	40
Lead	mg/kg	140
Chrome	mg/kg	120
Cadmium	mg/kg	2
Copper	mg/kg	80
Mercury	mg/kg	0.6
Nickel	mg/kg	100
Thallium	mg/kg	2
Zinc	mg/kg	300
Hydrocarbons[2)]	mg/kg	300 (600)
PCB_6 and PCB-118	mg/kg	0.15

[1)] During type testing and external monitoring of recycled aggregates (RC), the solid content must also be determined. The solid content is only determined during every second external monitoring.

[2)] The values stipulated apply to hydrocarbon compounds with a chain length of C_{10} to C_{22}. The total content (C_{10} to C_{40}) determined pursuant to DIN EN 14039, Edition January 2005, must not exceed the value stated in brackets. Exceedances originating in asphalt content are not exclusion criteria.

Table D.3: Permitted exceedances

Parameter Solid component	Evaluation-relevant area mg/kg	Permitted exceedance %	Standard
Arsenic	10 – 150	30	DIN EN 16170:2017-01 DIN EN 16171:2017-01
Lead	40 – 700	30	DIN EN 16170:2017-01 DIN EN 16171:2017-01
Cadmium	0.4 – 10	30	DIN EN 16170:2017-01 DIN EN 16171:2017-01
Chrome, total	30 – 600	30	DIN EN 16170:2017-01 DIN EN 16171:2017-01
Copper	20 – 320	30	DIN EN 16170:2017-01 DIN EN 16171:2017-01
Nickel	50 – 350	30	DIN EN 16170:2017-01 DIN EN 16171:2017-01
Thallium	0.5 – 7	30	DIN EN 16170:2017-01 DIN EN 16171:2017-01
Zinc	60 – 1.200	30	DIN EN 16170:2017-01 DIN EN 16171:2017-01
Mercury	0.2 – 5	30	DIN EN 12846:2012-08 DIN EN 16171:2017-01
PAH	0.2 – 30	≤ 20:40 > 20:20	DIN ISO 18287:2006-05 DIN EN 17503:2022-08
PCB	0.05 – 0.5	30	DIN EN 17322:2021-03
Hydrocarbons	300 – 2.000	30	DIN EN 14039:2005-01
Eluate	**–**		
pH value	5 – 13	–	DIN EN ISO 10523:2012-04
Eluate	**µS/cm**		
Electrical conductivity	200 – 12.500	–	DIN EN 27888:1993-11
Eluate	**mg/L**	**%**	
Chloride	160 – 5.000	25	DIN EN ISO 10304-1:2009-07
Sulphate	200 – 2.500	25	DIN EN ISO 10304-1:2009-07
Fluoride	1 – 80	25	DIN EN ISO 10304-1:2009-07 DIN 38405-4:1985-07
DOC	30 – 200	0	DIN EN 1484:2019-04

Table D.3 (continued)

Parameter Eluate	Evaluation-relevant area µg/L	Permitted exceedance %	Standard
Antimony	10 – 150	50	DIN EN ISO 11885:2009-09 DIN EN ISO 17294-2:2017-01
Arsenic	10 – 120	50	DIN EN ISO 11885:2009-09 DIN EN ISO 17294-2:2017-01
Lead	20 – 470	50	DIN EN ISO 11885:2009-09 DIN EN ISO 17294-2:2017-01
Cadmium	2 – 15	50	DIN EN ISO 11885:2009-09 DIN EN ISO 17294-2:2017-01
Chrome, total	10 – 1.100	50	DIN EN ISO 11885:2009-09 DIN EN ISO 17294-2:2017-01
Copper	20 – 2.000	50	DIN EN ISO 11885:2009-09 DIN EN ISO 17294-2:2017-01
Molybdenum	55 – 7.000	50	DIN EN ISO 11885:2009-09 DIN EN ISO 17294-2:2017-01
Nickel	20 – 280	50	DIN EN ISO 11885:2009-09 DIN EN ISO 17294-2:2017-01
Vanadium	30 – 1.350	50	DIN EN ISO 11885:2009-09 DIN EN ISO 17294-2:2017-01
Zinc	100 – 1.600	50	DIN EN ISO 11885:2009-09 DIN EN ISO 17294-2:2017-01
PAH	0.2 -50	65	DIN EN ISO 17993:2004-03 DIN 38407-39:2011-09
MKW	150 – 500	30	DIN EN ISO 9377-2:2001-07
Phenols	12 – 2.000	20	DIN 38407-27:2012-10
Chlorobenzenes, total	1 – 4	20	DIN 38407-37:2013-11
Chlorophenols, total	1 – 100	20	DIN EN 12673:1999-05
Hexachlorobenzene	0.02 – 0.04	20	DIN 38407-37:2013-11
Atrazine	0.1 – 1.1	30	DIN EN ISO 11369:1997-11 DIN EN ISO 27108:2013-12 DIN EN ISO 10695:2000-11 DIN 38407-36:2014-09
Bromacil	0.1 – 0.6	30	DIN EN ISO 11369:1997-11 DIN EN ISO 27108:2013-12 DIN EN ISO 10695:2000-11 DIN 38407-36:2014-09
Diuron	0.05 – 0.3	30	DIN EN ISO 11369:1997-11 DIN EN ISO 27108:2013-12 DIN EN ISO 10695:2000-11 DIN 38407-36:2014-09

Table D.3 (continued)

Parameter	Evaluation-relevant area	Permitted exceedance	Standard
Simazine	0.1 – 2.4	30	DIN EN ISO 11369:1997-11 DIN EN ISO 27108:2013-12 DIN EN ISO 10695:2000-11 DIN 38407-36:2014-09
Dimefuron	0.1 – 0.6	30	DIN EN ISO 11369:1997-11 DIN EN ISO 27108:2013-12 DIN EN ISO 10695:2000-11 DIN 38407-36:2014-09
Flumioxazin	0.1 – 0.6	30	DIN EN ISO 11369:1997-11 DIN EN ISO 27108:2013-12 DIN EN ISO 10695:2000-11 DIN 38407-36:2014-09
Flazasulfuron	0.1 – 0.6	30	DIN EN ISO 11369:1997-11 DIN EN ISO 27108:2013-12 DIN EN ISO 10695:2000-11 DIN 38407-36:2014-09
Glyphosate	0.1 – 1.5	30	DIN ISO 16308:2017-09 DIN 38407-22:2001-10
AMPA	0.1 – 0.6	30	DIN ISO 16308:2017-09 DIN 38407-22:2001-10

Annex E

Area of application: Courses without binder

Properties and requisite categories of the aggregates				
TL Gestein-StB Section No.	**Course / Property**	**Courses of frost-resistant material/ Frost protection course/ Self-hardening base course**	**Crushed rock/ Gravel base course**	**Surface course**
2.1.1	Material identification	is to be declared		
2.1.2	Particle density	is to be declared		
2.2.2	Particle size distribution (KGV)			
	Particle size groups/ Particle size fractions according to Table 2	G_F80 (row 9) $G_C80/20$ (rows 11; 13; 15; 17; 19) G_F85 (row 20a; 21a) $G_C80/20$ (rows 26 – 31)		
	Combined particle size groups according to Table 3	$G_C90/15$ $GT_C20/15$; $GT_C20/17.5$		
	Tolerance for KGV according to Table 4	GT_FNR; GT_ANR		
2.2.3	Fines content			
	Particle size groups/ Particle size fractions 0/2 to 0/5	is to be declared[a] (row 3)		
	According to table 5 2/4 to 32/63	f_4 (row 8)		$f_{declared}$ (row 9)
2.2.5	Particle shape of coarse aggregates and all-in aggregates	SI_{55}/FI_{50}		
2.2.6	Percentage of crushed surfaces in coarse aggregates and all-in aggregates	C_{NR}	$C_{90/3}$[b]	C_{NR}
2.2.9	Resistance to fragmentation of coarse aggregates and all-in aggregates	Rock-related according to Annex A[c]		
2.2.14.1	Water absorption	$WA_{cm}0.5$[f]		

Annex E (continued)

Properties and requisite categories of the aggregates				
TL Gestein-StB Section No.	**Course** / **Property**	**Courses of frost-resistant material/ Frost protection course/ Self-hardening base course**	**Crushed rock/ Gravel base course**	**Surface course**
2.2.14.2	Resistance to freeze-thaw attack	F_4; $F_{declare}$[d]	F_4; $F_{declared}$[e]	F_4
2.2.17	"Sonnenbrand" of coarse aggregates and all-in aggregates	SB_{sz}/SB_{LA}; for aggregates with D > 32 mm: is to be declared		
2.2.19.1	Dicalcium silicate disintegration of HOS and GKOS	no disintegration		
2.2.19.2	Iron disintegration of HOS and GKOS	no disintegration		
2.2.19.3	Soundness of SWS	V_5		–
2.2.19.4	Soundness of GRS	see Annex B		–
2.2.19.5	Soundness of HMVA	see Annex B	–	–
2.4	Environmental aspects	see section 2.4 and Annex D		

[a] f_{16} applies to GRS
[b] Applies only to gravel base courses
[c] See also TL SoB-StB
[d] Applies only to HMVA and recycled aggregates (RC)
[e] Applies only to recycled aggregates (RC)
[f] Former designation W_{cm}

Annex F.1

Area of application: Asphalt construction methods according to ZTV Asphalt-StB*)

TL Gestein-StB Section No.	Application for / Properties	AC T	AC TD	AC B	AC D, SMA, MA	PA	Gritting material
2.1.1	Material identification	is to be declared					
2.1.2	Particle density	is to be declared					
2.2	Coarse and fine aggregates or all-in aggregates						
2.2.2	Particle size distribution (KGV)						
	Particle size groups/ Particle size fractions according to Table 2	G_F85 (row 2); G_A85 (row 8) $G_C90/20$ (rows 10, 12, 14, 16) $G_C85/20$ (rows 24 and 25)		G_F85 (row 2) $G_C90/10$ (row 3); $G_C90/15$ (rows 4 to 7)			G_F85 (row 2), $G_C90/10$ (row 3) for particle size fractions 1/3, 2/3 and 2/4, the following applies: $G_C90/10$
	Combined particle size groups according to Table 3; all-in aggregates $d = 0$ and $D \geq 8$ mm	$G_C90/15$; G_A85 $G_{20/15}$; $G_{20/17.5}$		–			
	Tolerance for KGV according to Table 4	$G_{TC}NR$					
2.2.3	Fines content according to Table 5	for 0/2 and 0/5: f_{16} a); $f_{declared}$ a) 2/5 to 8/11: f_2 for 8/16 and greater: f_1		for 0/2: f_{16} a); $f_{declared}$ a) for 2/5 to 8/11: f_2 for 11/16 and 16/22: f_1			for 0/2: f_3 for 1/3, 2/3, 2/4 and 2/5: $f_{0.5}$; f_1; ≤ 3% by weight
2.2.4	Quality of the fines contents of fine aggregates and all-in aggregatesaccording to Table 6	Row 1					–

TL Gestein-StB Section No.	Application for / Properties	AC T	AC TD	AC B	AC D, SMA, MA	PA	Gritting material
2.2.5	Particle shape of coarse aggregates and all-in aggregates	SI_{50}/FI_{50}		SI_{20}/FI_{20}		SI_{15}/FI_{15}	SI_{NR}/FI_{NR}
2.2.6	Percentage of crushed surfaces in coarse aggregates and all-in aggregates	C_{NR}; $C_{50/30}$	C_{NR}	$C_{90/1}$; $C_{95/1}$; $C_{100/0}$		$C_{100/0}$	$C_{90/1}$[b]
2.2.7	Flow coefficient of fine aggregates and all-in aggregates	E_{CS}NR; E_{CS} declared; E_{CS}30; E_{CS}35				E_{CS}35	E_{CS}NR
2.2.9	Resistance to fragmentation of coarse aggregates and all-in aggregates	Annex A		SZ_{18}/LA_{20} SZ_{22}/LA_{25}	SZ_{18}/LA_{20}; SZ_{22}/LA_{25}; SZ_{26}/LA_{30}	SZ_{18}/LA_{20}	SZ_{18}/LA_{20}
2.2.10	Resistance to polishing of coarse aggregates and all-in aggregates	PSV_{NR}	PSV_{NR}; $PSV_{declared}$; $PSV_{declared}42$	PSV_{NR}	PSV_{NR}; $PSV_{declared}42$; $PSV_{declared}48$ $PSV_{declared}51$	$PSV_{declared}54$ PSV_{NR}	$PSV_{declared}42$ $PSV_{declared}48$ $PSV_{declared}51$
2.2.14.1	Water absorption	$WA_{cm}0.5$[d]					
2.2.14.2	Resistance to freezing and thawing	F_4	F_1				
2.2.14.3	Resistance to freezing and thawing in the presence of salt	–	Loss of mass ≤ 8% by weight[c]	–	Loss of mass ≤ 8% by weight[c]		

TL Gestein-StB Section No.	Application for / Properties	AC T	AC TD	AC B	AC D, SMA, MA	PA	Gritting material
2.2.15	Resistance to thermal shock of coarse aggregates and all-in aggregates	is to be declared					–
2.2.16	Affinity between coarse aggregates/all-in aggregatesand bitumen	is to be declared					
2.2.17	"Sonnenbrand" of coarse aggregates and all-in aggregates	SB_{SZ}/SB_{LA}					
2.2.18	*C*ontent of coarse organic contaminators	$m_{LPC}0.10$					
2.2.19.1	Dicalcium silicate disintegration of HOS or GKOS	no disintegration[e)]				–	–
2.2.19.2	Iron disintegration of HOS or GKOS	no disintegration[e)]				–	–
2.2.19.3	Soundness of SWS	$V_{3.5}$					–
2.2.19.4	Soundness of GRS	Q ≤ 1.3 % by volume	–				

TL Gestein-StB Section No.	Application for / Properties	AC T	AC TD	AC B	AC D, SMA, MA	PA	Gritting material
2.3	Fillers						
2.3.1	Particle size distribution	Table 26					–
2.3.3	Water content	≤ 1% by weight					
2.3.4.1	Void content (Rigden)	$V_{28/45}$; $V_{44/55}$					
2.3.4.2	Softening point increase "Delta ring and ball"	$\Delta_{R\&B}8/25$; $\Delta_{R\&B}25$					
2.3.5	Water solubility	WS_{10}					
2.3.6	Water susceptibility	is to be declared					
2.3.7	Calcium carbonate content of limestone fillers	CC_{70}; CC_{80}; CC_{90}					
2.3.8	Calcium hydroxide content of mixture fillers	Ka_{10}; Ka_{20}; Ka_{25}					
2.4	Environmental aspects	See section 2.4 and Annex D					

*) In the event of contradictions between Annex F.1 and Annex A of the TL Asphalt-StB, the rules and regulations of the TL Asphalt-StB, Annex A, take priority.

a) Besides designation of the category, the actual proportion of fines is to be declared.

b) Test on the particle size fraction 5/8

c) For frost action zone III (RStO 12): Loss of mass ≤ 5% by weight

d) Former designation Wcm

e) No use of GKOS

Annex F.2

Area of application: Asphalt construction methods according to ZTV BEA-StB*): Spraying and chipping, surface dressing, slurry surfacing, thin hot mix asphalt overlays on a sealing

TL Gestein-StB Section No.	Property / Application for	Spraying and chipping, surface dressing (OB)	Asphalt mixture for slurry surfacing (DSK)	Asphalt mixture for thin hot mix asphalt overlays on a sealing (DSH-V)
2.1.1	Material identification	is to be declared		
2.1.2	Particle density	is to be declared		
2.2	Coarse and fine aggregates			
2.2.2	Particle size distribution (KGV)			
	Particle size groups/Particle size fractions according to Table 2	G_C90/10 (row 3); G_C90/15 (row 4); G_C90/15 (row 5)	for 0/2: G_F85 (row 2); G_C90/10 (row 3); G_C90/15 (row 4) for particle size fraction 1/3, the following applies: G_C90/10	for 0/2: G_F85 (row 2); G_C90/10 (row 3); G_C90/15 (row 4);
	Combined particle size groups according to Table 3	–		
	Tolerance for KGV according to Table 4	G_{TC}NR		
2.2.3	Fines content according to Table 5	$f_{0.5}$	for 0/2: is to be declared for 1/3, 2/5 and 5/8: f_2	for 0/2: is to be declared for 2/5 and 5/8: f_2
2.2.4	Quality of the fines contents of fine aggregates and all-in aggregates according to Table 6	–	Row 1	–
2.2.5	Particle shape of coarse aggregates and all-in aggregates	SI_{15}/FI_{15}; SI_{20}/FI_{20}		SI_{15}/FI_{15}
2.2.6	Percentage of crushed surfaces in coarse aggregates and all-in aggregates	$C_{90/1}$; $C_{95/1}$; $C_{100/0}$	$C_{90/1}$; $C_{95/1}$; $C_{100/0}$	$C_{90/1}$; $C_{95/1}$; $C_{100/0}$

TL Gestein-StB Section No.	Application for / Property	Spraying and chipping, surface dressing (OB)	Asphalt mixture for slurry surfacing (DSK)	Asphalt mixture for thin hot mix asphalt overlays on a sealing (DSH-V)
2.2.7	Flow coefficient of fine aggregates and all-in aggregates	–	$E_{CS}35$	E_{CS}declared; $E_{CS}35$
2.2.9	Resistance to fragmentation of coarse aggregates and all-in aggregates	SZ_{18}/LA_{20}		
2.2.10	Resistance to polishing of coarse aggregates and all-in aggregates	$PSV_{declared}48$; $PSV_{declared}51$		
2.2.14.1	Water absorption	$WA_{cm}0.5$[b)]		
2.2.14.2	Resistance to freezing and thawing	F_1		
2.2.14.3	Resistance to freezing and thawing in the presence of salt	Loss of mass ≤ 8% by weight[a)]		
2.2.15	Resistance to thermal shock of coarse aggregates and all-in aggregates	–		is to be declared
2.2.16	Affinity between coarse aggregates/ all-in aggregatesand bitumen	is to be declared		
2.2.17	"Sonnenbrand" of coarse aggregates and all-in aggregates	SB_{SZ}/SB_{LA}		
2.2.18	Content of coarse organic contaminators	$m_{LPC}0.10$		
2.2.19.3	Soundness of SWS	$V_{3.5}$		

TL Gestein-StB Section No.	Application for / Property	Spraying and chipping, surface dressing (OB)	Asphalt mixture for slurry surfacing (DSK)	Asphalt mixture for thin hot mix asphalt overlays on a sealing (DSH-V)
2.3	Fillers			
2.3.1	Particle size distribution	–	–	Table 26
2.3.3	Water content	–	–	≤ 1% by weight
2.3.4.1	Void content (Rigden)	–	–	$V_{28/45}$; $V_{44/55}$
2.3.4.2	Softening point increase "Delta Ring and Ball"	–	–	$\Delta_{R\&B}8/25$; $\Delta_{R\&B}25$
2.3.5	Water solubility	–	–	WS_{10}
2.3.6	Water susceptibility	–	–	is to be declared
2.3.7	Calcium carbonate content of limestone fillers	–	–	CC_{70}; CC_{80}; CC_{90}
2.3.8	Calcium hydroxide content of mixture fillers	–	–	Ka_{10}; Ka_{20}; Ka_{25}
2.4	Environmental aspects	see section 2.4 and Annex D		

*) In the event of contradictions between Annex F.2 and Annex A of the ZTV BEA-StB, the rules and regulations of the ZTV BEA-StB, Annex A, take priority.

a) For frost action zone III (RStO 12): Loss of mass ≤ 5% by weight

b) Former designation W_{cm}

Area of application: Concrete road pavements and courses with hydraulic binders*)

Properties and requisite categories of the aggregates									
TL Gestein-StB Section No.	Course / Property	Setting	Hydr. bound base course	Concrete base course	Bottom concrete layer	Top concrete layer Bk0.3 – Bk1.0	Top concrete layer ($D > 8$) Bk1.8 – Bk100	Top concrete layer (0/8) Bk1.8 – Bk100
2.1.1	Material identification	is to be declared						
2.1.2	Particle density	is to be declared						
2.2.2	Particle size distribution (KGV)							
	Particle size groups/ Particle size fractions according to Table 2	G_F80 (row 9)		G_F85 (row 20, 21)				
		$G_C80/20$ (rows 11, 13, 15, 17, 19)		$G_C90/10$ (row 3); $G_C90/15$ (row 4–7); $G_C85/20$ (row 22–25)				
	Combined particle size groups according to Table 3	G_A85		$G_C90/15$				
		GT_{NR}; $GT_C20/15$; $GT_C20/17.5$			G_T15; $GT17.5$			
	Tolerance for KGV according to Table 4	GT_FNR		Row 1 or row 2				
2.2.3	Fines content							
	Particle size groups according to table 5	is to be declared[a)]		f_3				
	0/2 to 0/5							
	2/4 to 32/63	is to be declared[a)]		≤ 1% by weight				
2.2.5	Particle shape of coarse aggregates and all-in aggregates	$SI \leq 50/FI_{50}$				SI_{20}/FI_{20}		SI_{15}/FI_{15}
2.2.6	Percentage of crushed surfaces in coarse aggregates and all-in aggregates	–				C_{NR}; $C_{90/3}$	C_{NR}; $C_{90/1}$	$C_{90/1}$; $C_{100/0}$

Properties and requisite categories of the aggregates								
TL Gestein-StB Section No.	**Course / Property**	**Setting**	**Hydr. bound base course**	**Concrete base course**	**Bottom concrete layer**	**Top concrete layer Bk0.3 – Bk1.0**	**Top concrete layer (D > 8) Bk1.8 – Bk100**	**Top concrete layer (0/8) Bk1.8 – Bk100**
2.2.8	Shell content of coarse aggregates and all-in aggregates	–			SC_{10}			
2.2.9	Resistance to fragmentation of coarse aggregates and all-in aggregates	–	Rock-related according to Annex A					
2.2.10	Resistance to polishing of coarse aggregates and all-in aggregates	–	–	–	–	$PSV_{declared}42$[d]	$PSV_{declared}48$[d]	$PSV_{declared}48$[d] $PSV_{declared}53$[b,d]
2.2.14.1	Water absorption	$WA_{cm}0.5$[e]			–	–	–	–
2.2.14.2	Resistance to freezing and thawing	F_4			F_2	–	–	–
2.2.14.3	Resistance to freezing and thawing in the presence of salt	–	–	–	–	Loss of mass ≤ 8% by weight[c]		
2.2.17	"Sonnenbrand" of coarse aggregates and all-in aggregates	SB_{SZ}/SB_{LA}; for aggregates with D > 32 mm: is to be declared			SB_{SZ}/SB_{LA}			
2.2.18	Content of coarse organic contaminators							
	Fine aggregates	–			$m_{LPC} \leq 0.25$			
	Coarse aggregates	–			$m_{LPC} \leq 0.05$			

Properties and requisite categories of the aggregates								
TL Gestein-StB Section No.	**Course / Property**	**Setting**	**Hydr. bound base course**	**Concrete base course**	**Bottom concrete layer**	**Top concrete layer Bk0.3 – Bk1.0**	**Top concrete layer (D > 8) Bk1.8 – Bk100**	**Top concrete layer (0/8) Bk1.8 – Bk100**
2.2.19.1	Dicalcium silicate disintegration of HOS and GKOS	no disintegration			–	–	–	–
2.2.19.2	Iron disintegration of HOS and GKOS	no disintegration			–	–	–	–
2.2.19.3	Soundness of SWS	V_5		SWS is not to be used in concrete				
2.2.20	Alkali-silica reaction	–	–	see TL Beton-StB				
2.2.21	Chlorides	–	–	$C \leq 0.04\%$ by weight				
2.2.22.1	Acid-soluble sulphate	–	–	$AS_{0.8}$				
2.2.22.2	Total sulphur content	–	–	S ≤ 1% by weight				
2.2.23	Components affecting setting and hardening	are to be proven						
2.3.1	Particle size distribution filler	–	–	–	see table 26			
2.4	Environmental aspects	see section 2.4 and Annex D						

*) In the event of contradictions between Annex G and Annex A of the TL Beton-StB, the rules and regulations of the TL Beton-StB, Annex A, take priority.

a) The requirements of the fines content in the total mixture shall not be exceeded.

b) Exposed aggregate concrete

c) For frost action zone III (RStO-12): Loss of mass ≤ 5% by weight

d) Applies to coarse aggregates produced by artificial crushing processes (crushed aggregates)

e) Former designation W_{cm}

Annex H

Area of application: Cobble and slab paving

Properties and requisite categories of the aggregates			
TL Gestein-StB Section No.	**Property / Usage**	**Bedding material**	**Joint material**
2.1.1	Material identification	is to be declared	
2.1.2	Particle density	is to be declared	
2.2.2	Particle size distribution (KGV)		
	Particle size groups/Particle size fractions according to Table 2	G_F85 (row 2)[b] $G_C90/10$ (row 3)[b] $G_C90/15$ (rows 4; 5)[b] G_F80 (row 9) $G_C80/20$ (row 11) G_F85 (rows 20; 21)[a] $G_C85/20$ (rows 22; 23)[a]	
	Combined particle size groups according to Table 3	$G_C90/15$ $GT_C20/15$; $GT_C20/17.5$	
	Tolerance for KGV according to Table 4	GT_ANR	
2.2.3	Fines content		
	Particle size group/Particle size fraction	see TL Pflaster-StB	
2.2.5	Particle shape of coarse aggregates and all-in aggregates	SI_{55}/FI_{50}; SI_{50}/FI_{50}	
2.2.6	Percentage of crushed surfaces in coarse aggregates and all-in aggregates	C_{NR}; $C_{90/3}$	
2.2.7	Flow coefficient of fine aggregates and all-in aggregates	$E_{cs}35$; $E_{cs}30$; $E_{CSdeclared}$	
2.2.9	Resistance to fragmentation of coarse aggregates and all-in aggregates	SZ_{18}/LA_{20}; SZ_{22}/LA_{25}; SZ_{26}/LA_{30}; Annex A[c]	
2.2.14.1	Water absorption	$WA_{cm}0.5$[d]	
2.2.14.2	Resistance to freezing and thawing	F_4	
2.2.17	"Sonnenbrand" of coarse aggregates and all-in aggregates	SB_{SZ}/SB_{LA}	

Annex H (continued)

Properties and requisite categories of the aggregates			
TL Gestein-StB Section No.	**Property** / **Usage**	**Bedding material**	**Joint material**
2.2.19.1	Dicalcium silicate disintegration of HOS and GKOS	no disintegration	
2.2.19.2	Iron disintegration of HOS and GKOS	no disintegration	
2.2.19.3	Soundness of SWS	V_5	
2.2.19.4	Soundness of GRS	see Annex B	
2.4	Environmental aspects	see section 2.4 and Annex D	

[a] Applies to ballast and joint material made of round particles

[b] Applies to ballast and joint material made of crushed solid rock

[c] For the rows 5b, 6 and 7 of Annex A, SZ_{26} (LA_{30}) applies

[d] Former designation W_{cm}

Annex I

Technical regulations

DIN	DIN EN 196-2	Method of testing cement – Part 2: Chemical analysis of cement	1), 2)
	DIN EN 459-2	Building lime – Part 2: Test method	1), 2)
	DIN EN 932-3	Tests for general properties of aggregates – Part 3: Procedure and terminology for simplified petrographic description	1), 2)
	DIN EN 932-5	– Part 5: Common equipment and calibration	1), 2)
	DIN EN 933-1	Tests for geometrical properties of aggregates – Part 1: Determination of particle size distribution – sieving method	1), 2)
	DIN EN 933-3	– Part 3: Determination of particle shape - Flakiness index	1)2)
	DIN EN 933-4	– Part 4: Determination of particle shape - Shape index	1), 2)
	DIN EN 933-5	– Part 5: Determination of percentage of crushed and broken surfaces in coarse aggregates and all-in aggregates	1), 2)
	DIN EN 933-6	– Part 6: Assessment of surface characteristics Flow coefficient of aggregates	1), 2)
	DIN EN 933-7	– Part 7: Determination of shell content; percentage of shells in coarse aggregates	1), 2)
	DIN EN 933-8	– Part 8: Assessment of fines - Sand equivalent method	1), 2) 1), 2)
	DIN EN 933-9	– Part 9: Assessment of fines - Methylene Blue method	
	DIN EN 933-10	– Part 10: Assessment of fines - Grading of filler aggregates (air jet sieving)	1), 2)
	DIN EN 933-11	– Part 11: Classification test for the constituents of coarse recycled aggregate	1), 2)
	DIN EN 1097-1	Test procedures for mechanical and physical properties of aggregates – Part 1: Determination of the resistance to wear (Micro-Deval)	1), 2)
	DIN EN 1097-2	– Part 2: Methods for the determination of resistance to fragmentation	1), 2)
	DIN EN 1097-3	– Part 3: Determination of loose bulk density and voids	1), 2)
	DIN EN 1097-4	Test procedures for mechanical and physical properties of aggregates – Part 4: Determination of the voids of dry compacted filler	1), 2)

Technical regulations – continued

DIN	DIN EN 1097-5	– Part 5: Determination of the water content by drying in a ventilated oven	1), 2)
	DIN EN 1097-6	– Part 6: Determination of particle density and water absorption	1), 2)
	DIN EN 1097-7	– Part 7: Determination of the particle density of fillers – Pyknometer method	1), 2)
	DIN EN 1097-8	– Part 8: Determination of the polished stone value	1), 2)
	DIN EN 1097-9	– Part 9: Determination of the resistance to wear by abrasion from studded tyres – Nordic test	1), 2)
	DIN EN 12620	Aggregates for concrete	1), 2)
	DIN EN 12697-11	Bituminous mixtures – test methods for hot mix asphalt – Part 11: Determination of the affinity between aggregate and bitumen	1), 2)
	DIN EN 13043	Aggregates for bituminous mixtures and surface treatments for roads, airfields and other trafficked areas	1), 2)
	DIN EN 13179-1	Tests for filler aggregate used in bituminous mixtures – Part 1: Delta ring and ball method	1), 2)
	DIN EN 13179-2	– Part 2: Bitumen number	1), 2)
	DIN EN 13242	Aggregates for unbound and hydraulically bound mixtures for use in civil engineering work and road construction	1), 2)
	DIN EN 13286-47	Unbound and hydraulically bound mixtures – Part 47: Test method for the determination of California bearing ratio, immediate bearing index and linear swelling	1), 2)
	DIN EN 1367-1	Test method for thermal and weathering properties of aggregates – Part 1: Determination of resistance to frost-thaw attack	1), 2)
	DIN EN 1367-2	– Part 2: Magnesium sulphate test	1), 2)
	DIN EN 1367-3	– Part 3: Boiling test for “Sonnenbrand basalt”	1), 2)
	DIN EN 1367-5	– Part 5: Determination of resistance to thermal shock	1), 2)
	DIN EN 1367-6	– Part 6: Determination of resistance to frost-thaw attack in the presence of salt (NaCl)	1), 2)
	DIN EN 1744-1	Test method for chemical properties of aggregates – Part 1: Chemical analysis	1), 2)
	DIN EN 1744-3	Test method for chemical properties of aggregates – Part 3: Preparation of eluates by leaching of aggregates	1), 2)

Technical regulations – continued

DIN	DIN EN 1744-4	– Part 4: Determination of the water susceptibility of fillers for bituminous mixtures.	1), 2)
	DIN EN 1744-5	– Part 5: Determination of acid soluble chloride salts	1), 2)
	DIN EN 1744-6	– Part 6: Determination of the influence of recycled aggregate extract on the initial setting time of cement	1), 2)
FGSV		Practical information of the Working Group Aggregates, Unbound Pavements (FGSV 6000)	2)
	M Ls	Fact sheet on the use of lava slag in road and path construction (FGSV 611)	2)
	RStO	Guidelines for standardisation of the superstructures of traffic areas (FGSV 499)	2)
	TL Asphalt-StB	Technical delivery conditions for asphalt mixtures for the construction of asphalt pavements (FGSV 797)	2)
	TL Beton-StB	Technical delivery conditions for construction materials and construction material mixtures for base courses with hydraulic binders and concrete road pavements (FGSV 891)	2)
	TL BuB E-StB	Technical delivery conditions for soils and construction materials in road construction earthworks (FGSV 597)	2)
	TL Pflaster-StB	Technical delivery conditions for construction products for the production of cobble and slab pavings and borders (FGSV 643)	2)
	TL SoB-StB	Technical delivery conditions for construction material mixtures for producing layers not containing binders in road construction (FGSV 697)	2)
	TP Gestein-StB	Technical test instructions for aggregates in road construction (FGSV 610)	2)
	TP Prüfmittel-überwachung-StB	Technical test instructions for test equipment monitoring in road construction (FGSV 975)	2)
	TP Beton-StB	Technical test instructions for base courses with hydraulic binders and concrete road pavements (FGSV 892) with Annex 2: Working instruction for the determination of the soundness of hydraulically bound municipal incinerator bottom ash	2)
	ZTV Asphalt-StB	Additional technical terms of contract and guidelines for civil engineering works of asphalt road surfaces (FGSV 799)	2)

Technical regulations – continued

FGSV	ZTV BEA-StB	Additional technical terms of contract and guidelines for civil engineering works for the structural maintenance of asphalt pavements (FGSV 798)	2)
German Federal Law Gazette (BGBl).	EBV	Ordinance on Requirements for the Installation of Mineral Substitute Construction Materials in Technical Structures)" (Substitute Construction Materials Ordinance (EBV)) (Article 1 of the General Ordinance: Ordinance for the introduction of a Substitute Construction Materials Ordinance, for the new version of the Federal Soil Protection Ordinance and for the revision of the Landfill Ordinance and the Commercial Waste Ordinance) (FGSV R 2061)*)	2), 3)

*) The title featuring this FGSV no. is also available in the FGSV Reader "Premium"

Reference sources

1) DIN Media GmbH
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2) FGSV Verlag GmbH
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3) German Federal Law Gazette (BGBl)
Internet: www.bgbl.de, www.gesetze-im-internet.de

Annex J

Explanation of the categories

AAV	Resistance to surface abrasion (aggregate abrasion value)
AN	Resistance to abrasion from studded tyres (nordic abrasion value)
AS	Acid-soluble sulphate content
Bk	Load class
C	Proportion of completely crushed and partially crushed particles
CC	Calcium carbonate content
$\Delta_{R\&B}$	Softening point increase “Delta Ring and Ball”
d	Lower sieve size
D	Upper sieve size
E_{CS}	Flow coefficient
f	Fines content
F	Resistance to freezing and thawing
FI	Flakiness index
FL	Floating materials
G	Particle size distribution (grading)
G_A	Category for all-in aggregate
G_c	Category for coarse aggregate
G_F	Category for fine aggregate
GT	Tolerance, related to material passing the intermediate sieve (grading tolerance)
Ka	Calcium hydroxide content of mixture fillers
LA	Los Angeles value
MB_F	Methylene Blue value
M_{DE}	Micro-Deval coefficient
m_{LPC}	Content of organic contaminators
MS	Magnesium sulfate attack
PSV	Resistance to polishing (polished stone value)
R_a	Bituminous materials (asphalt)
R_b	Bricks, e.g. bricks, clinker bricks
R_c	Concrete (concrete), e.g. concrete products, concrete masonry blocks
R_g	Glass
R_u	Unbound aggregates, e.g. solid rock, gravel, slag

S	Total sulfur content
SE	Sand equivalent value
SI	Shape index
SB	“Sonnenbrand” of Basalt
SC	Shell content of coarse aggregates
SZ	Impact fragmentation value
WA_{cm}	Water absorption
WS	Water solubility
x	Impurities

Indices used

Declared	Measured value must be declared
A	All-in aggregates
C	Coarse aggregate
F	Fine aggregate
NR	no requirement, i.e.: no proof required
x	x stands for the limiting values to be complied with
x/y	x % by weight passage through the top sieve (D) and y % by weight passage through the bottom sieve (d)

Examples

f_3	Fines content ≤ 3% by weight
G_C	Particle size distribution of a coarse aggregate
G_F	Particle size distribution of a fine aggregate
G_A	Particle size distribution of an all-in aggregate
$G_C90/15$	Particle size distribution of a coarse aggregate with 1–10% by weight oversized particle (i.e. 90–99% by weight passing through the top sieve D) and 0–15% by weight undersized particle (i.e. 0–15% by weight passing through the bottom sieve d).
$PSV_{declared}51$	Intermediate value of the PSV categories
SZ_{18}/LA_{20}	Impact fragmentation value ≤ 18% by weight or Los Angeles coefficient ≤ 20% by weight

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