Section 4115. Coarse Aggregate for Portland Cement Concrete

4115.01 DESCRIPTION.

Gravel or crushed stone particles meeting one of the aggregate durability classes listed below. Acquire aggregates from an approved source meeting the requirements of Materials I.M. 409.

A. Class 2 Durability.
No deterioration of pavements of non-Interstate segments of the road system after 15 years and only minimal deterioration in pavements after 20 years of age.

B. Class 3 Durability.
No deterioration of pavements of non-Interstate segments of the road system after 20 years of age and less than 5% deterioration of the joints after 25 years.

C. Class 3i Durability.
No deterioration of pavements of the Interstate Road System after 30 years of service and less than 5% deterioration of the joints after 35 years.

4115.02 QUALITY.

Meet the requirements of Tables 4115.02-1 and 4115.02-2:

Table 4115.02-1: Aggregate Quality

Aggregate Quality	Maximum Percent Allowed	Test Method
Abrasion (Cr. Stone)	50	AASHTO T 96
Abrasion (Gravel)	35 (may be increased by 0.1% for each 1% of particles with at least one fractured face)	AASHTO T 96
Alumina[(a)]	0.5	Office of Materials Test Method No. Iowa 222
A Freeze	6	Office of Materials Test Method No. Iowa 211, Method A
Clay Lumps and Friable Particles	0.5	Materials I.M. 368

(a) If the Alumina value fails, determine the A Freeze value for specification compliance. Office of Materials Test Method No. Iowa 222 does not apply to gravel.

Table 4115.02-2: Maximum Permissible Amounts of Objectionable Materials

Objectionable Materials.	Maximum Percent Allowed	Test Method
Coal and carbonaceous shale	0.5	Materials I.M. 372
Total of all shale, similar objectionable materials, and coal combined	1.0	Materials I.M. 372
Organic Materials, except coal	0.01	Office of Materials Test Method No. Iowa 215
Unsound chert particles retained on 3/8 inch (9.5 mm) sieve (Nonstructural concrete)	3.0	Materials I.M. 372
Unsound chert particles retained on 3/8 inch (9.5 mm) sieve (Structural concrete)	2.0	Materials I.M. 372

Note: Chert particle which break into three or more pieces when subjected to the freezing and thawing test will be considered unsound.

Chert in aggregate produced from limestone sources is defined as unsound when any of the fractions of the crushed or uncrushed chert do not meet the soundness requirements.

4115.03 GRADATION.

Meet the requirements of Article 4109.02 and Table 4115.03-1:

Table 4115.03-1: Aggregate Gradations

Mix Class (Materials I.M. 529)	Mix Number (Materials I.M. 529)	Gradation Numbers (Article 4109.02)
D	57, 57-6	3 or 5
A, B, C	2 to 8, V47B	3, 4, or 5
M	4	3, 4, or 5
A, B, C, M	V	7

4115.04 AGGREGATE USE DURABILITY REQUIREMENTS.

A. Meet the requirements of Table 4115.04-1:

Table 4115.04-1: Aggregate Use Durability Requirements

Specification Section Number	Minimum Durability Class Required			Use
	3i	3	2	
2122, 2201, 2212, 2213, 2301, 2302, 2310, 2529, 2530 Interstate System Primary System Other	X*	X*	X	PCC Paved Shoulders, Base, Base Repair, Base Widening PCC Pavement, Widening, PCC Overlay, Finish Patches, and Bridge Approaches
2403			X	Structural Concrete
2406 (See 2403)			X	Concrete Structures
2407			X	Precast Units
2407, 2501		X		Prestressed Units, Concrete Piles
2412 (See 2403)			X	Concrete Bridge Decks
2413 (See 2413.02, D, 1)		X		Bridge Deck Surfacing, Repair, & Overlay
2414 (See 2403)			X	Concrete Railings
2415 (See 2403)			X	Concrete Box, Arch, & Circular Culverts
2416 (See 4145)			X	Rigid Pipe Culverts
2424			X	Shotcrete
2503 (See 2403)			X	Storm Sewers (Catch Basins, Intakes, & Utility Access)
2505 (See 2403)			X	Guardrails (Concrete End Anchorage)
2511, 2515 (See 2403)			X	PCC Sidewalks, Paved Driveways
2512 (See 2403)			X	PCC Curb & Gutter
2513 (See 2403)			X	Concrete Barrier
2516 (See 2403)			X	Concrete Walls and Steps

2517 Primary System Other		X	X	Railroad Approach Sections
2522 (See 2403)			X	Tower Lighting (Concrete Footings & Foundations)
2523 (See 2403)			X	Highway Lighting (Concrete Footings & Foundations)
2524 (See 2403)			X	Highway Signing (Concrete Footings & Foundations)
2525 (See 2403)			X	Traffic Signals (Concrete Footings & Foundations)
* For patches and PCC base repair, Class 2 durability or better aggregate will be required if the existing pavement was constructed of Class 2 or lower durability aggregate. If the existing pavement was constructed of Class 3 or Class 3i durability aggregate, use Class 3 aggregate or better and Class 3i aggregate, respectively, in the repair.				

B. Use crushed stone coarse aggregate for:

- Aesthetic concrete cast with form liners or rustication. This includes Mechanically Stabilized Earth (MSE) walls and noise walls.
- Concrete receiving color sealer or texture treatments.
- Concrete for precast box culverts that are to receive color sealer.

4115.05 COARSE AGGREGATE FOR BRIDGE DECK SURFACING, REPAIR, AND OVERLAY.

Acquire from a Class 3 durability or better source meeting the following requirements:

A. Quality.

Meet the requirements of Tables 4115.05-1 and 4115.05-2:

Table 4115.05-1: Aggregate Quality

Aggregate Quality	Maximum Percent Allowed	Test Method
Abrasion	40	AASHTO T 96
Alumina[(a)]	0.5	Office of Materials Test Method No. Iowa 222
A Freeze	6	Office of Materials Test Method No. Iowa 211, Method A
Absorption	2.5	Office of Materials Test Method No. Iowa 201
(a) If the Alumina value fails, determined the A Freeze value for specification compliance. Office of Materials Test Method No. Iowa 222 does not apply to gravels.		

Table 4115.05-2: Maximum Permissible Amounts of Objectionable Material

Objectionable Materials	Maximum Percent Allowed	Test Method
Unsound chert particles retained on No. 4 (4.75 mm) sieve	0.5	Materials I.M. 372
Total of all unsound chert, shale, coal, and iron combined	1.0	Materials I.M. 372
Organic Materials, except coal	0.01	Office of Materials Test Method No. Iowa 215
Note: Unsound chert particles are defined in Article 4115.02.		

B. Gradation.
Meet the gradation requirements for Gradation No. 6 of the Aggregate Gradation Table, Article 4109.02.