

SECTION 32 11 20

BASE COURSE FOR RIGID AND SUBBASES FOR FLEXIBLE PAVING

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

JAPANESE STANDARDS ASSOCIATION (JSA)

JIS A 1102	(2014) Method of Test for Sieve Analysis of Aggregates
JIS A 1103	(2014) Method of Test for Amount of Material Passing Test Sieve 75 μm in Aggregates
JIS A 1104	(2006) Methods of Test for Density and Water Absorption of Fine Aggregates
JIS A 1121	(2007) Method of Test for Resistance to Abrasion of Coarse Aggregate by Use of the Los Angeles Machine
JIS A 1201	(2009) Practise for Preparing Disturbed Soil Samples for Soil Testing
JIS A 1205	(2009) Test Method for Liquid Limit and Plastic Limit of Soils
JIS A 1210	(2009) Test Method for Soil Compaction Using a Rammer
JIS A 1214	(2013) Test Method for Soil Density by the Sand Replacement Method
JIS A 5001	(2008) Crushed Stone for Road Construction
JIS Z 8801	(2006) Test Sieves Part 1: Test Sieves of Metal Wire Cloth

JAPANESE GEOTECHNICAL SOCIETY (JGS)

JGS 0051	(2000) Method of Classification of Geomaterials for Engineering Purposes
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1.2 DEGREE OF COMPACTION

Degree of compaction required is expressed as a percentage of the maximum laboratory dry density obtained by the test procedure presented in JIS A 1210 abbreviated as a percent of laboratory maximum dry density.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submittals with an "S" are for inclusion in the Sustainability eNotebook, in conformance to Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Plant, Equipment, and Tools

SD-06 Test Reports

Initial Tests; G

In-Place Tests; G

1.4 EQUIPMENT, TOOLS, AND MACHINES

All plant, equipment, and tools used in the performance of the work will be subject to approval by the Contracting Officer before the work is started. Maintain all plant, equipment, and tools in satisfactory working condition at all times. Submit a list of proposed equipment, including descriptive data. Use equipment capable of minimizing segregation, producing the required compaction, meeting grade controls, thickness control, and smoothness requirements as set forth herein.

1.5 QUALITY ASSURANCE

Sampling and testing are the responsibility of the Contractor. Perform sampling and testing using a laboratory approved in accordance with Section 01 45 00.00 1001 45 00.00 2001 45 00.00 40 QUALITY CONTROL. Work requiring testing will not be permitted until the testing laboratory has been inspected and approved. Test the materials to establish compliance with the specified requirements and perform testing at the specified frequency. The Contracting Officer may specify the time and location of the tests. Furnish copies of test results to the Contracting Officer within 24 hours of completion of the tests.

1.5.1 Sampling

Take samples for laboratory testing in conformance with JIS A 1201. When deemed necessary, the sampling will be observed by the Contracting Officer.

1.5.2 Tests

1.5.2.1 Sieve Analysis

Perform sieve analysis in conformance with JIS A 1103 and JIS A 1102 using sieves conforming to JIS Z 8801.

1.5.2.2 Liquid Limit and Plasticity Index

Determine liquid limit and plasticity index in accordance with JIS A 1205.

1.5.2.3 Moisture-Density Determinations

Determine the laboratory maximum dry density and optimum moisture in accordance with paragraph DEGREE OF COMPACTION.

1.5.2.4 Field Density Tests

Measure field density in accordance with JIS A 1214.

1.5.2.5 Wear Test

Perform wear tests on subbase course and or rigid pavement base course material in conformance with JIS A 1121.

1.5.2.6 Weight of Slag

Determine weight per cubic meter of slag in accordance with JIS A 1104.

1.6 ENVIRONMENTAL REQUIREMENTS

Perform construction when the atmospheric temperature is above 2 degrees C. When the temperature falls below 2 degrees C, protect all completed areas by approved methods against detrimental effects of freezing. Correct completed areas damaged by freezing, rainfall, or other weather conditions to meet specified requirements.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Flexible Paving Subbase Course

Provide aggregates conforming to JIS A 5001, C-30/RC-30 and C-40/RC-40 consisting of crushed stone or slag, gravel, shell, sand, or other sound, durable, approved materials processed and blended or naturally combined. Provide aggregates which are free from lumps and balls of clay, organic matter, objectionable coatings, and other foreign material. The percentage of loss of material retained on the 4.75 mm sieve must not exceed 50 percent after 500 revolutions when tested in accordance with JIS A 1121. Provide aggregate that is reasonably uniform in density and quality. Provide slag that is an air-cooled, blast-furnace product having a dry weight of not less than 1050 kg/cubic meter. Provide aggregates with a maximum size of 37.5 mm for C-40/RC-40 and 31.5 mm for C-30/RC-30 and within the limits specified as follows:

Maximum Allowable Percentage by Weight
Passing Square-Mesh Sieve

Sieve Designation (mm)	C-30 / RC-30	C-40 /RC-40
53.0	----	100
37.5	100	95-100
31.5	95-100	----
26.5	----	----
19	55-85	50-80
13.2	----	----
4.75	15-45	15-40
2.36	5-30	5-25

The portion of any blended component and of the completed course passing the 0.425 mm must be either nonplastic or have a liquid limit not greater than 25 and a plasticity index not greater than 5.

2.1.2 Rigid Pavement Base Course

Provide aggregates for rigid pavement base course as specified for flexible paving subbase course.

2.2 TESTS, INSPECTIONS, AND VERIFICATIONS

2.2.1 Initial Tests

Perform one of each of the following tests on the proposed material prior to commencing construction to demonstrate that the proposed material meets all specified requirements prior to installation. Complete this testing for each source if materials from more than one source are proposed.

- a. Sieve Analysis .
- b. Liquid limit and plasticity index.
- c. Moisture-density relationship.
- d. Wear.
- e. Weight per cubic meter of Slag.

Submit certified copies of test results for approval not less than 30 days before material is required for the work.

2.2.2 Approval of Material

Tentative approval of material will be based on initial test results.

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

Provide adequate drainage during the entire period of construction to prevent water from collecting or standing on the working area.

3.2 STOCKPILING MATERIAL

Clear and level storage sites prior to stockpiling of material. Stockpile all materials, including approved material available from excavation and grading, in the manner and at the locations designated. Stockpile aggregates on the cleared and leveled areas designated by the Contracting Officer to prevent segregation. Stockpile materials obtained from different sources separately.

3.3 PREPARATION OF UNDERLYING COURSE OR SUBGRADE

Clean the underlying course or subgrade of all foreign substances prior to constructing the subbase or rigid pavement base course. Do not construct subbase or rigid pavement base course on underlying course or subgrade that is frozen. Construct the surface of the underlying course or subgrade to meet specified compaction and surface tolerances. Correct ruts or soft yielding spots in the underlying courses, areas having inadequate compaction, and deviations of the surface from the specified requirements set forth herein by loosening and removing soft or unsatisfactory material and adding approved material, reshaping to line and grade, and recompacting to specified density requirements. For cohesionless underlying courses or subgrades containing sands or gravels, as defined in JGS 0051, stabilize the surface prior to placement of the overlying course. Stabilize by mixing the overlying course material into the underlying course and compacting by approved methods. Consider the stabilized material as part of the underlying course and meet all requirements of the underlying course. Do not allow traffic or other operations to disturb the finished underlying course and maintain in a satisfactory condition until the overlying course is placed.

3.4 GRADE CONTROL

Provide a finished and completed subbase and rigid pavement base courses conforming to the lines, grades, and cross sections shown. Place line and grade stakes as necessary for control.

3.5 MIXING AND PLACING MATERIALS

Mix and place the materials to obtain uniformity of the material at the water content specified. Make such adjustments in mixing or placing procedures or in equipment as may be directed to obtain the true grades, to minimize segregation and degradation, to reduce or accelerate loss or increase of water, and to insure a satisfactory subbase course.

3.6 LAYER THICKNESS

Compact the completed course to the thickness indicated. No individual layer may be thicker than 150 mm nor be thinner than 75 mm in compacted

thickness. Compact the course(s) to a total thickness that is within 13 mm of the thickness indicated. Where the measured thickness is more than 13 mm deficient, correct such areas by scarifying, adding new material of proper gradation, reblading, and recompacting as directed. Where the measured thickness is more than 13 mm thicker than indicated, the course will be considered as conforming to the specified thickness requirements. The average job thickness will be the average of all thickness measurements taken for the job and must be within 6 mm of the thickness indicated. Measure the total thickness of the course(s) at intervals of one measurement for each 500 square meters of completed course. Measure total thickness using 75 mm diameter test holes penetrating the completed course.

3.7 COMPACTION

Compact each layer of the material, as specified, with approved compaction equipment. Maintain water content during the compaction procedure to within plus or minus 2 percent of optimum water content determined from laboratory tests as specified in this Section. Begin rolling at the outside edge of the surface and proceed to the center, overlapping on successive trips at least one-half the width of the roller. Slightly vary the length of alternate trips of the roller. Adjust speed of the roller as needed so that displacement of the aggregate does not occur. Compact mixture with hand-operated power tampers in all places not accessible to the rollers. Continue compaction of the subbase until each layer is compacted through the full depth to at least 100 percent of laboratory maximum density. Continue compaction of the rigid base course until each layer is compacted through the full depth to at least 95 percent of laboratory maximum density. Make such adjustments in compacting or finishing procedures as may be directed by the Contracting Officer to obtain true grades, to minimize segregation and degradation, to reduce or increase water content, and to ensure a satisfactory subbase and rigid pavement base course. Remove any materials that are found to be unsatisfactory and replace with satisfactory material or rework, as directed, to meet the requirements of this specification.

3.8 PROOF ROLLING

In addition to the compaction specified, proof roll subbase course under a flexible airfield pavement in areas designated on the drawings by application of 30 coverages for Class IV runways, 8 coverages for runways that support fighter aircraft only, and 4 coverages to all other paved areas, of a heavy pneumatic-tired roller having four or more tires abreast, each tire loaded to a minimum of 13,600 kg and inflated to a minimum of 862 kPa. A coverage is defined as the application of one tire print over the designated area. In the areas designated, apply proof rolling to the top layer of the completed subbase course. Maintain water content of the top layer of the subbase course as specified in paragraph COMPACTION from start of compaction to completion of proof rolling. Remove any subbase course materials that produce unsatisfactory results by proof rolling and replace with satisfactory materials. Then recompact and proof roll to meet specifications.

3.9 EDGES OF SUBBASE AND RIGID PAVEMENT BASE COURSE

Place approved material along the outer edges of the subbase and rigid pavement base course in sufficient quantity to compact to the thickness of the course being constructed. When the course is being constructed in two or more layers, simultaneously roll and compact at least a 600 mm width of

this shoulder material with the rolling and compacting of each layer of the subbase and rigid pavement base course, as directed.

3.10 FINISHING

Finish the surface of the top layer of rigid pavement base course after final compaction and proof rolling by cutting any overbuild to grade and rolling with a steel-wheeled roller. Do not add thin layers of material to the top layer of rigid pavement base course to meet grade. If the elevation of the top layer of rigid pavement base course is 13 mm or more below grade, scarify the top layer to a depth of at least 75 mm and blend new material in and compact and proof roll to bring to grade. Make adjustments to rolling and finishing procedures as directed by the Contracting Officer to minimize segregation and degradation, obtain grades, maintain moisture content, and insure an acceptable rigid pavement base course. Should the surface become rough, corrugated, uneven in texture, or traffic marked prior to completion, scarify the unsatisfactory portion and rework and recompact it or replace as directed.

3.11 SMOOTHNESS TEST

Construct the top layer so that the surface shows no deviations in excess of 10 mm when tested with a 3.00 m straightedge. Take measurements in successive positions parallel to the centerline of the area to be paved. Also take measurements perpendicular to the centerline at 15 meter intervals. Correct deviations exceeding this amount by removing material and replacing with new material, or by reworking existing material and compacting it to meet these specifications.

3.12 FIELD QUALITY CONTROL

3.12.1 In-Place Tests

Perform one of each of the following tests on samples taken from the placed and compacted subbase and rigid pavement base course. Take samples and test at the rates indicated.

- a. Perform density tests on every lift of material placed and at a frequency of one set of tests for every 500 square meters, or portion thereof, of completed area.
- b. Perform sieve analysis on every lift of material placed and at a frequency of one sieve analysis for every 1,000 square meters, or portion thereof, of material placed.
- c. Perform liquid limit and plasticity index tests at the same frequency as the sieve analysis.
- d. Measure the thickness of each course at intervals providing at least one measurement for each 500 square meters or part thereof. Measure the thickness using test holes, at least 75 mm in diameter through the course.

3.12.2 Approval of Material

Final approval of the materials will be based on tests for gradation, liquid limit, and plasticity index performed on samples taken from the completed and fully compacted course(s).

3.13 TRAFFIC

Do not allow traffic on the completed subbase and rigid pavement base course for airfield pavements. For roads, do not allow heavy equipment on the completed rigid pavement base course except when necessary for construction. When it is necessary for heavy equipment to travel on the completed rigid pavement base course, protect the area against marring or damage to the completed work.

3.14 MAINTENANCE

Maintain the completed course in a satisfactory condition until the full pavement section is completed and accepted. Immediately repair any defects and repeat repairs as often as necessary to keep the area intact. Retest any course that was not paved over prior to the onset of winter to verify that it still complies with the requirements of this specification. Rework or replace any area that is damaged as necessary to comply with this specification.

3.15 DISPOSAL OF UNSATISFACTORY MATERIALS

Dispose of any unsuitable materials that have been removed as directed .
No additional payments will be made for materials that have to be replaced.

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