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NAVFAC **IGS-09510 (JUNE 2003)**

Supersedes IGS-09510 (05/02)

Preparing Activity: LANTNAVFACENGCOM **Based on UFGS-09510N**

ITALIAN GUIDE SPECIFICATIONS

Use for ITALIAN projects only

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SECTION 09510

ACOUSTICAL CEILINGS

06/03

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NOTE: This guide specification is issued by the Atlantic Division, Naval Facilities Engineering Command for regional use in Italy.

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NOTE: This guide specification covers the requirements for conventional and impact/abrasion resistant acoustical tiles and panels, unit acoustical absorbers, suspension systems, adhesives and accessories necessary for acoustical treatment of ceilings.

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NOTE: On the drawings, show:

1. Location of acoustical systems. If more than one system is used, key to locations by using symbols.

2. Arrangement of panels, light fixtures, diffusers, other penetrations and exposed suspension grids.

3. Maximum spacing of suspension members for concealed grid suspension systems.

4. Location and material of fire stops above suspended ceilings.

5. Location of systems required to have Noise Reduction Class (NRC), fire endurance ratings, or both.

6. Details of special or patterned panels if necessary to describe adequately.

7. Where acoustical ceilings are provided in conjunction with thermal insulation beneath vented attic spaces, under certain types of roof decks, careful attention should be given to furnishing adequate details on the drawings. Such features as support of insulation over flush-mounted light fixtures, conduit, acoustical units, and suspension-system components and around heating, air-conditioning, and other utilities should be covered by the details. Include appropriate specifications in Section 07214, "Board and Block Insulation" to cover installation of insulation over the suspension system, light fixtures and other ceiling penetrations.

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NOTE: The designer should consult the appropriate building codes prior to editing this specification. The standards referenced are a part of those codes. Two possible codes may be used:

Eurocode 1, Basis of Design and Actions on Structures, Part 2-2: Action on Structures - Actions on structures exposed to fire.

Design and installation in accordance with law 46/90, Fire Prevention Systems, Ente Nazionale Italiano di Unificazione, (published 1994) and Circolare 91 - General Directions of Fire Prevention Services, issued 14 September 1961 by the Minister of the Interior (Describes the fire loads, reduction coefficients and fire classification of buildings and implements law 46/90).

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NOTE: Comments and suggestion on this specification are welcome and should be directed to the technical proponent of the specification. A listing of the technical proponents, including their organization designation and telephone number, is on the Internet.

Use of electronic communication is encourged.

Brackets are used in the text to indicate designer choices or locations where text must be supplied by the designer.

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PART 1 GENERAL

1.1 REFERENCES

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NOTE: EC countries are in the process of adopting the Eurocode and rescinding their previous laws pertaining to the design of buildings. The designer is advised to consult with local in-country consultants and authorities as to the current status of this transition and edit the following accordingly.

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

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NOTE: Regardless of which codes are used include the following EN references:

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EUROPEAN COMMITTEE FOR STANDARDIZATION (EN)

EN 10088-1	(1995) Stainless Steels, Part 1. List of Stainless Steels
EN 10113/1	(1993) Hot Rolled Products in Weldable Fine Grain Structural Steels, Part 1, General Delivery Conditions
EN 10113/2	(1993) Hot Rolled Products in Weldable Fine Grain Structural Steels, Part 2, Delivery Conditions for Normalized/Normalized Rolled Steels
EN 10113/3	(1993) Hot Rolled Products in Weldable Fine Grain Structural Steels, Part 3, Delivery Conditions for Thermomechanical Rolled Steels
EN 10214	(1995) Continuously Hot Dip Zinc-Aluminum Coated Steel Strip and Sheet - Technical Delivery Conditions
EN 10215	(1995) Continuously Hot-Dip Aluminum, Zinc Coated Steel Strip and Sheet - Technical Delivery Conditions
EN 10218-1	(1994) Steel Wire and Wire Products - General, Part 1: Test Methods
EN 10244-2	(2001) Steel Wire and Wire Products - Non-ferrous Metallic Coatings on Steel Wire, Part 2: Zinc or Zinc Alloy Coatings

EN 20140-3	(1992) Methods of Measurement of Sound Insulation in Building Elements : Part 3: Laboratory Measurements of Airborne Sound Insulation of Building Elements
EN 20140-9	(1993) Acoustics - Measurement of Sound Insulation in Building and of Building Elements - Part 9: Laboratory Measurement of Room-to-Room Airborne Sound Insulation of a Suspended Ceiling with a Plenum Above It
EN ISO 717-1	(1997) Acoustics - Rating of Sound Insulation in Buildings, Part 1, Airborne Sound Insulation
EN ISO 26927	(1990) Building Construction - Jointing Products
ENV 1991-2-2	(1995) Eurocode 1 - Basis of Design and Actions on Structures - Part 2-2: Actions on Structures - Actions on Structures Exposed to Fire
ENV 1992-1-2	(1995) Eurocode 2: Design of concrete Structures - Part 1-2: General Rules - Structural Fire Design
ENV 1993-1-2	(1995) Eurocode 3: Design of Steel Structures - Part 1-2: General Rules - Structural Fire Design
ENV 1994-1-2	(1994) Eurocode 4: Design of Composite Steel and Concrete Structures - Part 1-2: General Rules - Structural Fire Design
ENV 1995-1-2	(1994) Eurocode 5: Design of Timber Structures - Part 1-2: General Rules - Structural Fire Design
ENV 1996-1-2	(1995) Eurocode 6: Design of Masonry Structures - Part 1-2: General Rules - Structural Fire Design

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NOTE: For projects in countries that have adopted the Eurocode include the following references:

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NOTE: For projects in Italy, confirm that the Eurocodes have not yet been adopted and that the

following remain the governing documents: Design and installation in accordance with Law 46/90, "Fire Prevention Systems, and Circular 91: Generla Directions of Fire Prevention Services (September 1961, Minister of the Interior)".

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ENTE NAZIONALE ITALIANO DI UNIFICAZIONE (UNI)

UNI 5958	(1985) Products of Mineral Fiber for Thermal and Acoustical Insulation. Terms and Definitions
UNI 7677	(1977) Fire Tests, Terms and Definitions
UNI 7678	(1977) Elements of Construction, Fire Resistance Tests
UNI ISO 1182	(1990) Fire Tests, Building Products, Tests of Non-combustibility

CIRCULAR MINITERIALE (CM)

CM 91	(1961) Circular 91 - Minister of the Interior, Republic of Italy

1.2 SUBMITTALS

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NOTE:

Submittals must be limited to those necessary for adequate quality control. The importance of an item in the project should be one of the primary factors in determining if a submittal for the item is required.

A “G” following a submittal item indicates that the submittal requires Government approval. Some submittals are already marked with a “G”. Only delete an existing “G” if the submittal item is not complex and can be reviewed through the Contractor’s Quality Control system. Only add a “G” if the submittal is sufficiently important or complex in context of the project.

For submittals requiring Government approval on Army projects, a code of up to three characters within the submittal tags may be used following the "G" designation to indicate the approving authority. Recommended codes for Army projects are "RE" for Resident Engineer approval, "ED" for Engineering approval, and "AE" for Architect-Engineer approval. Codes following the "G" typically are not used for

Navy projects.

Submittal items not designated with a "G" are considered as being for information only for Army projects and for Contractor Quality Control approval for Navy projects.

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SD-02 Shop Drawings

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NOTE: When reflected ceiling plans showing ceiling penetrations are included in the project drawings, it may not be necessary for the Contractor to re-draw and submit as a shop drawing. In such cases, delete the requirement. Details not applicable to the project should also be deleted. On simple projects where manufacturer's standard printed data is sufficient, omit this submittal category.

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Acoustical units

Suspension system

Show suspension system, methods of anchoring and fastening, seismic restraints, and reflected ceiling plan.

SD-03 Product Data

Acoustical units

Suspension system

SD-04 Samples

Acoustical units G

Two samples of each type of acoustical unit showing texture, finish, and color.

SD-07 Certificates

Fire endurance

Ceiling sound transmission class

Test reports by an independent testing laboratory attesting that acoustical ceiling systems meet specified [fire endurance] [and] [sound transmission] requirements.

1.3 DESIGN CRITERIA FOR CEILING SYSTEM

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NOTE: Where many different ceiling systems are used, it may be more convenient to schedule Sound Reduction Ratings, fire ratings, panel and suspension types on the drawings, keyed to finish schedules, rather than to include this data in the specification.

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1.3.1 Fire Endurance

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NOTE: Insert required ratings for each system required to provide fire separation, except where ratings are shown on the drawings. Delete this paragraph when fire separation is not required. Where required, rating applies to total floor-ceiling or roof-ceiling assembly, including mechanical-electrical elements, penetrations, structural system, and deck. If system is required to be fire-endurance rated, show details of recessed fixture enclosures and other penetrations on drawings per Minister of Interior Circular CM-91-14.09.61.

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REI rating per CM 91 14.09.61 shall be [180] [_____] minimum as described in UNI 7677 and UNI 7678.

1.3.2 Ceiling System Sound Reduction Rating

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NOTE: Ensure that Sound Reduction Rating chosen is coordinated with rating of walls detailed on the drawings. It is inappropriate to have high Sound Reduction Rating for ceilings if walls nullify acoustical benefit.

Where room partitions do not extend to floor or roof deck above, ceiling plenum path may prevent acoustical privacy between rooms. Where required to provide adequate room to room sound attenuation, entire ceiling assembly including air terminals and light fixtures should have appropriate Sound Reduction Rating (Ceiling Sound Reduction Rating Range). Any penetration of ceiling assembly will destroy integrity of ceiling in this regard. Verify that other specification sections and drawings include appropriate data to ensure that these requirements are met for air terminals and light fixtures. For standard applications, specify Sound Reduction Rating range of 35 - 39. A ceiling Sound Reduction Rating range of 40-44 is recommended for all spaces where speech privacy is required and that

are surrounded or sub-divided by partitions which do not extend to underside of floor or roof deck above. For classified conference rooms, ceiling Sound Reduction Rating Range higher than 40-44 may be required; check with agency security officer. In such cases, sound attenuating requirements may have to be achieved by other means.

Include the paragraph below to identify ceiling systems and their locations which require sound reduction ratings. Coordinate values used in the following paragraph with the sound reduction rating in the material requirements of the acoustical units of Part 2 of this specification section.

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The ceiling sound reduction rating of the ceiling system shall be determined in accordance with EN 20140-9 and EN ISO 717-1 for 16 frequency data. Provide fixture attenuators over light fixtures and other ceiling penetrations, and provide acoustical blanket insulation adjacent to partitions, as required to achieve the specified Sound Reduction Index. Test ceiling shall be continuous at the partition and shall be assembled in the suspension system in the same manner that the ceiling will be installed on the project.

1.3.3 Ceiling Sound Absorption

Determine the NRC in accordance with EN 20140-3 and EN ISO 717-1 Method of Test.

1.3.4 Light Reflectance

Light reflectance shall be measured with a spectrophotometer, or reflectometer. Luminous reflective factor shall comply with requirements of the International Commission On Ilumination, Commission Internationale de I'Edrairage (CIE).

1.4 DELIVERY AND STORAGE

Deliver acoustical units in the manufacturer's original unopened containers with brand name and type clearly marked. Handle materials carefully and store them under cover in dry, watertight enclosures. Immediately before installation, store acoustical units for not less than 24 hours at the same temperature and relative humidity as the space where they will be installed.

1.5 ENVIRONMENTAL CONDITIONS

For 24 hours before, during, and 24 hours after installation of acoustical units, maintain temperature and relative humidity at typical in-service conditions. Interior finish work such as plastering, concrete, and terrazzo work shall be completed and dry before installation. Mechanical, electrical, and other work above the ceiling line shall be completed and approved prior to the start of acoustical ceiling installation.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Acoustical Units

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NOTE: Select type, class, pattern, NRC, light reflectance, size, edge and joint details for each ceiling system shown on the drawings. Check manufacturer's literature to ensure that units are available to meet selected requirements. The following criteria should be considered in making these selections: Write out full description, not just type number. When indicating type and pattern, write out full description, not type or pattern number. These numbers have no meaning in European norms.

Composition units with paint finish are lowest in cost and available in widest variety of patterns. Types III and IV are available in three forms: Form 1 (modulated, cast, or molded) is appropriate for high quality areas such as conference rooms, and officers dining facilities. It is more costly than forms 2 (water-felted) and 3 (dry-felted).

Type I - Cellulose composition with standard washable painted finish

Type II - Cellulose composition with plastic membrane-faced overlay

Type III - Mineral composition with standard washable painted finish

Type IV - Mineral composition with plastic membrane-faced overlay

Type V - Steel facings with mineral composition absorbent backing

Type VI - Stainless steel with mineral composition absorbent backing

Type VII - Aluminum with mineral composition absorbent backing

Type VIII - Cellulose composition with scrubbable pigmented or clear finish

Type IX - Mineral composition with scrubbable pigmented or clear finish

Type X - Mineral composition with plastic/aluminum membrane

Type III or IV units should be used except when any of the following conditions exist, one of the types listed below should be specified:

High Humidity - Aluminum or stainless steel pans with mineral wool pads. Humidity resistant mineral composition units.

Staining or Heavy Soiling - Composition units with plastic film face. Metal pan units. Metal faced composition units.

Impact Abrasion - Metal pan units. Impact resistant composition units. Metal faced composition units.

Metal pan units with pads cannot be used when space above the ceiling is used as an air plenum for heating, ventilating or air conditioning systems.

Pattern -

1. **Regularly large hole perforated**
2. **Randomly large hole perforated**
3. **Finely perforated**
4. **Fissured**
5. **Textured light to medium**
6. **Textured heavy**
7. **Smooth**
8. **Printed**
9. **Embossed**
10. **Embossed-in-register**
11. **Other (specify)**

NRC Rating - Use NRC of 0.50 minimum in spaces where sound control is not critical. For conference rooms, executive offices, teleconferencing rooms, and other occupancies where sound control is critical, use NRC 0.60 minimum. For open office environments, use NRC of 0.75 minimum.

Light Reflectance - A lower light reflectance may be specified when desired for special architectural or lighting effects. The available (light reflection coefficients are (.75 minimum), (.70 minimum), (.65 minimum), (.60 minimum).

Edge Detail - Rabbeted edges may be specified to permit face of panels to project below surface of exposed grid system. Strong sidelighting at low angle of incidence in concealed suspension systems will greatly exaggerate surface irregularities;

beveled edge tiles are suggested for such locations.

When indicating type and pattern, write out full description, not type or pattern number. These numbers have not meaning in European norms.

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UNI 5958, and the following requirements.

2.1.1.1 Composition Lay-In Panels [; [_____]]

a. Type: (Non-asbestos) mineral composition with factory-applied standard washable painted finish. Color [white] [_____].

(Non-asbestos) mineral composition with factory-applied plastic membrane-faced overlay. color [white] [_____].

Mineral composition with scrubbable pigmented or clear finish. Color [white] [_____].

b. Form: [Modulated, cast or molded] [Water felted or dry felted]

c. Class 1 In accordance with CM 91 14.09.61.

d. Pattern: [_____].

e. Sound Reduction Rating: Minimum [_____]

f. Noise Reduction Coefficient (NRC): Minimum [0.75] [_____] in [open office] [_____] areas. Minimum [0.60] [_____] in [conference rooms, executive offices, teleconferencing rooms] and other rooms as designated. Minimum [0.50] [_____] in all other rooms and areas.

g. Light Reflectance (LR) Coefficient: [0.75 or greater.] [_____].

h. Nominal Size: [600] [_____] by [600] [1200] [_____] millimeters [24] [_____] by [24] [48] [_____] inches.

i. Edge Detail: [Square] [Reveal] [_____].

2.1.1.2 Composition Tile [; [_____]]

a. Type: (Non-asbestos) mineral composition with factory-applied standard washable painted finish. Color [white] [_____].

(Non-asbestos) mineral composition with factory-applied plastic membrane-faced overlay. Color [white] [_____].

b. Form: {modulated, cast or molded] [Water felted or dry felted]

c. Class 1 in accordance with CM 91 14.09.61.

d. Pattern: [_____].

e. Sound Reduction Rating: Minimum [_____].

f. Noise Reduction Coefficient (NRC): Minimum [0.75] [_____] in [open office] areas. Minimum [0.60] [____] in [conference rooms, executive offices, teleconferencing rooms] and other rooms as designated. Minimum [0.50] [_____] in all other rooms and areas.

g. Light Reflectance (LR) Coefficient: [LR-1, 0.75 or greater.] [_____].

h. Nominal Size: [300 by 300] [_____] mm [12 by 12] [_____] inches.

i. Edge Detail: [Beveled.] [Square.]

2.1.1.3 Metal Pans [; [_____]]

a. Type: [Aluminum faces with white baked on enamel finish].

[Stainless steel with a dull finish] and non-asbestos mineral composition absorbent backing.]

[Aluminum with [lacquered mill] [clear satin anodized] finish.]

b. Class 1 in accordance with CM 91 14.09.61.

c. Pattern: [_____].

d. Sound Reduction Rating: Minimum [_____].

e. Light reflectance (LR) Coefficient: [0.75 or greater] [_____].

f. Nominal Size: [300 by [300] [600] [900] [1200] mm 12 by [12] [24] [36] [48] inches beveled or cross scored to simulate 300 by 300 mm 12 by 12 inch units] [600 by [600] [1200] mm24 by [24] [48] inches].

g. Edge Detail: Manufacturers standard for use with [snap-in metal pan suspension system] [exposed grid suspension system].

h. Pads: Completely enclosed, and of material and thickness required for acoustical and flame spread tests.

2.1.1.4 Impact/Abrasion Resistant [Tile] [Lay-In Panels] [; [_____]]

Impact and Abrasion Resistant Composition [Tile] [Lay-in Panels] [;[_____]]:

a. Type: (Non-asbestos) mineral composition with a hardened mineral surface and factory applied white paint finish. Surface shall be resistant to impact and abrasion.

b. Class 1 in accordance with CM 91 14.09.61.

c. Pattern: [_____].

[d. Sound Reduction Index: Minimum [_____].

e. Noise Reduction Coefficient: [0.75] [____] in [open office] areas. Minimum [0.60] [____] in [conference rooms, executive offices, teleconferencing rooms], and other rooms as designated. Minimum [0.50] [____] in all other rooms and areas.

f. Light Reflectance: 0.75 or greater.

g. Nominal Size: [300 by 300] [600 by 600] [600 by 1200] mm [12 by 12] [24 by 24] [24 by 48] [_____] inches.

h. Edge Detail: [Square] [Beveled].

i. Joint Detail: [Trimmed and butted] [Kerfed and rabbeted].

2.1.1.5 Humidity Resistant Composition Lay-In Panels [; [_____]]

a. Type: Non-asbestos mineral or glass fibers bonded with ceramic, moisture resistant thermo-setting resin, or other moisture resistant material and having a factory applied white paint finish. Panels shall not sag or warp under conditions of heat, high humidity or chemical fumes.

b. Class 1 in accordance with CM 91 14.09.61.

c. Pattern: [_____].

d. Sound Reduction Index: Minimum [_____].

e. Noise Reduction Coefficient: [0.75] [____] in [open office] areas. Minimum [0.60] [____] in [conference rooms, executive offices, teleconferencing rooms], and other rooms as designated. Minimum [0.50] [____] in all other rooms and areas.

f. Light Reflectance: 0.75 or greater.

g. Nominal Size: [600 by 1200] [_____] mm [24 by 48] [_____] inches.

h. Edge Detail: Square.

2.1.1.6 Metal Faced Composition Lay-In Panels [; [_____]]

a. Type: [(Steel facings with non-asbestos mineral composition absorbent backing).]

[(Stainless steel facings with non-asbestos mineral composition absorbent backing)]

[(Aluminum facings with non-asbestos mineral composition absorbent backing) with [anodized] [baked enamel] [acrylic] finish color [white] [_____].]

b. Class [1] [____] in accordance with CM 91 14.09.61.

c. Pattern: [_____].

d. Sound Reduction Index: Minimum [_____].

e. Light Reflectance: LR-1, 0.75 or greater.

f. Nominal Size: 600 by [600] [1200] mm 24 by [24] [48] inches.

g. Edge Detail: Square.

h. Joint Detail: Trimmed and butted.

2.1.1.7 Unit Acoustical Absorbers

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NOTE: Unit acoustical absorbers should be used in high noise areas such as bowling alleys, industrial areas or in other locations when recommended by an acoustical consultant. Quantity and spacing should be shown on the drawings.

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Individually mounted sound absorbing plaques composed of glass fibers or non-asbestos mineral fibers and having a NRC range of not less than 0.60 - 0.70 reported as a 4 frequency average.

2.2 SUSPENSION SYSTEM

EN 10113/1, EN 10113/2, EN 10113/3 and the following requirements:

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NOTE: Generally, lay-in panels supported by exposed grid suspension system provide most economical installation and allow greatest access to space above ceiling. Where lay-in panels are subject to displacement by building occupants or where ceiling must be directly attached to underside of structural system, concealed framing system may be more appropriate. In lobbies, auditoriums, chapels or clubs where a monolithic appearance may be desired, greater expense of concealed suspension system may be justified. Downward access concealed systems should not be specified in areas subject to moderate to severe seismic activity. Form TI-809-04 (TI 809-04 replaced R-355)

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a. Type: [Exposed grid] [Indirect hung concealed H and T or zee] [Direct hung, concealed, downward access] [Direct hung, concealed, upward access] [Snap-in metal pan] [for [_____] and [_____] for [_____]].

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NOTE: Select classification required to support ceiling load including acoustical units, lights and other items supported by suspension system. Light duty should be specified for residential construction only. Load carrying capacities based on 1200 mm 4 foot hanger spacing:

Classification	kg/meter of Main Runner		
	Direct Hung	Indirect Hung	Furring Bar
Light Duty	7.38	2.95	6.64
Intermediate Duty	17.72	5.17	9.60
Heavy Duty	23.62	11.81	-

Classification	lb/Linear Foot of Main Runner		
	Direct Hung	Indirect Hung	Furring Bar
Light Duty	5.0	2.0	4.5
Intermediate Duty	12.0	3.5	6.5
Heavy Duty	16.0	8.0	-

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b. Structural Classification: [Light] [Intermediate] [Heavy] duty [for [_____] and [_____] duty for [_____]] for main runners and cross tees.

****

NOTE: Select desired finish for exposed portions of suspension system including wall and edge moldings of concealed systems.

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c. Finish: Surfaces exposed to view shall be of uniform width and shall be [aluminum or steel with factory applied [white] [black] [_____] baked enamel finish. Zinc coated steel shall receive a phosphate treatment prior to painting] [aluminum with [clear] [[_____] color] anodized finish.]

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NOTE: Hold down clips may be required for lay-in panels when the space above the ceiling will be used as an air plenum or when the ceiling will be subjected to impact. If the ceiling has a fire endurance rating and the panels weigh less than 4.9

kilograms per square meter 1.0 pound per square foot, hold down clips are required. Hold down clips may also be specified where frequent cleaning is required to prevent displacement during cleaning.
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d. Accessories: Provide manufacturer's standard [hold down clips and] wall or edge moldings.

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NOTE: Seismic requirements should be included for all projects located within areas subject to moderate to severe seismic activity. Form TI 809-04 (TI 809-04 replaced P-355).
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e. Seismic Requirements:

Provide suspension system materials as required to comply with seismic restraint system requirements.

2.2.1 Hangers

2.2.1.1 Wires

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NOTE: Select the applicable paragraph(s) from the following:
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NOTE: Select stainless steel or nickel copper alloy wire for facilities where high humidity can be expected such as large kitchens, dishwashing areas, etc. Select a nickel copper alloy when hangers are used in an indoor pool environment. Select zinc-coated steel wire for other locations.
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NOTE: When spacing of hanger wires exceeds 1200 mm 4 feet or when heavy loads are supported, 3.4 or 4.1 mm 8 or 10 gage wire should be specified.
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[Soft tempered steel wire conforming to test methods of EN 10218-1,Class B zinc coating EN 10244-2, and [2.7] [_____] mm[0.106] [_____] inches in diameter. Hangers and attachment shall support a minimum 1330 N 300 pound ultimate vertical load without failure of supporting material or attachment.]

[Soft tempered stainless steel wire, number 1.4301 EN 10088-1, conforming to test methods of EN 10218-1, [2.7] [_____] mm[0.106] [_____] inches in diameter. Hangers and attachment shall support a minimum 1330 N 300 pound

ultimate vertical load without failure of supporting material or attachment.]

[Annealed nickel-copper alloy wire, [2.7] [_____] mm [0.1055] [_____] inches in diameter. Hangers and attachment shall support a minimum 1330 N 300 pound ultimate vertical load without failure of supporting material or attachment.]

[2.2.1.2 Straps

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NOTE: Normally wire hangers should be used. If the project is in an area subject to violent storms, steel strap or rod hangers should be specified.
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25 by 5 mm One by 3/16 inch galvanized steel conforming to EN 10113/1, EN 10113/2, EN 10113/3 with a light commercial zinc coating or with an electrodeposited zinc coating conforming to EN 10214 or EN 10215.

][2.2.1.3 Rods

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NOTE: Normally wire hangers should be used. If the project is in an area subject to violent storms, steel strap or rod hangers should be specified.
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5 mm 3/16 inch diameter threaded steel rods, zinc or cadmium coated.

][2.3 ADHESIVE

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NOTE: Tiles larger than 300 x 600 mm 12 x 24 inches should not be attached by adhesive method.
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As recommended by tile manufacturer.

]2.4 ACOUSTICAL SEALANT

EN ISO 26927 nonstaining.

2.5 IDENTIFICATION OF ACCESS PANELS

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NOTE: Include this paragraph only when access panels are specified in paragraph entitled "Suspension Systems, Part F" "Accessibility." Delete identification code numbers and systems not applicable to the particular project and add additional numerical codes and system descriptions if necessary. Code numbers and corresponding system descriptions shall remain unchanged, i.e., if

"sprinkler system" is omitted, the code number "6" will also be omitted from the listing.

****

Identify ceiling access panel by a number utilizing white identification plates or plastic buttons with contrasting numerals. The plates or buttons shall be of minimum 25 mm one inch diameter and securely attached to one corner of each access unit. Provide a typewritten card framed under glass listing the code identification numbers and corresponding system descriptions listed above. Mount the framed card where directed and furnish a duplicate card to the Contracting Officer. Code identification system shall be as follows:

1 Fire detection/alarm system

2 Air conditioning controls

3 Plumbing system

4 Heating and steam systems

5 Air conditioning duct system

6 Sprinkler system

7 Intercommunication system

8 Nurse's call system

9 Pneumatic tube system

10 Medical piping system

11 Program entertainment

12 Telephone junction boxes

13 Detector X-ray

14 [_____]

2.6 ACCEPTABLE PRODUCTS

The following manufacturers offer products that meet the requirements of these specifications:

2.6.1 Manufacturer's

The following manufacturer's make products which comply with these specifications.

Armstrong World Industries Italia
Momo
Via dell'Epomeo, 24

80126 - NAPOLI
Telephone: 081/7284308

USG Italia S.r.l.
Telephone: 39-29-5328587
Fax: 39-29-5328637
Claudio Comelli

KNAUF Italia S.r.l.
Maierbit Italia
Via Nuova delle Brecce, 350
80147 - NAPOLI
Telephone: 081/7520411
Fax: 081/7527370

ISOVER
B. & T. s.n.c.
Via Acqua Salsa, 21
80045 - POMPEI (NA)
tELEPHONE: 081/8507877

PART 3 EXECUTION

[3.1 SURFACE PREPARATION

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NOTE: Adhesive method of application should not be used for new construction. It may be used for application to existing ceiling surfaces in remodel work.
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Examine surfaces to receive directly attached acoustical units for unevenness, irregularities, and dampness that would affect quality and execution of the work. Areas where acoustical units will be cemented shall be free of oils, form residue, or other materials that reduce bonding capabilities of the adhesive.

]3.2 INSTALLATION

3.2.1 Suspended Ceilings

EN 10113/1, EN 10113/2, EN 10113/3.

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NOTE: European norms do not (as of this writing) include a reference describing the normal (non-seismic) installation of acoustical ceilings. Absent this information, the designer is required to refer to ASTM C636-92 and indicate installation requirements on the drawings and in these specifications. Refer to both ASTM C636 and ASTM E 580 for applications in seismic areas. Refer to

manufacturer's technical data for installation requirements for fire rated assemblies and indicate those requirements here and on the drawings.

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Install ceiling systems in accordance with manufacturer's written instructions and, no less then, the following:

a. [Mount hangers using suitable cast-in-place hanger inserts.] [or Mount hangers by tying around carrying channels.] [or Mount hangers by securing to special attachment devices. Provide certification that devices are suitable for the purpose and loads.]

b. A maximum of one in six wires may be splayed from the vertical if countersloping wire or brace is provided.

c. Minimum 2mm wire.

d. Install carrying channels level and where required to provide for hanger spacing specified.

e. Install main runners level (within 6mm per 3 meters).

f. Tightly wrap wire through runners and around itself a minimum of three turns.

g. Install cross runners to within 0.8mm of the required center distance at right angles to main runners.

h. Install ceiling fixtures in grid so as not to exceed carrying capacity of grid. Provide additional hangers within 150 mm of each corner where supplemental hangers are required.

3.2.1.1 Hangers

Space hangers [1200] [_____] mm [4] [_____] feet on centers each direction. Lay hangers out for each individual room or space. Install additional hangers where required to support framing around beams, ducts, columns, grilles and other penetrations through the ceiling. Splayed wires may be used if opposite countersplayed wire of same angle as first wire is installed and attached to same supporting member. No hanger wires or other loads shall be suspended from underside of metal deck. Where lighting fixtures are supported from the suspended ceiling system, hangers shall be provided at a minimum of four hangers per fixture and located not more than 150 mm 6 inches from each corner of each fixture. [See Section 16510, "Interior Lighting" for additional lighting installation requirements.]

3.2.1.2 Suspension Members

Keep main runners and carrying channels clear of abutting walls and partitions. Provide at least two main runners for each ceiling span.

3.2.1.3 Acoustical Units

Edges of ceiling tiles shall be in close contact with metal supports [with

each other] and in true alignment. Arrange units so that units less than 1/2 width are minimized.

3.2.1.4 Wall or Edge Molding

Install wall molding at intersection of suspended ceiling and vertical surfaces. Miter corners where wall moldings intersect or install corner caps. Secure molding within 75 mm 3 inches from ends of each length and not more than 400 mm 16 inches on center between end fastenings.

[3.2.1.5 Hold Down Clips

****
NOTE: Hold down clips may be required for lay-in panels when the space above the ceiling will be used as an air plenum or when the ceiling will be subjected to impact. If the ceiling has a fire endurance rating or the panels weigh less than 4.9 kilograms per square meter 1.0 pound per square foot, hold down clips are required. Hold down clips may also be specified where frequent cleaning is required to prevent displacement during cleaning.
****

Provide hold down clips for all panels in ceiling system [_____] and around troffer lights and [_____] in system [_____].

]3.2.1.6 Calking

****
NOTE: Specify calking when the space above the ceiling will be used as an air plenum, or when required to reduce sound transmission between rooms.
****

Seal all joints around pipes, ducts or electrical outlets penetrating the ceiling. Apply a continuous ribbon of acoustical sealant on vertical web of wall or edge moldings. See Section 07920 "Joint Sealants."

3.2.1.7 Seismic Restraint System

****
NOTE: Seismic requirements should be included for all projects located within areas subject to moderate to severe seismic activity. From TI-809-04 (TI-809-04 replaced P-355).
****

a. In all spaces larger than 13 square meters provide the following:

(1) Support light fixtures and ceiling mounted equipment weighting less than 25.3 Kg by positive attachment to ceiling grid and two additional 2.7 mm suspension wires to support the light fixture or ceiling mounted equipment from the ceiling system

hangers or to the structure above wires may be slack. Ceiling mounted equipment (not light fixtures) weighting less than 9.1 kG. Require only positive attachment to ceiling grid.

(2) Support light fixture or ceiling mounted equipment weighting more than 25.3 Kg with full support from structure above.

(3) Main runners and cross runners (including connections) designed to carry a mean ultimate test load of not less than 27.2 kg in tension.

(4) Perimeter closure angles with a support ledge of 22 mm wide, minimum.

(5) A clearance of 9.5 mm between grid (and tiles) and fixed walls.

(6) A tie or spacer bar between perimeter components to prevent spreading.

(7) Suspension wires (No. 12 gage) spaced at 1200 mm on center, minimum.

(8) Vertical suspension wires with a minimum of three turns and a carrying capacity of 45 kg, minimum.

(9) Vertically installed wires with trapeze devices at obstructions.

(10) A free floating ceiling with above described perimeter supports at penetrations and no lateral support provided for partitions.]

(11) Flexible conduit for lighting fixtures and flexible duct for air handling devices.

****
NOTE: In Spain and other areas with a ground motion coefficient of 0.62 or greater and spaces larger than 13 square meters include the following requirements:
****

b. In all spaces larger than 13 square meters. Provide the following:

(1) Support light fixtures and ceiling mounted equipment weighting less than 25.3 Kg by positive attachment to ceiling grid and two additional 2.7 mm suspension wires to support the light fixture or ceiling mounted equipment from the ceiling system hangers or to the structure above wires may be slack. Ceiling mounted equipment (not light fixtures) weighting less than 9.1 kG. Require only positive attachment to ceiling grid.

(2) Support light fixture or ceiling mounted equipment weighting

more than 25.3 Kg with full support from structure above.

(3) Intermediate and heavy duty main runners and cross runners (including connections) designated to carry a mean ultimate test load of not less than 81.6 kg in tension. Intermediate dry suspension systems require 2.7 mm hangers be attached within 76 mm of each corner of the light fixture. Tandem fixtures may utilize common wires.

(4) Perimeter closure angles with a support ledge of 22 mm wide, minimum.

(5) A clearance of 9.5 mm between grid (and tiles) and fixed walls.

(6) A tie or spacer bar between perimeter components to prevent spreading.

(7) Suspension wires (2.7 mm) spaced at 1200 mm on center, minimum.

(8) Vertical suspension wires a minimum of three turns and a carrying capacity of 45 kg, minimum.

(9) Vertically installed wires with trapeze devices at obstructions.

(10) Horizontal restraint points at 3.6 meters on center. Each restraint point with four 2.7 mm wires secured to the main runners within 50 mm of the cross-runner intersection splayed 90 degrees from each other at an angle not exceeding 45 degrees from the plane of the ceiling. A vertical strut connected to the main runner and to the structure above. A free floating ceiling with above described perimeter supports at penetrations and not lateral support provided for partitions and a 12 gage vertical support wire at the end of each main and cross runner within 200 mm of each wall.

****
NOTE: Select the applicable paragraph(s) from the following:
****

****
NOTE: Include first paragraph for direct hung upward or downward access suspension systems. Number and size of panels depend on size of tile and spacing of main runners and cross runners. Check manufacturers' data for available arrangements. Include second paragraph for indirect hung H and T, zee and tongue and groove systems. Specify total number of panels required, with location to be determined in field except when precise location can be determined during design and shown on the

drawings. Delete paragraphs for exposed grid and snap in metal pan suspension systems.

****

[c. Accessibility: [_____] panels [_____] by [_____] mminches in size within each [_____] by [_____] mm inchgrid spacing shall provide direct access to the space above the ceiling. All other acoustical panels within the grid shall be demountable through the access panel opening.]

[c. Accessibility: Provide [[_____] access panels in locations where directed.] [access panels where shown.] Access panels shall match adjacent acoustical units in appearance. Equip the panels with suitable framing or fastening devices designed to permit removal or replacement without damage to the units or supporting system. Access panels shall be not less than 600 by 600 mm 24 by 24 inches nor more than 600 by 1200 mm] 24 by 48 inches in size.]

[3.2.2 Adhesive Application

****

NOTE: Adhesive method of application should not be used for new construction. It may be used for application to existing ceiling surfaces in remodel work. Tiles larger than 300 x 600 mm 12 x 24 inches should not be attached by the adhesive method.

****

Wipe back of tile to remove accumulated dust. Daub acoustical units on back side with four equal daubs of adhesive. Apply daubs near corners of tiles. Contact area of each daub shall be at least 50 mm 2 inchesdiameter in final position. Press units into place, aligning joints and abutting units tight and uniform without differences in joint widths.

]3.3 CLEANING

Clean soiled or discolored unit surfaces after installation. Touch up scratches, abrasions, voids and other defects in painted surfaces. Remove damaged or improperly installed units and install new materials.

3.4 MAINTENANCE MATERIAL (EXTRA STOCK)

****

NOTE: In order to assure matching acoustical units that may become damaged and require spot replacement, a supply of extra ten percent of units in the original pattern is recommended in order to prevent later replacement of the ceiling in an entire room because of mismatched units. However, the Government facility should be consulted to ensure that adequate warehousing and protection is available for these extra units.

****

Furnish one spare acoustical unit for each 100 units installed.

-- End of Section --