
NAVFAC IGS-07320 (MAY 2002)

Preparing Activity: LANTNAVFACENGCOM Based on UFGS-07320N

ITALIAN GUIDE SPECIFICATIONS

Use for ITALIAN projects only

SECTION 07320

CLAY ROOF TILE
05/02

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

NOTE: This guide specification covers terra cotta clay roof tile for use on sloped roofs in the EFA Mediterranean area of responsibility. Terra cotta clay roofing is widely used throughout Europe. It is available from numerous sources and has a long life (>50 years). It is available in a number of shapes and colors including those with an aged appearance for use in restoration. The tiles are usually applied shingle style over a sloped concrete deck and may be part of an insulated or non-insulated system. Special shapes are available for ridges, valleys, ventilation and other uses.

NOTE: Roof slopes in Europe are expressed as percentages (rise divided by run). Clay roofing tiles are not recommended on roof slopes of less than 25% (35% in some publications). Slopes of 30% to 100% are typical. The steeper roof slopes (>50%) are recommended in areas subject to snow loading and wind driven rain.

NOTE: The following information must be indicated on the drawings:

1. Locations and extent of clay tile roofs and special shapes, if any.

2. Method of attachment to substrate.
3. Flashing at ridges, valleys, intersections with vertical surfaces, eaves, penetrations and rakes.
4. Method of ventilation of attic space.
5. Gutters and down spouts, if any.

Coordination between the structural engineer and architect are required to design the sloping slab for the support of these heavy tiles. Coordinate with Section 07600, "Flashing and Sheet Metal."

NOTE: Attic ventilation:

1. Provide net, unobstructed attic ventilation areas over insulated ceilings as recommended by ASRAE Handbook of Fundamentals, Chapter 21 and as follows:
2. For attics with vapor retarder, provide 0.1 square meter of net ventilation areas for each 30 square meters of attic floor area.
3. For attics without vapor retarder, provide 0.1 square meter of net attic ventilation area for each 15 square meters of attic floor area.
4. For insulation of cathedral ceilings, provide at least a 50 mm gap between upper face of insulation and underside of roof sheathing. Provide ventilation openings at bottom and top of ventilated cavity; show on drawings.

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 encouraged.

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

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.

EUROPEAN COMMITTEE FOR STANDARDIZATION (EN)

- EN 196-1 (1995) Methods of Testing Cement, Part 1 - Determination of Strength
- EN 413-1 Masonry Cement - Part 1 - Specification
- EN 413-2 Masonry Cement - Part 2 - Test Methods
- EN 538 (1994) Clay Roofing Tiles for Discontinuous Laying - Flexural Strength Test
- EN 539-1 (1994) Clay Roofing Tiles for Discontinuous Laying - Determination of Physical Characteristics. Part 1 - Impermeability Test

ENTE UNIFICAZIONE D'ITALIA (UNI)

- UNI 8635-1 (1984) Buildings - Tests of Products for Discontinuous Roofing - Part 1
- UNI 8635-2 (1984) Buildings - Tests of Products for Discontinuous Roofing - Part 2
- UNI 8635-3 (1984) Buildings - Tests of Products for Discontinuous Roofing - Part 3
- UNI 8626 (1984) Buildings - Products for Discontinuous Roofing; Characteristics, Sampling Plan and Limits of Acceptance
- UNI 9460 (1989) Discontinuous Roofing - Practical Instruction Code for the Design and Execution of Clay Tile Roofing

1.2 SUBMITTALS

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.

Submit the following in accordance with section entitled "Submittal Procedures."

SD-03, Product Data

Clay tiles

Underlayment/vapor barrier

Roof insulation

Fasteners

SD-04, Samples

Clay tiles; G

1.3 DELIVERY, STORAGE AND HANDLING

1.3.1 Delivery

Deliver materials to the site in shrink-wrapped bundles bearing the manufacturer's name and style designation. Store and handle to protect from damage. Comply with the manufacturer's recommendations for handling, storing and protecting of materials before and during installation.

1.3.2 Storage

Inspect materials delivered to site for damage; unload and store in manufacturer's original packaging. Store only in locations easily

accessible for inspection and handling. Break down pallets on ground into bundles of a size and weight compatible with roof structural capacity prior to lifting to roof.

1.4 SAFETY PRECAUTIONS

- a. Comply with safety requirements of DL 624 and 494 for work on roofs and other elevated locations.
- b. Describe safety precautions in Safety Plan. Refer to Section 01330, " Submittals Procedures."

1.5 EXTRA STOCK

Provide an extra stock of two percent of each type and color of tile used in clean, labeled containers. Include special shapes in this stock.

PART 2 PRODUCTS

2.1 CLAY ROOFING TILES

Machine formed natural terra cotta clay roofing tiles, kiln fired to vitrification and free from surface imperfections, with preformed holes for attachment, complying with the requirements of UNI 8635-1, UNI 8635-2, UNI 8635-3 and the following:

NOTE: Choose one of the following styles of clay tile roof tiles.

Tegold Portoghese - This tile has a flat rectangular area with a hollow half cylindrical segment attached to one side of the flat portion along the longer edge. On the portion of the flat area opposite where the half cylindrical portion joins the flat portion are two raised ridges. These ridges are designed to receive the cylindrical edge of next tile creating a water barrier. Ridges also occur at the top areas of the rectangular portion of the tile to form a water barrier with the slopping tile above. The cross section of the tile could also be described as resembling a question mark lying with the open side down. The general size of these tiles are about 40 cm long from top to bottom and about 25 cm wide.

Tegold Marsigliese - This tile is generally flat with slightly raised ridges and interlocking grooves at both sides and top and bottom. These ridges and grooves overlap with the tiles above and below as well as those at the sides to form water barriers and drains to shed water. The general size of these tiles are about 35 cm long from top to bottom and about 20 wide.

Tegole Romane - This tile is in the shape of a hollow half cylinder with both ends open. Some are tapered slightly from top to bottom while most are non-tapered with a consistent cross section. These are without ridges and are laid on the roof side to side with every other one concave side up with these overlapped by other tiles with the concave side down. They are also overlapped top to bottom shingle fashion to shed water. The general size of these tiles are about 40 cm long from top to bottom and about 25 cm wide.

- a. Style: [Tegole Portoghese] [Tegole Marsigliese] [Tegole Romane].
- b. Color: [Natural] [aged] [_____].
- c. Special shapes [ridges] [ventilation] [penetrations] [_____].
- d. Length: [35 cm] [40 cm][_____].
Width: [20 cm] [25 cm] [_____].
Weight: [3.00 Kg] [3.20 Kg] [3.4 Kg].
- e. Flexural strength: 100 Kg (minimum) per EN 538
- f. Permeability: 0.7 milliliters per square cm per 24 hours (minimum) per EN 539-1
- g. Dimensional tolerances: per UNI 8626
Length: <3% (maximum)
Width: <3% (maximum)

Products meeting the requirements of these specifications are manufactured by the following:

Pica
Strada Montefeltro, 83
Pesaro (PS)
Tel: 0721/440-1
Fax: 0721/201-370

Cotto Toscano
52043 Castiglione Fiorentino (AR)
Tel: 0575/680-131
Fax: 0575/657-455

Agricola Industriale della Faella S.p.A.
Castelfranco di Sopra (AR)

Tel: 055/914-6063
Fax: 055/965-651

Fornace (Gruppo Sila)
Via Ghiarola Nuova, 120
Fiorano Modenese (MO)
Tel: 0536/83-0232
Fax: 0536/83-27764

Products of other manufacturers meeting the requirements of these specifications are also acceptable.

2.1.1 Special Shapes

Provide special shapes for ridges, and ridge ends, [plumbing vents], [ventilation].

2.2 FASTENERS

2.2.1 Fasteners

Fasteners for installation of clay tiles to [steel deck: self tapping stainless steel screws] [wood deck or nailers: copper or stainless steel ring shank nails 3.3 mm with 11 mm head for attachment to wood sleepers of sufficient length to penetrate wood nailers a minimum of 19 mm. Verify chemical compatibility of pressure treated nailers and fasteners].

2.2.2 Wind Locks

3.3 mm copper or stainless steel wire formed clips as recommended by tile manufacturer for the type of tile and project location.

2.3 GROUT

Masonry cement (meeting the requirements of EN 413-1 and EN 413-2), sand and water mixture prepared in accordance with EN 196-1.

PART 3 EXECUTION

3.1 EXAMINATION

Examine structural roof deck for compliance with requirements of selected system. Verify that roof penetrations are installed in proper locations.

3.2 PREPARATION

NOTE: Some form of underlayment is recommended between the substrate and the roof tiles. The type will depend on the substrate and may be as simple as a mopped-on bituminous damp-proofing or as extensive as a single ply membrane. Insulation in a pitched roof is usually installed in the "attic" floor, however it may be installed as part of the roofing

system as well. The perlite board described as part of the metal deck system is not for insulation, but as a substrate for the underlayment.

3.2.1 Cleaning

Clean structural deck surfaces to receive clay tile roofing.

3.2.2 [Metal Deck

[Mechanically fasten one layer of 12 mm thick perlite rigid insulation board with a minimum of six cadmium plated self tapping screws per 1200 x 2400 board.] [Mop continuous ribbons of hot asphalt or asphalt adhesive on metal deck ribs. Lay perlite rigid insulation boards on asphalt.] Attach two layers of roofing felt, shingle style, lapping successive courses a minimum of 150 mm with hot asphalt or asphalt adhesive. Refer to Section 07214, "Board and Block Insulation."]

3.2.3 [Concrete Deck

Coat roof substrate with a bituminous damp-proofing material. Refer to Section 07112, "Bituminous Damp-Proofing."]

3.2.4 [Wood Deck

Attach two layers of asphalt impregnated felt, shingle style, lapping successive courses a minimum of 150 mm. Nail to wood deck using galvanized roofing nails.]

3.3 CLEATS [AND NAILERS]

[For insulated assemblies, attach nailers to substrate to perpendicular to eaves same thickness as insulation. Space nailers to allow for installation of insulation boards but not more than 600 mm apart.] Attach 3 meter long treated wood cleats to substrate [nailers] parallel to the eave spaced to provide for the specified tile lap. Leave 3 cm space between ends of cleats. Refer to Section 06200, "Rough Carpentry."

3.4 FLASHING

Install flashing at all ridges, valleys, intersections with vertical surfaces and roof penetrations, along eaves and rake edges and as indicated. Refer to Section 07600, "Flashing and Sheet Metal."

3.5 CLAY TILES

Install clay tiles in a vertical or diagonal pattern, using a metal straight edge to assure alignment, with a lap not less than 7.5 cm and in compliance with UNI 9460. Fasten with copper nails or by tying with stainless steel wire [as recommended by manufacturer] [as indicated]. Evenly distribute the full range of colors across the roof so as to avoid patches of distinct colors.

- a. Grout solid the open ends of clay tiles at eaves.
- b. Grout in special shapes as recommended by the manufacturer and as indicated.

3.6 CLEANING

Remove grout from exposed surfaces of tiles. Upon completion of the work, remove excess materials and refuse generated by the work of this section.

-- End of Section --

NOTE: Suggestions for improvement of this specification will be welcomed using the "Agency Response Form" located in SPECSINTACT under "System Directory" or DD Form 1426. Suggestions should be forwarded to:

Commander
Naval Facilities Engineering Command
ATTN: NAVFAC Criteria Office
1510 Gilbert Street
Norfolk, VA 23511-2699
FAX: (757) 322-4416 or DSN 262-4416
EMAIL: specs@efdlant.navfac.navy.mil
