



US Army Corps
of Engineers ®

EIRS Bulletin

Engineering Improvement Recommendation System

No. 97-01

Date: 31 January 1997

The Engineering Improvement Recommendation System Bulletin is part of our Information Feedback System and is used in military construction programs to expedite dissemination of information regarding problems. The probable solutions included in the EIRS BULLETIN have not been thoroughly explored or staffed. Accordingly, these probable solutions do not represent a final HQUSACE position, and their use is not mandatory. Probable solutions are considered as informational in nature for the purpose of permitting prompt consideration by the field. EIRS Bulletin recipients are encouraged to comment on the probable solutions presented so that other viewpoints can be considered in the development of the final HQUSACE position. Since changes to criteria approved by ENG Form 3078, Recommended Changes to Engineering Documents, are expected to remain firm, they are identified as final solutions and should be used in current design. To defray printing costs, local reproduction of this bulletin is authorized. This issue of the EIRS Bulletin contains 3 enclosures as follows:


ENCL 1: ENGINEERING AND DESIGN - Metric Design Policy - Specifications for Modular Metric Products

ENCL 2: ENGINEERING AND DESIGN - Department of the Army (DA) Packages for Hazardous Materials (HAZMAT) Storage Facilities and U.S. Military Entrance Processing Station (MEPS)

ENCL 3: ENGINEERING AND DESIGN - CURRENT DESIGN CRITERIA - Recently Issued Criteria

FOR THE DIRECTOR OF MILITARY PROGRAMS:

3 Encls


KISUK CHEUNG, P.E.
Chief, Engineering Division
Directorate of Military Programs

ENGINEERING AND DESIGN

Metric Design Policy - Specifications for Modular Metric Products:

a. Problem: The metric design policy for Military Construction that was issued by HQUSACE (CEMP-EA) memorandum, subject Metric Design Policy for Military Construction, signed by MG. Pat. M. Stevens, Director of Military Programs on 21 November 1994, requires that all FY 97 and future military projects shall be designed using the metric system of measurement.

The recently passed Savings in Construction Act of 1996, P.L. 104-289 has imposed some restrictions on the use of "hard metric" specifications for concrete masonry units (CMU) and recessed lighting fixtures (RLF).

b. Probable Solution: When specifying CMU or RLF in our metric projects. construction documents for bids or proposals must allow general contractors the use of either hard metric or inch-pound substitute (soft metric) products based on the total installed price. The new policy for specifying CMU and RLF in our metric projects is issued by HQUSACE (CEMP-EA/CECW-EP) memorandum, subject Metric Design Policy - Specifications for Modular Metric Products, signed by the Director of Military Programs on 13 December 1996 (enclosed).

c. Implementation: As stated in the enclosed memorandum, the implementation of this new policy is considered to be **immediate**. The policy applies to all construction contracts and solicitations issued on or after 10 January 1997. Some previously completed construction documents may need to be revised in accordance with the enclosed metric policy if the solicitation for bids is issued after this date.



REPLY TO
ATTENTION OF:

CEMP-EA/CECW-EP

13 DEC 1996

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: Metric Design Policy - Specifications for Modular Metric Products

1. In the recently passed Savings in Construction Act of 1996, P.L. 104-289 (110 Stat. 3411, enclosure 1), Congress imposed new restrictions on use of "hard metric" specifications for concrete masonry units (CMU) and recessed lighting fixtures (RLF).

a. The law allows the use of the 100 mm building module for metric design. However, CMU and RLF may *not* be specified only in hard metric versions unless the "agency head" determines that hard metric version is --

(1) necessary for repair or replacement (*or*, for RLF only, the predominant voluntary industry consensus standards include the use of hard metric for the RLF items specified) *or*

(2) needed to "coordinate dimensionally" into 100 millimeter building modules and their total installed price is estimated to be equal to or less than the total installed price of using non-metric sized products, i.e., inch-pound CMU and RLF products.

b. Hard metric, which is also referred to as modular metric, means measurements or products that need to physically change to new sizes to fit into the internationally accepted 100 mm building design module. Hard metric does not include measurements or products that are simply relabeled in metric units but do not physically change in size to be used in a metric building module. These relabeled measurements or products are called soft metric. Of the thousands of building products, only a few, such as brick, CMU, RLF, ceiling tiles, gypsum wallboard, rigid insulation, etc., are modular products; and the new statute applies only to CMU and RLF. Total installed price is defined as the price of purchasing and installing the product/material including all cutting/trimming necessary to fit them with other building components in a 100 mm building module.

2. Effective immediately, our policy is to allow general contractors the use of either hard metric or inch-pound substitute (soft metric) CMU and RLF in our metric projects so that they can make the selection based on the total installed price. Therefore, when

CEMP-EA/CECW-EP

SUBJECT: Metric Design Policy - Specifications for Modular Metric Products

specifying CMU and RLF in metric projects, construction documents for bids or proposals must ensure that the following steps are taken.

a. For Project Drawings -

(1) Project drawings should indicate concrete block walls only by wall thickness in metric dimensions. Location and details of wall openings, horizontal or vertical breaks, joints, corners, horizontal or vertical coursing, rebar spacing, etc. that are critical for the project should be identified as required by the Corps of Engineers Guide Specifications on Masonry (CEGS 04200) on contract documents. As always, decision to use CMU or alternative product as load-bearing structural system or wall material should be based on engineering and life cycle cost considerations.

(2) Suspended ceiling systems should be laid out on a 100 mm module using modular metric RLF dimensions. Suspended ceiling system components are T-bars, wall moldings, hangers, acoustical ceiling tile, recessed air diffusers, grills and registers, and RLF. Contractors should be allowed to use either hard metric or inch-pound products for all components of the suspended ceiling system. Location and details of access panels and other penetrations through ceilings that are critical for the project should be identified as required by CEGS 09510, titled Acoustical Ceilings. In addition, the specific design criteria and the assumptions for lighting should be noted on the drawings to enable the contractor to layout inch-pound suspended ceiling system. As always, selection of ceiling systems and components will be based on engineering and life cycle cost considerations.

b. For Project Specifications - Project specifications for CMU and RLF should be edited to include both the hard metric and inch-pound values for these two products. Also, a note to the contractors be added in the CMU and RLF specifications to advise them of their choice of either metric or inch-pound products, and for RLF only, the choice of substituting all suspended ceiling components.

c. Request for Waiver from this policy, i.e., request for specifying only hard metric CMU or RLF in a metric project must be submitted to Commander, US Army Corps of Engineers, ATTN: CEMP-EA, 20 Massachusetts Ave., N.W., Washington, DC 20314-1000, for approval.

3. Other modular metric products will be specified in accordance with the enclosed guidance (enclosure 2). This guidance requires that modular metric products should be specified: (1) where it is required to fit the 100 mm metric module, (2) where it is

CEMP-EA/CECW-EP

SUBJECT: Metric Design Policy - Specifications for Modular Metric Products

commercially available and there is competition, i.e., can be obtained from more than one source, and (3) the product's total installed cost is reasonable. Designers should conduct market surveys to determine the availability of modular metric products before specifying them. Specified products have to be commercially available, but not necessarily an off-the-shelf item. A detailed written total installed cost analysis is not required for specifying modular metric products except CMU and RLF.


4. The law also requires each agency that awards construction contracts to designate a senior agency official to serve as a construction metrication ombudsman. The designated individual will be responsible for reviewing and responding to metric related complaints concerning Federal building projects from prospective bidders, subcontractors, suppliers or their authorized representatives. HQUSACE will advise when the metric ombudsman is appointed.

5. The law applies to construction contracts awarded and solicitations issued on or after 10 January 1997. The law does not apply to contracts awarded and solicitations issued on or before 9 January 1997. The law has a 10-year sunset provision and applies to all Federal building or construction projects within the United States and its territories, but excludes any construction projects or buildings owned or controlled by a State government, local government, Indian tribe, or any private entity.

6. The point of contact (POC) for Military Programs is Mr. Ami Ghosh, CEMP-EA, telephone (202) 761-8603, fax (202) 761-8815, and for Civil Works is Mr. Jack Bickley, CECW-EP, telephone (202) 761-8892, fax (202) 761-4534. This memorandum has been coordinated with the Office of the Principle Assistant Responsible for Contracting (CEPR) and the Office of the Chief Counsel (CECC-C).

FOR THE COMMANDER:

2 Encls


PHILLIP R. ANDERSON
Brigadier General, USA
Director of Military Programs

DISTRIBUTION:
(See Page 4)

CEMP-EA/CECW-EP

SUBJECT: Metric Design Policy - Specifications for Modular Metric Products

DISTRIBUTION:

COMMANDER,

US ARMY ENGINEER DIVISION, LOWER MISSISSIPPI VALLEY
US ARMY ENGINEER DIVISION, MISSOURI RIVER
US ARMY ENGINEER DIVISION, NEW ENGLAND
US ARMY ENGINEER DIVISION, NORTH ATLANTIC
US ARMY ENGINEER DIVISION, NORTH CENTRAL
US ARMY ENGINEER DIVISION, NORTH PACIFIC
US ARMY ENGINEER DIVISION, OHIO RIVER
US ARMY ENGINEER DIVISION, PACIFIC OCEAN
US ARMY ENGINEER DIVISION, SOUTH ATLANTIC
US ARMY ENGINEER DIVISION, SOUTH PACIFIC
US ARMY ENGINEER DIVISION, SOUTHWESTERN
US ARMY ENGINEERING AND SUPPORT CENTER, HUNTSVILLE
US ARMY TRANSATLANTIC PROGRAMS CENTER

CF:

COMMANDER,

US ARMY ENGINEER DISTRICT, ALASKA
US ARMY ENGINEER DISTRICT, ALBUQUERQUE
US ARMY ENGINEER DISTRICT, BALTIMORE
US ARMY ENGINEER DISTRICT, BUFFALO
US ARMY ENGINEER DISTRICT, CHARLESTON
US ARMY ENGINEER DISTRICT, CHICAGO
US ARMY ENGINEER DISTRICT, DETROIT
US ARMY ENGINEER DISTRICT, FAR EAST
US ARMY ENGINEER DISTRICT, FORT WORTH
US ARMY ENGINEER DISTRICT, GALVESTON
US ARMY ENGINEER DISTRICT, HONOLULU
US ARMY ENGINEER DISTRICT, HUNTINGTON
US ARMY ENGINEER DISTRICT, JACKSONVILLE
US ARMY ENGINEER DISTRICT, JAPAN
US ARMY ENGINEER DISTRICT, KANSAS CITY
US ARMY ENGINEER DISTRICT, LITTLE ROCK
US ARMY ENGINEER DISTRICT, LOS ANGELES
US ARMY ENGINEER DISTRICT, LOUISVILLE

(CONT)

CEMP-EA/CECW-EP

SUBJECT: Metric Design Policy - Specifications for Modular Metric Products

CF: (CONT)

COMMANDER,

US ARMY ENGINEER DISTRICT, MEMPHIS
US ARMY ENGINEER DISTRICT, MOBILE
US ARMY ENGINEER DISTRICT, NASHVILLE
US ARMY ENGINEER DISTRICT, NEW ORLEANS
US ARMY ENGINEER DISTRICT, NEW YORK
US ARMY ENGINEER DISTRICT, NORFOLK
US ARMY ENGINEER DISTRICT, OMAHA
US ARMY ENGINEER DISTRICT, PHILADELPHIA
US ARMY ENGINEER DISTRICT, PITTSBURG
US ARMY ENGINEER DISTRICT, PORTLAND
US ARMY ENGINEER DISTRICT, ROCK ISLAND
US ARMY ENGINEER DISTRICT, SACRAMENTO
US ARMY ENGINEER DISTRICT, SAN FRANCISCO
US ARMY ENGINEER DISTRICT, ST. LOUIS
US ARMY ENGINEER DISTRICT, ST. PAUL
US ARMY ENGINEER DISTRICT, SAVANNAH
US ARMY ENGINEER DISTRICT, SEATTLE
US ARMY ENGINEER DISTRICT, TULSA
US ARMY ENGINEER DISTRICT, VICKSBURG
US ARMY ENGINEER DISTRICT, WALLA WALLA
US ARMY ENGINEER DISTRICT, WILMINGTON
US ARMY TRANSATLANTIC PROGRAMS CENTER, EUROPE

104 P.L. 289

PUBLIC LAW 104-289

104th Congress -- 2nd Session

H.R. 2779

104 P.L. 289; 110 Stat. 3411

1996 Enacted H.R. 2779; 104 Enacted H.R. 2779

DATE: OCT. 11, 1996 -- PUBLIC LAW 104-289

SYNOPSIS: An Act

To provide for appropriate implementation of the Metric Conversion Act of 1975 in Federal construction projects, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the "Savings in Construction Act of 1996".

SEC. 2. FINDINGS.

The Congress finds the following:

(1) The Metric Conversion Act of 1975 was enacted in order to set forth the policy of the United States to convert to the metric system. Section 3 of that Act requires that each Federal agency use the metric system of measurements in its procurement, grants, and other business-related activities, unless that use is likely to cause significant cost or loss of markets to United States firms, such as when foreign competitors are producing competing products in non-metric units.

(2) In accordance with that Act and Executive Order 12770, of July 25, 1991, Federal agencies increasingly construct new Federal buildings in round metric dimensions. As a result, companies that wish to bid on Federal construction projects increasingly are asked to supply materials or products in round metric dimensions.

(3) While the Metric Conversion Act of 1975 currently provides an exemption to metric usage when impractical or when such usage will cause economic inefficiencies, amendments are

Enclosure-1 to the 13 December 1996 Metric Design Policy Memorandum (page 1 of 6)

warranted to ensure that the use of specific metric components in metric construction projects do not increase the cost of Federal buildings to the taxpayers.

SEC. 3. DEFINITIONS.

Section 4 of the Metric Conversion Act of 1975 (15 U.S.C. 205c) is amended--

(1) by striking "and" at the end of paragraph (3);

(2) by striking "Commerce." in paragraph (4) and inserting "Commerce;"; and

(3) by inserting after paragraph (4) the following:

"(5) 'full and open competition' has the same meaning as defined in section 403(6) of title 41, United States Code;

"(6) 'total installed price' means the price of purchasing a product or material, trimming or otherwise altering some or all of that product or material, if necessary to fit with other building components, and then installing that product or material into a Federal facility;

"(7) 'hard-metric' means measurement, design, and manufacture using the metric system of measurement, but does not include measurement, design, and manufacture using English system measurement units which are subsequently reexpressed in the metric system of measurement;

"(8) 'cost or pricing data or price analysis' has the meaning given such terms in section 304A of the Federal Property and Administrative Services Act of 1949 (41 U.S.C. 254b); and

"(9) 'Federal facility' means any public building (as defined under section 13 of the Public Buildings Act of 1959 (40 U.S.C. 612) and shall include any Federal building or construction project--

"(A) on lands in the public domain;

"(B) on lands used in connection with Federal programs for agriculture research, recreation, and conservation programs;

"(C) on or used in connection with river, harbor, flood control, reclamation, or power projects;

"(D) on or used in connection with housing and residential projects;

"(E) on military installations (including any fort, camp, post, naval training station, airfield, proving ground, military supply depot, military school, or any similar facility of the Department of Defense);

"(F) on installations of the Department of Veteran Affairs used for hospital or domiciliary purposes; or

"(G) on lands used in connection with Federal prisons, but does not include (i) any Federal building or construction project the exclusion of which the President deems to be justified in the public interest, or (ii) any construction project or building owned or controlled by a State

government, local government, Indian tribe, or any private entity."

SEC. 4. IMPLEMENTATION IN ACQUISITION OF FEDERAL FACILITIES.

(a) The Metric Conversion Act of 1975 (15 U.S.C. 205 et seq.) is amended by inserting after section 13 the following new section:

"SEC. 14. IMPLEMENTATION IN ACQUISITION OF CONSTRUCTION SERVICES AND MATERIALS FOR FEDERAL FACILITIES.

"(a) In General.-- Construction services and materials for Federal facilities shall be procured in accordance with the policies and procedures set forth in chapter 137 of title 10, United States Code, section 2377 of title 10, United States Code, title III of the Federal Property and Administrative Services Act of 1949 (41 U.S.C. 251 et seq.), and section 3(2) of this Act. Determination of a design method shall be based upon preliminary market research as required under section 2377(c) of title 10, United States Code, and section 314B(c) of the Federal Property and Administrative Services Act of 1949 (41 U.S.C. 264b(c)). If the requirements of this Act conflict with the provisions of section 2377 of title 10, United States Code, or section 314B of the Federal Property and Administrative Services Act of 1949, then the provisions of 2377 or 314B shall take precedence.

"(b) Concrete Masonry Units.-- In carrying out the policy set forth in section 3 (with particular emphasis on the policy set forth in paragraph (2) of that section) a Federal agency may require that specifications for the acquisition of structures or systems of concrete masonry be expressed under the metric system of measurement, but may not incorporate specifications, that can only be satisfied by hard-metric versions of concrete masonry units, in a solicitation for design or construction of a Federal facility within the United States or its territories, or a portion of said Federal facility, unless the head of the agency determines in writing that--

"(1) hard-metric specifications are necessary in a contract for the repair or replacement of parts of Federal facilities in existence or under construction upon the effective date of the Savings in Construction Act of 1996; or

"(2) the following 2 criteria are met:

"(A) the application requires hard-metric concrete masonry units to coordinate dimensionally into 100 millimeter building modules; and

"(B) the total installed price of hard-metric concrete masonry units is estimated to be equal to or less than the total installed price of using non-hard-metric concrete masonry units. Total installed price estimates shall be based, to the extent available, on cost or pricing data or price analysis, using actual hard-metric and non-hard-metric offers received for comparable existing projects. The head of the agency shall include in the writing required in this subsection an

explanation of the factors used to develop the price estimates.

"(c) Recessed Lighting Fixtures.-- In carrying out the policy set forth in section 3 (with particular emphasis on the policy set forth in paragraph (2) of that section) a Federal agency may require that specifications for the acquisition of structures or systems of recessed lighting fixtures be expressed under the metric system of measurement, but may not incorporate specifications, that can only be satisfied by hard-metric versions of recessed lighting fixtures, in a solicitation for design or construction of a Federal facility within the United States or its territories unless the head of the agency determines in writing that--

"(1) the predominant voluntary industry consensus standards include the use of hard-metric for the items specified; or

"(2) hard-metric specifications are necessary in a contract for the repair or replacement of parts of Federal facilities in existence or under construction upon the effective date of the Savings in Construction Act of 1996; or

"(3) the following 2 criteria are met:

"(A) the application requires hard metric recessed lighting fixtures to be dimensionally into 100 millimeter building modules; and

"(B) the total installed price of hard-metric recessed lighting fixtures is estimated to be equal to or less than the total installed price of using non-hard-metric recessed lighting fixtures. Total installed price estimates shall be based, to the extent available, on cost or pricing data or price analysis, using actual hard-metric and non-hard-metric offers received for comparable existing projects. The head of the agency shall include in the writing required in this subsection an explanation of the factors used to develop the price estimates.

"(d) Limitation.-- The provisions of subsections (b) and (c) of this section shall not apply to Federal contracts to acquire construction products for the construction of facilities outside of the United States and its territories.

"(e) Expiration.-- The provisions contained in subsections (b) and (c) of this section shall expire 10 years from the effective date of the Savings in Construction Act of 1996."

SEC. 5. OMBUDSMAN.

Section 14 of the Metric Conversion Act of 1975, as added by section 4 of this Act, is further amended by adding at the end the following new subsection: "(f) Agency Ombudsman.-- (1) The head of each executive agency that awards construction contracts within the United States and its territories shall designate a senior agency official to serve as a construction metrication ombudsman who shall be responsible for reviewing and responding to complaints from

prospective bidders, subcontractors, suppliers, or their designated representatives related to--

"(A) guidance or regulations issued by the agency on the use of the metric system of measurement in contracts for the construction of Federal buildings; and

"(B) the use of the metric system of measurement for services and materials required for incorporation in individual projects to construct Federal buildings. The construction metrication ombudsman shall be independent of the contracting officer for construction contracts.

"(2) The ombudsman shall be responsible for ensuring that the agency is not implementing the metric system of measurement in a manner that is impractical or is likely to cause significant inefficiencies or loss of markets to United States firms in violation of the policy stated in section 3(2), or is otherwise inconsistent with guidance issued by the Secretary of Commerce in consultation with the Interagency Council on Metric Policy while ensuring that the goals of the Metric Conversion Act of 1975 are observed.

"(3) The ombudsman shall respond to each complaint in writing within 60 days and make a recommendation to the head of the executive agency for an appropriate resolution thereto. In such a recommendation, the ombudsman shall consider--

"(A) whether the agency is adequately applying the policies and procedures in this section;

"(B) whether the availability of hard-metric products and services from United States firms is sufficient to ensure full and open competition; and

"(C) the total installed price to the Federal Government.

"(4) After the head of the agency has rendered a decision regarding a recommendation of the ombudsman, the ombudsman shall be responsible for communicating the decision to all appropriate policy, design, planning, procurement, and notifying personnel in the agency. The ombudsman shall conduct appropriate monitoring as required to ensure the decision is implemented, and may submit further recommendations, as needed. The head of the agency's decision on the ombudsman's recommendations, and any supporting documentation, shall be provided to affected parties and made available to the public in a timely manner.

"(5) Nothing in this section shall be construed to supersede the bid protest process established under subchapter V of chapter 35 of title 31, United States Code."

SEC. 6. EFFECTIVE DATE AND MISCELLANEOUS PROVISIONS.

(a) *Effective Date.*-- This Act and the amendments made by this Act shall take effect 90 days after the date of enactment of this Act.

(b) Savings Provisions.-- This Act shall not apply to contracts awarded and solicitations issued on or before the effective date of this Act, unless the head of a Federal agency makes a written determination in his or her sole discretion that it would be in the public interest to apply one or more provisions of this Act or its amendments to these existing contracts or solicitations.

Speaker of the House of Representatives.

Vice President of the United States and President of the Senate.

GUIDANCE FOR SPECIFYING MODULAR METRIC CONSTRUCTION PRODUCTS

1. REFERENCES.

- a. Federal Register, Vol. 61 No. 96, 16 May 1996, 24761 - Federal Agency Guidance for the Acquisition of Modular Metric Construction Products
- b. Public Law 104-289, Savings in Construction Act of 1996 (110 Stat. 3411), which specifically applies to only two modular products - concrete masonry units (CMU) and recessed light fixtures (RLF).

2. PURPOSE. This document provides information on USACE metrication progress and guidelines for using modular metric, also known as hard metric, construction products in metric projects.

3. BACKGROUND.

a. In 1988, Federal law mandated the metric system as the preferred system of measurement in the United States (US) and required that metric be used in all Federal procurement, grants, and business-related activities, to the extent feasible, by September 30, 1992. The law is intended to pursue metrication for increased cost-effectiveness and productivity of U.S. business and to provide greater access to markets while avoiding any undue burden on US firms. Executive Order 12770, *Metric Usage in Federal Government Programs*, dated 25 July 1991, required federal agencies to develop specific timetables and milestones for transition to the metric system.

b. USACE has made substantial progress in the adoption of metric measurements. All Corps of Engineers Guide Specifications (CEGS) and all active Department of the Army (DA) standard design packages (11 designs) for military projects have already been converted to the metric system. Current USACE metrication policy is to design all FY 97 and future military projects using the metric system of measurement. While recommended, USACE policy regarding metrication is not mandatory for small O&MA projects, projects with Non-Federal sponsors or projects that use non-metric as-built drawings extensively where the use of the metric system may not be economically feasible. Currently, we have 65 metric military projects ---totaling approximately \$1.13 billion under design or construction.

Enclosure 2 to the 13 December 1996 Metric Design Policy Memorandum (page 1 of 5)

c. The metrication process for products involves "soft metric conversion" and "hard metric conversion". Dimensions for the vast majority of construction products need only be "soft-converted" for use in metric construction projects. A soft metric conversion means that the physical dimensions of the product remain unchanged while the measurement units used to describe and specify the product are changed to metric units. To make metric construction succeed, a small percentage of products need their physical dimensions changed or "hard-converted" to fit them into the internationally recognized building module of 100 millimeters (mm). These products are frequently referred to as modular products or hard metric products.

Modular construction products are brick, CMU (also known as concrete block) components of the suspended ceiling systems such as acoustical ceiling tiles, recessed lighting fixtures (RLF) and air diffusers, raised access flooring, wallboard, plywood, particleboard, and rigid insulation. According to the guidelines in reference 1.a., a modular construction product in a hard metric size shall only be specified in a Federal construction project if the product's application requires it to "dimensionally coordinate" into 100 mm building module, the product is found to be competitively available, and the product's total installed cost is reasonable. Total installed cost is the cost of purchasing and installing the product including all cutting/trimming necessary to fit them with other building components in a 100 mm building module. Use of modular products avoids unnecessary jobsite cutting or trimming fostering cost-effective, logical design and quality construction.

4. GUIDELINES FOR SOME SPECIFIC MODULAR CONSTRUCTION PRODUCTS.

a. **Steel Reinforcing Bar.** The actual diameter size of steel reinforcing bar is not required to change in order to coordinate dimensionally into the 100 mm building module. Therefore, the American Society for Testing and Materials (ASTM) has recently adopted new metric bar standards which are based on soft conversion of existing inch-pound bars.

b. **Brick.** Many common brick sizes are within a millimeter or two of metric modular sizes and nearly all can fit within 100 mm module by slightly varying mortar joint widths to 10 mm.

c. **Concrete Masonry Units (CMU).** The new legislation which becomes effective 10 January 1997 (reference 1b) allows federal agencies to specify only hard metric versions of CMU unless (1) the block will be required to fit together into the 100 mm building module, and (2) the "agency head" determined (prior to contract award)

that the total installed price of hard-metric CMU is estimated to be equal to or less than the total installed price of using inch-pound (soft metric) CMU. To comply with the new law, the majority of the Federal agencies including USACE, elected to let the construction contractor use either metric or substitute inch-pound blocks in our metric projects without compromising design requirements. Construction documents for bids or proposals, issued after 10 Jan 97, will incorporate this policy. It is the general contractor, not the government, who will make the decision whether metric or inch-pound concrete block offers the most efficient and cost-effective solution in each situation. If the general contractor decides to use inch-pound CMU, the following provisions should be met so that quality is not jeopardized: (1) mortar joint width should be no less than 10 mm, (2) horizontal reinforcements, if required, should be placed between the joints only, (3) no cut block should be put at the end of wall, and (4) if the vertical reinforcement and the masonry block webs do not match, the block must be cut to adjust, rebars will not be cut, bent or eliminated to correct the condition.

d. Suspended Ceiling Systems. Components for suspended ceiling systems are T-bars, hangers, ceiling tile, recessed lighting fixtures (RLF), and recessed air diffusers. All components are available in modular metric sizes and are priced competitively with their inch-pound counterparts with the exception of recessed lighting fixtures. In this case also, for compliance with the above mentioned law, USACE and other Federal agencies elected to let the construction contractor make the decision whether metric or inch-pound recessed lighting fixtures should be used. Construction documents for bids or proposals, issued after 10 January 1997, will incorporate this policy. If the general contractor decides to use inch-pound RLF, he will be allowed to use substitute inch-pound products for all suspended ceiling components provided they do not interfere with other design requirements.

e. Raised Access Flooring. Raised access flooring is a specialty item used primarily in computer rooms and other areas where provision for under floor cabling is desirable. A number of manufacturers make raised access flooring to fit the 100 mm module, but there may be a cost premium for small orders and longer delivery times for most orders. Metric raised access flooring will be specified if costs are comparable to inch-pound access flooring and procurement lead times are acceptable.

f. Wallboard. Wallboard is formed in continuous sheets of variable widths and cut to specified lengths. A variety of manufacturers make wallboard to fit the 100 mm module, but there may also be a cost premium for small orders and longer delivery times for most orders. While the use of metric wallboard is desirable in metric projects, its use is not mandatory on small projects or small orders if project duration or cost will

increase. Where framing spacing is specified to fit modular metric construction, the contractor should not be allowed to cut or trim the sealed edges of inch-pound (soft metric) wallboard sheets to fit into the metric frame spacing.

g. Plywood and Particleboard. Like wallboard, wood-based sheet products such as plywood and particleboard can be produced in modular metric sizes. There may be a premium for small orders and longer delivery times for most orders. When framing spacing is specified to fit modular metric construction, the construction contractor may make the decision whether metric sheets or trimmed inch-pound sheets offer the most efficient and cost-effective solution in each situation.

h. Rigid Insulation. Rigid insulation is used on exterior walls and as a roof underlay. Currently, this product is available only in inch-pound sizes and must be cut to fit metric framing spacing. On roofs, the product is usually laid over a rigid substrate that allows any sheet size to be used. Where the sheets are applied directly to metric framing spacing (400 or 600 mm), the width must be trimmed by the contractor.

5. ADDITIONAL GUIDANCE AND INFORMATION ON METRICATION.

a. Further guidance on the federal acquisition of modular metric construction products is available from the Construction Metrication Council of the National Institute of Building Sciences, 1201 L Street, N.W., Suite 400, Washington D.C. 20005, Tel. 202-289-7800. The Construction Metrication Council issues a bimonthly newsletter, *Metric in Construction* which provides private and public support for the metrication of Federal construction and promotes the adoption and use of the metric system of measurement.

b. HQUSACE Architectural *Gargoyle* is an informal publication that is issued by CEMP-A. This publication provides information and news of interest about metrication along with other hot topics. *Gargoyle* can be found on CEMP-A web site at URL http://www.hq.usace.army.mil/cemp/e/a/cemp_ea.htm.

c. If you have any questions regarding metrication you should first contact your district metric point-of-contact (POC). If you do not know who your metric POC is, contact your district architectural POC. The list of architectural POC can be accessed from the CEMP-A web site. Quite often the district metric POC and the architectural POC are the same individual. The metric or architectural POC will be able to assist you in obtaining the answer.

d. Request for additional guidance or information concerning metrication should be

addressed to Commander, US Army Corps of Engineers, ATTN: CEMP-EA, 20 Massachusetts Ave., N.W., Washington, DC 20314-1000, or the appropriate engineering discipline POC at HQUSACE, ATTN: CEMP-ET, 20 Mass. Ave, N.W., Washington, DC 20314-1000.

ENGINEERING AND DESIGN

Department of the Army (DA) Packages for Hazardous Materials (HAZMAT) Storage Facilities and U.S. Military Entrance Processing Station (MEPS):

a. Problem: The subject standard design packages have been developed and approved in accordance with AR 415-15 and ER 1110-3-113. These packages are available from the U.S. Army Engineering and Support Center, Huntsville, ATTN: CEHNC-ED-ES (Mr. Ron Taylor), DSN 760-1402 or commercial phone (205) 895-1402.

Previously, there were no standard design packages for either of these facilities and, as a result, there is no information in the Architectural and Engineering Instructions (AEI), Design Criteria, dated 3 July 1994, for the facilities.

b. Probable Solution: The AEI, Design Criteria, dated 3 July 1994, will be revised to include information as presented in the following pages about the subject facilities. The information about the HAZMAT Storage Facilities will be added to the AEI, Chapter 5 after paragraph 2.o., General Purpose Warehouse; and the information about the MEPS Facilities will be added to the AEI, Chapter 5 before paragraph 2.q., Military Police Facilities.

c. Implementation: In accordance with AR 415-15 and ER 1110-345-100, the use of designs developed under the DA Facilities Standardization Program, such as these new DA Standard Packages for HAZMAT Storage Facilities and MEPS Facilities, are mandatory for use and unjustifiable deviations will not be made. The implementation of these new standard design packages is considered to have *routine application* as defined by ER 1110-345-100.

d. Additional Information: For additional information on HAZMAT Storage Facilities contact Ms. Sherri Anderson-Hudgins, CEHNC-PM-CR, telephone number (205) 895-1522, facsimile (205) 895 1172, Center of Standardization (COS) for the DA Standard Design Package for HAZMAT Storage Facilities. For MEPS Facilities, contact Mr. Steve Turner, CESAS-PM-MC, telephone (912) 652- 5722, COS for the MEPS Facilities.

U.S. Military Entrance Processing Stations

(1) General. The U.S. Military Entrance Processing Stations (MEPS) are used to process new recruits into all branches of the Armed Forces. The proponent for this facility is the DOD Military Entrance Processing Command (MEPCOM).

(2) Standardization. The Center of Standardization (COS) for the U.S. Military Entrance Processing Stations (MEPS) is the Savannah District Engineer Office.

(3) Design Criteria. The DA Standard Design Package for MEPS, DEF 141-25-01 (reference 5-26) will be used as the basis for design of all MEPS projects. The MEPS standard design has been developed using dual system of measurement with inch-pound measurement as the primary design module. The drawing package is available from the U.S. Army Engineering and Support Center, Huntsville, ATTN: CEHNC-ED-ES, P.O. Box 1600, Huntsville, AL 35807-4301.

(4) Space Allowances. The Standard Design Package presents three different sized MEPS facilities: large, 3039.40 m² (32,717 ft²), medium, 2490.83 m² (26,812 ft²), and small, 1969.94 m² (21,205 ft²). The standard floor plans presented as a guide to show the size and general arrangement of the spaces. Actual size of MEPS facility and arrangement of space shall be approved by the MEPCOM on a project-by-project basis.

(5) Functional Areas. The standard design offers an efficient layout by placing five major elements of the building, namely Headquarters, Testing, Liaison/Counselor, Operations, and Medical, around a central Reception and Control area. The modular layout of the facilities allow easy modification of each of the modules without losing the design integrity to meet a particular MEPS project needs.

Hazardous Materials Storage Facilities

(1) General. Many commodities, as a group broadly described as hazardous materials (HM), requires specialized care in storing and handling mandated by public law and regulations. The Hazardous Materials Storage Facilities designs are developed to provide storage space for HM on a temporary basis until the materials are supplied to a customer. Because of the inherent risks to personnel and facilities posed by the storage of HM, a number of protective features, e.g., alarms, climate control, fire protection and suppression, heat/smoke and explosion venting, emergency eyewash,

spill control and containment, etc, must be considered in designing and allocating HM storage space. The various types of HM that can be stored in this facility includes: Corrosives, Oxidizers, Flammable and combustible liquids, Organic Peroxides, Water Reactives, Poisons/Toxins, and Low Hazard materials. This facility is not designed to store Radioactive and Explosive materials, or to process any HM. In addition, this facility shall not be used to store hazardous wastes (HW), as defined under Resource Conservation and Recovery Act (RCRA) of 1976. HW is to be stored in the "Conforming Storage Facilities" and ultimate disposal of HW is to be arranged through the Defense Reutilization and Marketing Service (DRMS).

(2) Standardization. The Center of Standardization (COS) for the HM Storage Facilities is the U.S. Army Engineering and Support Center, Huntsville.

(3) Design Criteria. The DA Standard Design Package for HM Storage Facilities, DEF 442-28-01(reference 5-27) will be used as the basis for design of all HM Storage Facilities projects. Since each installation will have its own unique mix and quantity of HM, the size and types of storage area will vary from one installation to another. Therefore, it is not possible to develop one or two "standard" layouts. This package is unique in that it does not provide specific facility designs, instead it addresses the various components of the building (or modules) that, when combined, form a HM Storage facility. The Logistics Support Activity Packaging, Storage and Containerization Center (LOGSA-PSCC), ATTN: AMXLS-TD, 11 Hap Arnold Boulevard, Tobyhanna, Pa 18466-5097, telephone (717) 895-6711, facsimile (717) 795-7894, offers assistance in determining the efficient storage layout, storage space and material handling equipment (MHE) requirements for HM storage facilities to the Army and other government activities. The standard design package is developed using metric system of measurement and is available from the U.S. Army Engineering and Support Center, Huntsville, CEHNC-ED-ES, P.O. Box 1600, Huntsville, AL 35807-4301.

(4) Space Allowance. There are no standard sizes for the HM Storage Facilities. The design is based on a modular concept that provides flexibility to sizing HM Storage Facilities to meet specific mission requirements. This design package illustrates how various modules may be combined , in virtually any configuration, to form a HM storage facility.

(5) Functional Areas. HM Storage facilities will normally consist of 4 major components: Storage Module, Support Module, Mechanical space including MHE Charging Room, and detached Compressed Gas Cylinder Storage Shed. Storage Module is the primary component of any HM storage facility. To accommodate various

quantities and non-compatible mix of HM, a total of 10 different sized storage modules are utilized in this design. This facility is to be constructed at dock height and is comprised of a number of potentially different sized Storage module arranged along a main corridor. This corridor connects the Storage Modules with the centralized Support Module which contains the docks, shipping/receiving area, and administrative area. At one end of the facility is the Mechanical and Electrical rooms and the MHE Charging Room, which provides battery chargers for the material handling equipments. A covered shed for the storage of compressed gas cylinders and drummed Petroleum, Oils and Lubricants (POL) is provided at a distance of at least 15.3 meters (50 feet) from the HM Storage facility. The number and size of the sheds is also flexible to accommodate the needs of the installation.

CURRENT DESIGN CRITERIA

Recently Issued Criteria:

a. Problem: There have been instances where current design criteria were not used in project designs because recently issued Engineering and Design documents were placed in a central office file and were not distributed to design personnel who need to be aware of the current criteria and guidance.

b. Probable Solution: From all reports, EIRS Bulletins are widely circulated within the Engineering Division of USACE Commands and are readily accessible to all engineering and design personnel. This enclosure includes a listing of recently issued criteria.

Engineering and Design criteria for Civil Works and Military Programs are distributed by the "Construction Criteria Base (CCB)" System. National Institute of Building Sciences NIBS. CCB is available in CD-ROM format and is on the CCB web site at "<http://www.nibs.org/ccb>". Information about subscribing to CCB may be obtained by calling NIBS at (202) 289-7800. Current Military Programs Engineering and Design criteria are also available on our TECHINFO web site at "<http://w2.hnd.usace.army.mil>". For further information on TECHINFO, call the Huntsville Engineering and Support Center, CEHNC-ED-ES-G, at (205) 895-1821 between 8:00 a.m. and 4:00 p.m., Central Time.

Encl 3 (2 pages)

PUBLICATION LIST

<u>PUB-NO.</u>	<u>PUBLICATION</u>	<u>PUB-DATE</u>
CEAGS-09680A	Carpet	Feb 97
CEGS-10270	Raised Floor System	Jan 97
CEGS-12520	Window Treatment	Dec 96