
PROCEDURE: PRE-CHECK (PC) APPROVAL

Division of the State Architect (DSA) documents referenced within this publication are available on the [DSA Forms](#) or [DSA Publications](#) webpages.

DISCIPLINE(S)

Structural (SS), Fire and Life Safety (FLS), Access Compliance (AC) and CALGreen/Energy (CGE).

PURPOSE

The purpose of this procedure is to describe DSA requirements for the submission of the design of a building or structure for PC review and the procedures that DSA uses to approve such PC designs.

The goal of the pre-check (PC) approval process is to streamline DSA plan review by providing a procedure for approving the design of commonly used structures prior to the submittal of plans to DSA for construction projects. The PC approval process allows designers to incorporate designs for structures that have already been “pre-checked” by DSA into their plans for actual site-specific construction projects. When such drawings are used, it is the designer’s responsibility to ensure that their project drawings and the manufacturer’s PC drawings are correctly coordinated and complete prior to submittal to DSA. PC approval is one prerequisite for “over-the-counter” (OTC) review; see DSA Policy (PL) 07-02: *Over-the-Counter Review of Projects Using Pre-Check (PC) Approved Designs* for additional OTC requirements.

BACKGROUND

The PC program provides for DSA approval of the design of a structure in advance of submittal for construction.

Allowable Use of PC Process

The PC approval process can be used for buildings, shade structures, light standards (poles), structures supporting solar components and other structures where the approved design may be used on multiple campuses or projects. Once the PC documents have been approved, they can be submitted with site-specific drawings.

PC approval is for design only and is not for construction. A separate application must be submitted to DSA each time a PC is incorporated into plans for a construction project.

The approval of a site-specific project is expedited since the part of the project that is PC-approved will have already been reviewed.

Design Criteria

DSA has prepared PC Design Criteria documents for several common PC project types, including but not limited to: relocatable buildings, modular buildings and elevator towers, freestanding signs and scoreboards, as well as shade structures and structures supporting solar components. Each of these documents has been issued as an Interpretation of Regulations (IR) to be utilized by designers when developing and submitting PC documents for DSA review. If there are any questions as to the applicability of the PC Design Criteria documents, the design professional shall contact the respective DSA regional office where the PC project will be submitted to schedule a pre-application meeting prior to submittal.

PRE-CHECK (PC) APPROVAL

1. PRE-CHECK SUBMITTAL

1.1 Required Documents

The documents required to be submitted for PC approval are listed on form *DSA 3: Project Submittal Checklist*. If the PC project is a permanent or relocatable modular building, additional documentation is required for review to the California Green Building Standards Code (CALGreen) and the California Energy Code (Energy Code) as indicated on form *DSA 403 PC-PER: Performance Method – CALGreen & Energy Code Compliance Checklist for Pre-Checked (PC) Building Designs* for the performance method, or the form *DSA 403 PC-PRE: Prescriptive Method – CALGreen & Energy Code Compliance Checklist for Pre-Checked (PC) Building Designs* for the prescriptive method, and *DSA Procedure (PR) 18-02: Pre-Check (PC) Building Designs CALGreen/Energy Code Compliance Review*. Site-specific information is not required with the PC approval but is required to be provided when a site-specific construction project is submitted for DSA review.

1.2 Fee Requirement

A deposit of \$6,000 is required when a PC project is submitted for review. Final fees will be charged based on the number of hours used to perform the review at the established hourly rates DSA determines each year for the reviewers' work. Before review begins, DSA will estimate the time needed for review. If it is estimated that the plan review of the PC submittal will take more than 35 hours, for structural safety, fire and life safety, and access review, DSA may request additional deposit money prior to the start of review.

Prior to CALGreen/Energy Code review, DSA will also estimate the time needed for CALGreen/Energy Code review. If it is estimated that the review will take more than 24 hours, review per Section 1.3.1 below, or 12 hours for Section 1.3.2 below; or, five hours for Section 1.3.3 below. DSA may request an additional deposit prior to the start of CALGreen/Energy code review. The actual total fee will be based on the actual hours expended on the review. DSA will either refund excess fees paid or invoice for additional fees required as appropriate. If additional fees are required, payment must be received before PC plans are approved.

1.3 Fee Requirement for Energy Code and CALGreen Review

A fee separate from structural, fire and life safety, and access compliance review in Section 1.2 above shall be required for CALGreen/Energy Code review. A deposit for the CALGreen Code (Title 24, Part 11) and Energy Code (Title 24, Part 6) plan review is due when a PC project is submitted for review. The final fee will be charged as indicated in Section 1.2 above but may also require an additional deposit as described in Section 1.2 above. DSA has estimated the deposit required for each CALGreen/Energy plan review as shown in the subsections below. Refer to Appendix A below for information regarding limits of major options in a single PC.

1.3.1 Permanent modular or relocatable buildings submitted for an approval for conditioned spaces designed to meet the worst-case scenario for any and all climate zones, per Energy Code 140.3(a)8.B and Reference Appendices NA4.3(a), require a deposit of \$5,000.

1.3.2 Permanent modular or relocatable buildings submitted for conditioned spaces to meet a single climate zone per Energy Code 140.3(a)8.A and Reference Appendices NA4.3(b), require a deposit of \$2,500.

1.3.3 Permanent modular or relocatable buildings that have only unconditioned space (e.g., unconditioned restroom buildings) require a deposit of \$1,000.

1.4 Information on Cover Sheet

1.4.1 The following PC stamp must be preprinted, by the applicant, on the cover sheet of the PC drawings and specifications.

PRE-CHECK (PC) APPROVAL**PRE-CHECK (PC) DOCUMENT****CODE: [ENTER YEAR] CBC****A SEPARATE PROJECT APPLICATION FOR CONSTRUCTION IS REQUIRED**

1.4.2 The itemized information listed in Appendix B below (Design Information to be Shown on PC Drawings Cover Sheet) must be shown on the PC drawings cover sheet and, if needed, continue on the sheets immediately following the cover sheet.

1.5 Tests and Special Inspections

To assist designers who will incorporate the PC drawings into their site-specific (or stockpile) drawings for future construction projects, the PC drawings shall include an example form *DSA 103: List of Required Structural Tests and Special Inspections* for each of the options checked as required in Appendix D below (PC Tests and Inspections Guideline for Permanent Modular or Relocatable Buildings Only). Future designers will create a form DSA 103 for their construction project based on the example form DSA 103(s) shown on the PC drawings applicable to the PC options utilized. All the example form DSA 103(s) on the PC drawings must be crossed out before the PC drawings can be approved as part of a site-specific (or stockpile) project so that they will not conflict with the official form DSA 103 for the project.

1.6 Revisions to PC Designs

Any revision made without DSA review and approval automatically voids the PC approval. If revisions are requested to a PC-approved design, a new PC application is required, subject to Sections 1.1 and 1.2 above, except the submission fee is \$3,000. The revisions to the drawings and affected calculations must be clearly indicated. The DSA plan reviewer will check only those portions of the design that are impacted by the revisions. Any change to the CALGreen compliance or the energy compliance features (i.e., building envelope, mechanical systems, water heating equipment, lighting design, fixture selection, indoor air quality, etc.) will require CALGreen and Energy Code review and is subject to Section 1.3 above.

If errors or omissions are discovered in an existing PC design, they shall be corrected through this PC revision process.

1.7 Renewal

Renewal of a PC is required when a new building code becomes effective or a significant code change occurs. The applicant must submit an application for renewal in accordance with Section 1.1 above. A fee is required per Sections 1.2, and 1.3 above.

2. MULTIPLE-OPTION PC

PC projects may include options for construction that would be determined when the PC design drawings are selected for a specific school site. Options may include alternative foundation systems, number of modules, location of windows and doors, etc. However, if the options or combinations thereof in a single PC become too numerous or complicated, it renders the PC impractical and inefficient for use in OTC or conventional plan reviews. See Appendix A below which lists limits on some commonly used major options.

In order to meet the allocated time constraint for OTC review (see PL 07-02), limits on the number of minor variations and major options are provided in Sections 2.1 and 2.2 below. All the options or variations requested on a PC must be shown and identified graphically on separate drawings, elevations, floor plans, details, etc. All options must be coordinated and meet all minimum code requirements.

PRE-CHECK (PC) APPROVAL

2.1 Minor Variations

There are currently no limits on the number of minor variations within a major option. Qualified minor variations include, in general, window and door sizes and locations in moment frame buildings, cladding types and items that do not affect code-regulated construction. PC manufacturer must consider that window, door, and skylight sizes and locations affect Energy Code compliance. The PC must include all permitted options, and Energy Code documentation must demonstrate compliance to the most restrictive combination of options.

2.2 Major Options

The maximum number of major options permitted in a single PC is listed in Appendix A below. If the total number of options exceeds one of the limits (including the base case), applicants must divide the project into two or more separate PC applications in accordance with Title 24, Part 1 (California Administrative Code [CAC]), Section 4-317. Alternatively, the actual number of options in a PC may be determined in a consultation meeting as described in Section 2.4 below.

2.3 Index to Drawings

Where multiple major options are included, provide a table on the drawings to identify the specific drawings applicable to each option. See Appendix E below (Index to Drawings Required for PCs with Multiple Major Options) for example tables.

2.4 Additional Options

When a submittal of options exceeding the limits in Appendix A below is anticipated, contact the applicable DSA Regional Office to arrange a meeting. The purpose of the meeting is to ensure that the multiple-option PC can be efficiently reviewed and once approved, will result in drawings that can be efficiently incorporated into site-specific or stockpile projects for OTC review.

3. SPECIAL DESIGN REQUIREMENTS FOR PERMANENT MODULAR OR RELOCATABLE BUILDINGS

Designs for relocatable one-story buildings less than 2,160 square feet in area may use the code exceptions as noted in the applicable version of *IR 16-1: Design and Construction Requirements for Relocatable Buildings*.

3.1 Energy Code Requirements

The design must comply completely with all Title 24 regulations, including the CALGreen Code (Part 11) and the Energy Code (Part 6). For energy-related requirements, see PR 18-02 and form DSA 403 PC-PER or form DSA 403 PC-PRE.

3.2 Fire and Life Safety Requirements

PC submittals shall include the following:

3.2.1 California Building Code (CBC) Chapter 7A compliance.

Plans must indicate if the building has been designed per CBC Chapter 7A for construction/installation on project campuses located within a designated fire hazard severity zone (FHSZ).

3.2.2 Room Usage

Identify the proposed uses for each room, inclusive of area, occupant load factor (OLF), and occupant load.

3.2.3 Occupancy

Define the occupancy classification for the building or structure as applicable.

PRE-CHECK (PC) APPROVAL

3.2.4 Junction Boxes – Fire Alarm

Placement of junction boxes for all fire alarm appliances and conduit with pull strings shall be shown on PC drawings. Placement of junction boxes shall conform to the requirements for a “total coverage” system per National Fire Protection Association (NFPA) Standard 72 as adopted and amended in CBC Chapter 35, and California Electrical Code (CEC), Article 760. All such junction boxes shall be labeled “Fire Alarm.”

3.2.5 Fire Sprinkler System

When an automatic fire sprinkler system (AFSS) is included in the PC, the complete AFSS must be detailed in the drawings. The AFSS shall be designed in accordance with NFPA Standard 13 as adopted and amended in CBC Chapter 35, and comply with the AFSS plan review submittal guidelines described in DSA Guideline (GL)1: *Project Submittal Guideline: Automatic Fire Sprinkler Systems*.

3.2.6 Design Responsibility

California law provides that an AFSS may be designed by a Class C-16 (Fire Protection) licensed contractor only when that same contractor will install the system. If an AFSS system is designed by a C-16 licensed contractor and installed by a different contractor, the design and subsequent installation are not valid. This also invalidates DSA approval of the project and any subsequent certification of construction based on the invalid design and installation. Therefore, AFSS drawings intended for general bid shall be signed and stamped by a California registered mechanical engineer or fire protection engineer.

Exception: AFSS drawings may be signed by a California licensed C-16 contractor when that same contractor will install the system including, but not limited to, the system riser for the building that will be installed at each specific project site. If a C-16 licensed contractor designs the AFSS, the drawings must include the following note:

“[name of C-16 design contractor] performed the design of this fire sprinkler system. California law states that this design is only valid if the same C-16 licensed contractor who designed the system performs the installation. DSA project approval will become invalid if a different contractor installs any portion of the fire sprinkler system (including the riser). If another contractor will install any portion of the fire sprinkler system, responsibility for the entire fire sprinkler system installation (including the riser) must be accepted by a California registered mechanical engineer or fire protection engineer. Acceptance of responsibility is indicated by signing and stamping all fire sprinkler drawings. Signed and stamped drawings must be submitted to, and approved by, DSA prior to proceeding with the installation. Note that these requirements may apply if the building is subsequently relocated to a new location in the future.”

3.2.7 Additionally, drawings shall include both of the following notes. Note (1) shall be completed with design water flow and pressure requirements and note (2) shall be completed with occupancy/use information:

- 1) A minimum water flow of ____ (GPM) and pressure of ____ (psi) is required at the base of the riser for the system to operate as designed. Fire flow testing is required on site to verify availability of design flow and pressure at the base of the riser. The project inspector shall witness fire flow testing.
- 2) The automatic fire sprinkler system for the building has been designed for light hazard only, in accordance with NFPA 13. The building shall be limited to the following occupancy and use: (e.g., classroom, administrative, assembly, etc.).

3.2.8 The hydraulic design area must be identified on the fire sprinkler plans for all PC options. Where used, include any design area reduction calculations on the plans.

PRE-CHECK (PC) APPROVAL

3.2.9 Provide typical architectural sections through the design area identifying ceiling heights and any soffit areas, mechanical chases, framing members, or similar features which may create obstructions to fire sprinkler coverage.

3.2.10 Access Compliance Requirements

The design must comply with the accessibility provisions of the CBC Chapter 11B. Accessible door signs to be provided by others shall have locations, details and specifications indicated in the PC drawings with applicable CBC references.

4. SPECIAL REQUIREMENTS FOR SOLAR PC APPROVAL

This section describes the special requirements for the design, review, and approval of PC solar structures and for the approval of site-specific solar projects utilizing solar PC documents.

4.1 Design Requirements

The design must comply with all the applicable Title 24 regulations.

4.2 Structural Safety

See *IR 16-8: Solar Photovoltaic and Thermal Systems Review and Approval Requirements*. Solar design that uses proprietary support systems, connectors, anchorages, etc., must have product evaluation reports that comply with *IR A-5: Acceptance of Products, Materials, & Evaluations Reports*.

4.3 Fire and Life Safety Requirements

See IR 16-8.

4.4 Solar PC Review

File a separate solar PC application for each type of solar energy system. For example, submit one application for a photovoltaic (PV) system and a separate application for a solar thermal system.

4.5 Solar PC Approval

PC plan approval of PV solar systems mounted onto a building or structure may be approved by DSA when the system is included as part of a complete building or structure. Roof- or wall-mounted PV systems, not part of a complete building or structure, will not be accepted for PC approval due to variable building configurations and loading combinations. In addition to the building or structure and its foundations, the approved PC documents shall include specifications of the solar panels for the specified manufacturer(s) and the design and detailing of the:

- Support framing/racks for the manufacturer's system.
- Anchorage of the system's panels, components and equipment to the support framing.
- Anchorage of the system's support framing to the building or structure.

Ground-mounted PV solar systems not part of a building or structure may be submitted to DSA for PC approval provided the PC documents include specifications of the solar panels for the specified manufacturer(s) and the design, including detailing of the:

- Support framing/racks for the manufacturer's system.
- Anchorage of the system's panels, components and equipment to the support framing.
- Anchorage of the system's support framing to the foundation.
- Foundation

PRE-CHECK (PC) APPROVAL

4.6 Approval of Site-Specific Projects Utilizing a Solar PC

Per Education Code Section 17282.5(b), the review of a site-specific project utilizing approved solar PC documents will be completed within 45 calendar days of the receipt of a complete application. Request for OTC review of site-specific projects may be granted if the criteria of PL 07-02 are met.

The anchorage of the solar panels and the Balance of System (BOS) equipment manufactured by the solar manufacturer shall be verified by the project engineer to be in accordance with DSA-approved solar PC construction documents. If the project engineer finds these components not in accordance with the solar PC construction documents, they shall provide details of construction for those components on the site-specific submittal. Depending on the scope of the supplemental anchorage details and calculations, OTC review may not be granted.

5. PC APPROVAL

5.1 PC Stamp-Out

The final set of the PC-approved plans and specifications must show the regular DSA identification stamp (with the application identification, disciplines reviewed and date stamped) and the PC stamp as described in Section 1.4 above.

5.2 Record Sets

A record set of approved plans, specifications and calculations will be kept in DSA's files for each PC. A PC design approved in one DSA regional office will be accepted in all other DSA regional offices without additional review.

5.3 Revocation

DSA reserves the right to revoke any PC approval. The grounds for revocation include, but are not limited to, the following:

1. Approval was granted on the basis of false information submitted.
2. The PC design has demonstrated a history of unsafe or unsatisfactory performance.
3. Repeated structural modifications during fabrication.
4. DSA determines the PC construction documents or elements shown in the PC construction documents are not code compliant.
5. Any unauthorized deletions, additions or alterations of any DSA-approved plans or specification.

A DSA Procedure documents a process or series of steps that DSA staff and/or external stakeholders must complete in order to fulfill one or more administrative requirements of DSA's review and approval of plans and specifications and construction oversight programs.

PRE-CHECK (PC) APPROVAL**APPENDIX A: GUIDELINES FOR MULTIPLE-OPTIONS IN A SINGLE PC^{1, 2}**

(All options must be shown and identified graphically on drawings.)

Description of Major Options		Total Options Allowed in a PC (including the base case)
1.	Floor live load	4
2.	Roof live load	2
3.	Wind speed	1
4.	Seismic load	1
5.	Geometry or footprint of individual module	1
6.	Roof configuration and construction	
	a. Material (wood, steel)	2
	b. Slope: single, dual or variable	4
	c. Mansard	1
7.	Material of floor construction at any level	2
8.	Wall framing – material (wood, steel)	2
9.	Lateral force-resisting system	1
10.	Foundation	1 ³
11.	Occupancy (E ⁴ , B ⁴ , A, etc.)	1
12.	Automatic fire sprinkler system	1 ⁵
13.	“Total Coverage” fire alarm design	3
14.	Climate zone envelope assembly	1 ⁶
15.	HVAC systems	3 ⁷

¹ Additional options may be accepted in consultation with DSA per Section 2.4 of this procedure.

² These limitations are not intended to apply to unenclosed site structures, such as lunch or car shelters, bleachers, shade structures, solar structures, flag or light poles, etc. Exception: Solar structures are limited to 2 wind speed and/or 2 seismic load options.

³ Two options (wood or concrete) are allowed for single-story relocatable buildings less than 2,160 ft² in area. Other foundation systems may be considered by DSA on a case-by-case basis.

⁴ Exception, group “E” and “B” occupancies may be included in a single PC design if the plans are identical for both occupancies and the more restrictive requirements are met for the group “E” occupancy.

⁵ An option to leave the automatic fire sprinkler system out is permitted as long as no changes to drawings are associated with this option (i.e., the framing system is unchanged if fire sprinklers are not included).

⁶ A PC with a single envelope assembly design option. A PC designed to meet the worst-case (least efficient) orientation for any and all climate zones per California Energy Code Section 140.3(a)8.B, and Reference Appendices NA4.3(a) is acceptable. Alternatively, a PC submitted with grouped climate zones as described in PR 18-02 is acceptable.

⁷ More than one HVAC systems size or type options (i.e., 2.5 T and 3T or wall mount and rooftop mount) for a single modular building size constitute multiple HVAC system options. Multiples of a specific HVAC size or type to accommodate multiple modules do not constitute a separate HVAC option.

PRE-CHECK (PC) APPROVAL**APPENDIX B: DESIGN INFORMATION TO BE SHOWN ON PC DRAWINGS COVER SHEET**

Description	
General	
<input type="checkbox"/>	1. All applicable codes and standards
<input type="checkbox"/>	2. Show complete PC specifications on drawings ⁸⁷
<input type="checkbox"/>	3. All multiple options per Sections 2.1 and 2.2
<input type="checkbox"/>	4. A form DSA 103 (List of Required Structural Tests and Special Inspections) for each applicable option shown in APPENDIX D .
<input type="checkbox"/>	5. Where multiple major options are included, provide an index on the drawings to identify the specific drawings applicable to each option. See APPENDIX E for example.
Building Data	
<input type="checkbox"/>	1. Classification of type of construction per CBC, Chapter 6.
<input type="checkbox"/>	2. Use or occupancy classification per CBC, Chapter 3.
<input type="checkbox"/>	3. Occupant load factor per CBC, Table 1004.5.
<input type="checkbox"/>	4. Risk category per CBC, Table 1604A.5
<input type="checkbox"/>	5. Number of stories
<input type="checkbox"/>	6. Building areas
<input type="checkbox"/>	7. Module size
<input type="checkbox"/>	8. Structural design notes – See APPENDIX C for sample template.
<input type="checkbox"/>	9. CALGreen and Energy Code information per DSA PR 18-02.
<input type="checkbox"/>	10. Note regarding prohibition of use of PC use in 65 CNEL noise contours, if applicable (See CALGreen Section 5.507.4.1 Exterior Noise Transmission).
Fire and Life Safety (FLS)	
<input type="checkbox"/>	1. Identify if the PC is designed per CBC Chapter 7A for placement in a designated Fire Hazard Severity Zone classified as Very High by CAL FIRE, or a fire hazard severity zone established by the local fire authority.
<input type="checkbox"/>	2. Indicate whether an automatic fire sprinkler system is provided. (See CBC, Chapter 9 for when a system is required).
<input type="checkbox"/>	3. If a fire sprinkler system is not provided, indicate whether the building is designed to support the future weight of a fire sprinkler system (1.5 psf).

⁸⁷ Specifications submitted separately on a paper size that is different from the drawing size are not acceptable unless prior permission is secured from DSA. If permitted, the title sheet of the PC drawing set shall show an index of specifications and add the following statement:

“Complete specifications for this PC are listed on a separate document.”

PRE-CHECK (PC) APPROVAL**APPENDIX C: SAMPLE TEMPLATE: CBC PC STRUCTURAL DESIGN NOTES**

Description	Design Values
Dead and Live Loads	
Floor live load	
Second floor live load (for two-story structure only).	
Roof live load	
Ramp live load	
Roof dead load	
Floor dead load	
Second floor dead load (for two-story structure only).	
Allowable Soil Pressure	
DL (wood footing)	
DL+LL (wood footing – 1,000 psf max.)	
DL+LL+Snow (wood footing)	
DL+LL+Seismic (wood footing)	
DL+LL (concrete footing)	
DL+LL+Seismic (concrete footing)	
Roof Snow Load	
Ground snow load, P_g , from County	
Roof snow load: <input type="checkbox"/> Flat, P_f or <input type="checkbox"/> Low-Slope, P_m or <input type="checkbox"/> Sloped, P_s	
Snow exposure factor, C_e	1.2
Snow load importance factor, I_s	<input type="checkbox"/> 1.0 <input type="checkbox"/> 1.1
Thermal factor, C_t	<input type="checkbox"/> 1.0 <input type="checkbox"/> 1.2
Flood Design	
Flood Hazard Area: <input type="checkbox"/> Yes <input type="checkbox"/> No (If no, skip to Wind Design)	
Flood Hazard Map used and datum elevation (from County).	
Lowest floor elevation	
Flood proofing elevation	
Lowest horizontal structural member elevation (bottom).	

PRE-CHECK (PC) APPROVAL

Description	Design Values
Wind Design	
Basic wind speed (3-second gust), V .	
Risk category	<input type="checkbox"/> II <input type="checkbox"/> III
Wind exposure category:	<input type="checkbox"/> C <input type="checkbox"/> D
Topographic factor, K_{zt} (1 min.).	
Internal pressure coefficient, GC_{pi} (if applicable).	
Seismic Design	
Lateral force-resisting system	
Analysis procedure	
Seismic design category (SDC).	<input type="checkbox"/> D <input type="checkbox"/> E
Seismic importance factor, I_e	<input type="checkbox"/> 1.0 <input type="checkbox"/> 1.25
Design base shear, V	
Seismic response coefficient, C_S	
Response modification factor, R	
Site class	<input type="checkbox"/> D <input type="checkbox"/> E
Mapped spectral response acceleration at short period, S_S	
Short-period site coefficient, F_a	1
Design spectral response acceleration at short period, S_{DS} – used to determine C_S (with cap per ASCE 7, Section 12.8.1.3)	
Design spectral response acceleration at short period, S_{DS} – used to determine other parameters and non-structural component anchorage (no cap).	
Mapped spectral response acceleration at 1-second period, S_I	
Long-period site coefficient, F_v	1.5
Design spectral response acceleration at 1-second period, S_{D1}	
Horizontal or vertical irregularity type(s)	



Note: Contact the DSA Regional Offices for additional information and instructions at www.dgs.ca.gov/DSA/Contact.

PRE-CHECK APPROVAL

APPENDIX D: PC TESTS & INSPECTIONS GUIDELINE for PERMANENT MODULAR OR RELOCATABLE BUILDINGS ONLY

User Note: The purpose of this guide is to aid in the proper completion of form DSA 103: Example List of Required Structural Tests and Special Inspections for this pre-check (PC) design. Check the applicable tests and/or special inspections on the form DSA 103 using this guideline. An example form DSA 103 or guideline table as shown below with the appropriate boxes checked must be included on the PC drawings for each lettered column that is applicable to your PC.



For assistance or questions about types of construction not covered in this guideline, contact your DSA Regional Office.

Type of Permanent Modular or Relocatable Steel Moment Frame Building Project

**X INDICATES TEST OR INSPECTION TO BE DONE
- - - INDICATES NOT APPLICABLE**

Drawings shall also include a note stating:
The example form DSA 103(s) shown on this sheet are for illustration purposes only. A form DSA 103 is to be completed for each application that this PC is being incorporated into and all example form DSA 103s are to be crossed out on this drawing.

TESTS or INSPECTIONS (as listed on form DSA 103)			STOCKPILE		CONSTRUCTION OF PERMANENT MODULAR OR RELOCATABLE BUILDING (diaphragm or foundation material)			RELOCATION OF CERTIFIED RELOCATABLE BUILDING	
MATERIAL TYPE	DSA 103 Item #	DESCRIPTION	A	B	C (Note 5)	D	E	F	G
			Wood Floor Only	Concrete Floors	Plywood Floor Only - Wood Foundation	Plywood Floor - Concrete Foundation	Concrete Floor - Concrete Foundation	Wood Foundation	Concrete Foundation
SOILS	GENERAL (Note 4)	S1.a Verify that: • Site has been prepared properly prior to placement of controlled fill and/or excavations for foundations. • Foundation excavations are extended to proper depth and have reached proper material, and • Materials below footings are adequate to achieve the design bearing capacity.	---	---	---	X	X	---	X



PRE-CHECK APPROVAL

SOILS (Cont.)	SOIL COMPACTION AND FILL (Note 4)	S2.a	Perform classification and testing of fill materials.	---	---	---	X	X	---	X
		S2.b	Verify use of proper materials, densities and inspect lift thicknesses, placement and compaction during placement of fill.	---	---	---	X	X	---	X
		S2.c	Compaction testing.	---	---	---	X	X	---	X
CONCRETE	NON-FOUNDATION CONCRETE	C1.c	During concrete placement, fabricate specimens for strength tests, perform slump and air content tests, and determine the temperature of the concrete.	---	X	---	---	X	---	---
		C1.d	Test concrete (f _c).	---	X	---	---	X	---	---
		C1.e	Batch plant inspection. <input checked="" type="radio"/> Continuous <input type="radio"/> Periodic	---	X	---	---	X	---	---
		C6.A	Inspect placement of concrete, reinforcing and embedded items in elevated floor/roof - by RBIP.	---	X	---	---	X	---	---
	FOUNDATION	C1.a	Verify use of required design mix.	---	---	---	X	X	---	X

PRE-CHECK APPROVAL

		C1.b	Identify, sample and test reinforcing steel. (See Note 1 for Waiver for one-story.)	---	X	---	X	X	---	X
		C1.c	During concrete placement, fabricate specimens for strength tests, perform slump and air content tests, and determine the temperature of the concrete.	---	---	---	X	X	---	X
		C1.d	Test concrete (f'c).	---	---	---	X	X	---	X
		C1.e	Batch plant inspection. <input checked="" type="radio"/> Continuous <input type="radio"/> Periodic	---	---	---	X	X	---	X
CONCRETE (Cont'd)	POST-INSTALLED ANCHORS (Note 2)	C5.a	Inspect installation of post-installed anchors.	---	---	---	X	X	---	X
		C5.b	Test post-installed anchors.	---	---	---	X	X	---	X
STRUCTURAL STEEL, COLD-FORMED STEEL AND ALUMINUM USED FOR STRUCTURAL PURPOSES	VERIFICATION OF MATERIALS, EQUIPMENT, WELDERS, ETC.	S/A1.a	•Verify identification of all materials and: • Mill certificates indicate material properties that comply with requirements. • Material sizes, types and grades comply with requirements.	X	X	X	X	X	---	---
		S/A1.b	Test unidentified materials.	X	X	X	X	X	---	---
		S/A1.c	Examine seam welds of HSS shapes.	X	X	X	X	X	---	---
		S/A1.d	Verify and document steel fabrication per DSA-approved construction documents.	X	X	X	X	X	---	---
		S/A3.a	Verify weld filler material identification markings per AWS designation listed on	X	X	X	X	X	---	---

PRE-CHECK APPROVAL

			the DSA-approved documents and the WPS.							
		S/A3.b	Verify weld filler material manufacturer's certificate of compliance.	X	X	X	X	X	---	---
		S/A3.c	Verify WPS, welder qualifications and equipment.	X	X	X	X	X	---	---
	SHOP WELDING (Note 3)	S/A4.a	Inspect groove welds, multi-pass fillet welds, single-pass fillet welds > 5/16", plug and slot welds.	X	X	X	X	X	---	---
		S/A4.b	Inspect single-pass fillet welds ≤ 5/16", floor and roof deck welds.	X	X	X	X	X	---	---
		S/A4.c	Inspect welding of stairs and railing systems. (See Note 6)	X	X	X	X	X	---	---
STRUCTURAL STEEL, COLD-FORMED STEEL AND ALUMINUM USED FOR STRUCTURAL PURPOSES (Cont.)	FIELD WELDING (Note 3)	S/A5.a	Inspect groove welds, multi-pass fillet welds, single-pass fillet welds > 5/16", plug and slot welds.	---	---	X	X	X	---	X
		S/A5.b	Inspect single-pass fillet welds ≤ 5/16".	---	---	X	X	X	---	X
		S/A5.c	Inspect end-welded studs (ASTM A-108) installation (including bend test).	---	---	---	X	X	---	---
		S/A5.d	Inspect floor and roof deck welds.	---	X	---	---	X	---	---
		S/A5.e	Inspect welding of structural cold-formed steel Periodic/Special Inspector.	X	X	X	X	X	---	---

PRE-CHECK APPROVAL

		S/A5.f	Inspect welding of stairs and railing systems. (See Note 6)	---	---	X	X	X	---	X
	OTHER STEEL	S/A11.a	Shop Welding - Inspect welding of cold-formed steel Periodic/Special Inspector.	X	X	X	X	X	---	---
		S/A11.b	Shop Welding - Inspect welding of steel floor deck welds Periodic/Special Inspector.	---	X	---	---	X	---	---
OTHER – SHOT PINS (Two-Story Modular)		X1.a	Ceiling wire hangers (pins in metal deck with concrete fill) Test/Lab.	---	X	---	---	X	---	---

PRE-CHECK APPROVAL

Additional Information for PC designs only, not to be added to DSA 103			
	STOCKPILE	CONSTRUCTION OF PERMANENT MODULAR OR RELOCATABLE BUILDING	RELOCATION OF CERTIFIED RELOCATABLE BUILDING
INSPECTOR CLASS (minimum requirements)	RBIP or Class 1	In Plant: RBIP or Class 1 Site: Class 4 for Single-Story Site: Class 2 for Two-Story	Class 4 for Single-Story Class 2 for Two-Story
SELECTION OF THE PROJECT INSPECTOR AND TESTING/SPECIAL INSPECTION AGENCY	Selected and Employed by the Testing Lab Approved by DSA, A/E of Record and Structural Engineer	By the School District and approved by DSA and A/E responsible for in-plant construction observation	By the Owner (not manufacturer) and approved by DSA, A/E of Record and Structural Engineer
COST OF THE PROJECT INSPECTOR (CAC, Section 4-333[b]) AND TESTING/SPECIAL INSPECTION AGENCY (CAC, Section 4-335[b])	By the Owner (not manufacturer)	By the School District	

NOTES:

- Note 1: Reinforcing steel tests may be waived for one-story buildings, per CBC, Section 1910A.2.
- Note 2: Required only where the details of the PC specify the use of this type of anchor.
- Note 3: Required only where the details of the PC specify this welding.
- Note 4: These tests and inspections are applicable only when a geotechnical report is required.
- Note 5: Wood foundations are not permitted for permanent modular buildings per CBC Section 1807A.1.4.
- Note 6: These tests and inspections are applicable only when stairs and ramps are part of the scope of work.

PRE-CHECK APPROVAL

APPENDIX E: INDEX TO DRAWINGS REQUIRED FOR PCs WITH MULTIPLE MAJOR OPTIONS

When a PC includes multiple major options, an index similar to the examples shown here must be included on the PC drawings identifying which drawings are applicable to each option.

This index will enable future designers using portions of the PC drawings as part of the drawings for an actual construction project to easily identify all of the specific PC drawing sheets applicable to the option(s) to be constructed. It will also enable the DSA plan reviewer to confirm that the correct sheets of the PC drawings are included.

In these examples, the various options would be checked off and the sheets that are to be required are then identified in the last column.

SHEET INDEX		
OPTIONS	SHEET TITLE	SHEET NUMBER
COVER SHEET	GENERAL NOTES, APPLICABLE CODES, BUILDING DATA, STRUCTURAL DESIGN DATA ABBREVIATIONS SYMBOLS, OPTIONS LIST, SHEET INDEX AND TEST AND INSPECTION CHECK LIST	A0.01
SPECIFICATIONS		
ALL	<input type="checkbox"/> SPECIFICATIONS	A0.02
ALL	<input type="checkbox"/> TEST AND INSPECTION GUIDELINES	A0.03
FLOOR PLANS		
OPTION A	<input type="checkbox"/> FLOOR PLAN OPTION A	A1.01
OPTION B & B2 (WALL MTD.)	<input type="checkbox"/> FLOOR PLAN OPTION B & B2 (WALL MTD.)	A1.02
OPTION B & B2 (FLR. MTD.)	<input type="checkbox"/> FLOOR PLAN OPTION B & B2 (FLOR MTD.)	A1.03
ROOF PLANS		
BUILT-UP ROOF		
	<input type="checkbox"/> ROOF PLAN 4 PLY BUILT-UP ROOF DUAL SLOPE	A2.01
	<input type="checkbox"/> ROOF PLAN 4 PLY BUILT-UP ROOF MONO SLOPE	A2.02
	<input type="checkbox"/> ROOF DETAILS 4 PLY BUILT-UP ROOF (WOOD BEAMS)	A2.03
	<input type="checkbox"/> ROOF DETAILS 4 PLY BUILT-UP ROOF (STUCCO)	A2.04
	<input type="checkbox"/> ROOF DETAILS 4 PLY BUILT-UP ROOF (DUAL BEAMS)	A2.05
METAL ROOF		
	<input type="checkbox"/> ROOF PLAN STEERING BEAM METAL ROOF DUAL SLOPE	A2.11
	<input type="checkbox"/> ROOF PLAN STEERING BEAM METAL ROOF MONO SLOPE	A2.12
	<input type="checkbox"/> ROOF DETAILS-STEERING BEAM METAL ROOF (WOOD BEAMS)	A2.13
	<input type="checkbox"/> ROOF DETAILS-STEERING BEAM METAL ROOF (STUCCO)	A2.14
	<input type="checkbox"/> ROOF DETAILS-STEERING BEAM METAL ROOF (DUAL BEAMS)	A2.15
EPDM ROOF		
	<input type="checkbox"/> ROOF PLAN EPDM ROOF DUAL SLOPE	A2.21
	<input type="checkbox"/> ROOF PLAN EPDM ROOF MONO SLOPE	A2.22
	<input type="checkbox"/> ROOF DETAILS EPDM ROOF (WOOD BEAMS)	A2.23
	<input type="checkbox"/> ROOF DETAILS EPDM ROOF (STUCCO)	A2.24
	<input type="checkbox"/> ROOF DETAILS EPDM ROOF (DUAL BEAMS)	A2.25
ELEVATIONS		
DUAL SLOPE		
	<input type="checkbox"/> EXTERIOR ELEVATIONS, DUAL SLOPE, OPTION A	A3.01
	<input type="checkbox"/> EXTERIOR ELEVATIONS, DUAL SLOPE, OPTION B&B2	A3.02
MONO SLOPE		
	<input type="checkbox"/> EXTERIOR ELEVATIONS, MONO SLOPE, OPTION A	A3.11
	<input type="checkbox"/> EXTERIOR ELEVATIONS, MONO SLOPE, OPTION B&B2	A3.12
DUAL SLOPE (O.B. SIDING)		
	<input type="checkbox"/> EXTERIOR ELEVATIONS, DUAL SLOPE, OPTION A, O.B. SIDING	A3.21
	<input type="checkbox"/> EXTERIOR ELEVATIONS, DUAL SLOPE, OPTION B&B2, O.B. SIDING	A3.22
MONO SLOPE (O.B. SIDING)		
	<input type="checkbox"/> EXTERIOR ELEVATIONS, MONO SLOPE, OPTION A, O.B. SIDING	A3.31
	<input type="checkbox"/> EXTERIOR ELEVATIONS, MONO SLOPE, OPTION B&B2, O.B. SIDING	A3.32
INTERIOR ELEVATIONS		
OPTION A	<input type="checkbox"/> INTERIOR ELEVATIONS, OPTION A - WALL MOUNTED TOILETS	A4.01
OPTION B & B2	<input type="checkbox"/> INTERIOR ELEVATIONS, OPTION B&B2 - WALL MOUNTED TOILETS	A4.02
OPTION A	<input type="checkbox"/> INTERIOR ELEVATIONS, OPTION A - FLOOR MOUNTED TOILETS	A4.11
OPTION B & B2	<input type="checkbox"/> INTERIOR ELEVATIONS, OPTION B&B2 - FLOOR MOUNTED TOILETS	A4.12
SCHEDULES		
ALL	<input type="checkbox"/> DOOR, FRAME, WINDOW AND SIKHANE	A5.01
DETAILS		
WOOD SIDING, WOOD STUDS	<input type="checkbox"/> ARCHITECTURAL - DETAILS - WOOD SIDING - WOOD STUDS	A6.01
STUCCO, WOOD STUDS	<input type="checkbox"/> ARCHITECTURAL - DETAILS - STUCCO - WOOD STUDS	A6.02
WOOD SIDING, METAL STUDS	<input type="checkbox"/> ARCHITECTURAL - DETAILS - WOOD SIDING - STEEL STUDS	A6.03
STUCCO, STEEL STUDS	<input type="checkbox"/> ARCHITECTURAL - DETAILS - STUCCO - STEEL STUDS	A6.04
O.B. SIDING, WOOD STUDS	<input type="checkbox"/> ARCHITECTURAL - DETAILS - O.B. SIDING - WOOD STUDS	A6.05
O.B. SIDING, STEEL STUDS	<input type="checkbox"/> ARCHITECTURAL - DETAILS - O.B. SIDING - STEEL STUDS	A6.06

OPTIONS LIST - KEY NOTES		
MODULE SIZE:	12' X 40' SINGLE STORY	<input type="checkbox"/> WITH RAMPS A0.50
BUILDING SIZES:	24' X 40' THRU 216' X 40'	<input type="checkbox"/> WITHOUT RAMPS A0.51
GRADE LEVEL:	<input type="checkbox"/> KINDERGARTEN	
	<input type="checkbox"/> ELEMENTARY	
	<input type="checkbox"/> MIDDLE SCHOOL/HIGH SCHOOL/ADULT	
ACCESSORIES:	<input type="checkbox"/> TOILET ROOM AB.51, AB.52, AB.53	
	<input type="checkbox"/> DRINKING FOUNTAIN AB.03	
	<input type="checkbox"/> CABINETS	
	<input type="checkbox"/> RATED WALLS	
FLOOR PLAN:		A1.01
CEILING PLAN:	<input type="checkbox"/> 2'X4' ACOUSTIC T-BAR SYSTEM A2.01, A2.31	
	<input type="checkbox"/> HARD LID (TOILET ROOM ONLY) A2.32	
ROOF:	<input type="checkbox"/> PLYWOOD SUBSTRATE	<input type="checkbox"/> MONO PITCH A3.01, A3.22
	<input type="checkbox"/> 26 GAUGE STANDING SEAM	<input type="checkbox"/> DUAL PITCH A3.11, A3.22
	<input type="checkbox"/> BUILT UP	<input type="checkbox"/> OVERHANG A3.03, A3.24
	<input type="checkbox"/> MONO	<input type="checkbox"/> PARAPET A3.04, A3.25
	<input type="checkbox"/> DUAL	<input type="checkbox"/> OVERHANG A3.13, A3.24
	<input type="checkbox"/> HORIZONTAL STEEL STRAP TRUSS	<input type="checkbox"/> MONO A3.02, A3.23
	<input type="checkbox"/> 22 GAUGE STANDING SEAM	<input type="checkbox"/> DUAL A3.12, A3.23
	<input type="checkbox"/> GENERAL DETAILS - ALL CASES A3.21	
EXTERIOR ELEVATIONS:	<input type="checkbox"/> DURATEMP SIDING	<input type="checkbox"/> MONO A4.01
		<input type="checkbox"/> DUAL A4.11
	<input type="checkbox"/> STUCCO	<input type="checkbox"/> PARAPET A4.21
		<input type="checkbox"/> MONO A4.02
		<input type="checkbox"/> DUAL A4.12
INTERIOR ELEVATIONS:		<input type="checkbox"/> PARAPET A4.22
WALL SECTIONS:	ALL CASES	
	<input type="checkbox"/> MONO	<input type="checkbox"/> WOOD FLOOR A6.01, A6.51
		<input type="checkbox"/> CONC. FLOOR A6.02, A6.51
	<input type="checkbox"/> DUAL	<input type="checkbox"/> WOOD FLOOR A6.11, A6.51
		<input type="checkbox"/> CONC. FLOOR A6.11, A6.51
	<input type="checkbox"/> PARAPET	<input type="checkbox"/> WOOD FLOOR A6.21, A6.51
		<input type="checkbox"/> CONC. FLOOR A6.22, A6.51
WALL DETAILS:	<input type="checkbox"/> WOOD STUDS	<input type="checkbox"/> SIDING A6.61, A6.65
		<input type="checkbox"/> EXTERIOR PLASTER A6.62, A6.65
	<input type="checkbox"/> STEEL STUDS	<input type="checkbox"/> SIDING A6.63, A6.65
		<input type="checkbox"/> EXTERIOR PLASTER A6.64, A6.65
FINISH SCHEDULE:	ALL CASES	A7.01
CABINETS:	<input type="checkbox"/> WOOD STUDS	AB.01
	<input type="checkbox"/> STEEL STUDS	AB.02
RATED WALLS:	<input type="checkbox"/> WOOD STUDS	AB.01, AB.02
	<input type="checkbox"/> STEEL STUDS	AB.01, AB.02
FOUNDATION:	<input type="checkbox"/> WOOD FOUNDATION LIMITED TO 2160 SQ. FT. MAX	<input type="checkbox"/> WOOD FLOOR
		<input type="checkbox"/> CLASSROOM LL.=50PSF F1.01
		<input type="checkbox"/> PARTITION LL.=50+20PSF F1.02
		<input type="checkbox"/> ASSEMBLY LL.=100PSF F1.01
		<input type="checkbox"/> LIBRARY LL.=150PSF F1.02
DETAILS-ALL CASES	<input type="checkbox"/> WOOD FLOOR	<input type="checkbox"/> CLASSROOM LL.=50PSF F2.01
	<input type="checkbox"/> CONC. FOUNDATION ABOVE GRADE	<input type="checkbox"/> PARTITION LL.=50+20PSF F2.01
		<input type="checkbox"/> ASSEMBLY LL.=100PSF F2.02
		<input type="checkbox"/> LIBRARY LL.=150PSF F2.02
	<input type="checkbox"/> CONC. FLOOR	<input type="checkbox"/> CLASSROOM LL.=50PSF F2.03
	<input type="checkbox"/> 3 1/2"	<input type="checkbox"/> PARTITION LL.=50+20PSF F2.03
	<input type="checkbox"/> 5"	<input type="checkbox"/> ASSEMBLY LL.=100PSF F2.03
		<input type="checkbox"/> LIBRARY LL.=150PSF F2.03
DETAILS-ALL CASES		F4.11, F4.12, F4.21, F4.22
	<input type="checkbox"/> CONC. FOUNDATION BELOW GRADE	<input type="checkbox"/> WOOD FLOOR
		<input type="checkbox"/> CLASSROOM LL.=50PSF F3.01
		<input type="checkbox"/> PARTITION LL.=50+20PSF F3.01
		<input type="checkbox"/> ASSEMBLY LL.=100PSF F3.02
		<input type="checkbox"/> LIBRARY LL.=150PSF F3.02
	<input type="checkbox"/> CONC. FLOOR	<input type="checkbox"/> CLASSROOM LL.=50PSF F3.03
	<input type="checkbox"/> 3 1/2"	<input type="checkbox"/> PARTITION LL.=50+20PSF F3.03
	<input type="checkbox"/> 5"	<input type="checkbox"/> ASSEMBLY LL.=100PSF F3.03
		<input type="checkbox"/> LIBRARY LL.=150PSF F3.03
DETAILS-ALL CASES		F4.11, F4.12, F4.31, F4.32
FLOOR FRAMING:	VENTILATION-ALL CASES	
	<input type="checkbox"/> WOOD FLOOR	<input type="checkbox"/> CLASSROOM LL.=50PSF S1.01
		<input type="checkbox"/> PARTITION LL.=50+20PSF S1.01
		<input type="checkbox"/> ASSEMBLY LL.=100PSF S1.01
		<input type="checkbox"/> LIBRARY LL.=150PSF S1.01
DETAILS-ALL CASES		S1.30
	<input type="checkbox"/> 3 1/2" CONCRETE FLOOR	<input type="checkbox"/> CLASSROOM LL.=80PSF S1.11
		<input type="checkbox"/> PARTITION LL.=50+20PSF S1.11
		<input type="checkbox"/> ASSEMBLY LL.=100PSF S1.11
		<input type="checkbox"/> LIBRARY LL.=150PSF S1.11
DETAILS-ALL CASES		S1.31
	<input type="checkbox"/> 5" CONCRETE FLOOR	<input type="checkbox"/> CLASSROOM LL.=50PSF S1.21
		<input type="checkbox"/> PARTITION LL.=50+20PSF S1.21
		<input type="checkbox"/> ASSEMBLY LL.=100PSF S1.21
		<input type="checkbox"/> LIBRARY LL.=150PSF S1.21
ROOF FRAMING:	DETAILS-ALL CASES	S1.31
	<input type="checkbox"/> 26 GAUGE STANDING SEAM OR BUILT-UP ROOF OVER 3/4" PLYWOOD SUBSTRATE	<input type="checkbox"/> MONO S2.11
		<input type="checkbox"/> DUAL S2.21
	<input type="checkbox"/> 22 GAUGE STANDING SEAM, NO SUBSTRATE, STEEL STRAPS. (SKYLIGHT LOCATION LIMITED)	<input type="checkbox"/> MONO S2.12
		<input type="checkbox"/> DUAL S2.22
	<input type="checkbox"/> BUILT UP ROOF W/PARAPETS	<input type="checkbox"/> MONO S2.13, S2.33
SECTIONS:	DETAILS-ALL CASES	S2.31, S2.32
	<input type="checkbox"/> MONO	<input type="checkbox"/> WOOD FLOOR S3.01
		<input type="checkbox"/> CONCRETE FLOOR S3.01
	<input type="checkbox"/> DUAL	<input type="checkbox"/> WOOD FLOOR S3.01
		<input type="checkbox"/> CONCRETE FLOOR S3.01
	<input type="checkbox"/> PARAPET	<input type="checkbox"/> WOOD FLOOR S3.03
		<input type="checkbox"/> CONCRETE FLOOR S3.03
MODLINE CONNECTIONS:		S3.11
	<input type="checkbox"/> BOLTED	S3.12
	<input type="checkbox"/> WELDED	S3.12
WALL FRAMING	<input type="checkbox"/> WOOD STUDS	S4.01, S4.02, S4.03
	<input type="checkbox"/> STEEL STUDS	S4.11, S4.12, S4.13
MECHANICAL	ALL SHEETS	
TITLE 24	<input type="checkbox"/> 24'x40'	<input type="checkbox"/> WALL MOUNT UNIT T24-1
		<input type="checkbox"/> ROOF TOP UNITS T24-5
	<input type="checkbox"/> 36'x40'	<input type="checkbox"/> WALL MOUNT UNIT T24-2
		<input type="checkbox"/> ROOF TOP UNITS T24-6
	<input type="checkbox"/> 48'x40'	<input type="checkbox"/> WALL MOUNT UNIT T24-3
		<input type="checkbox"/> ROOF TOP UNITS T24-7