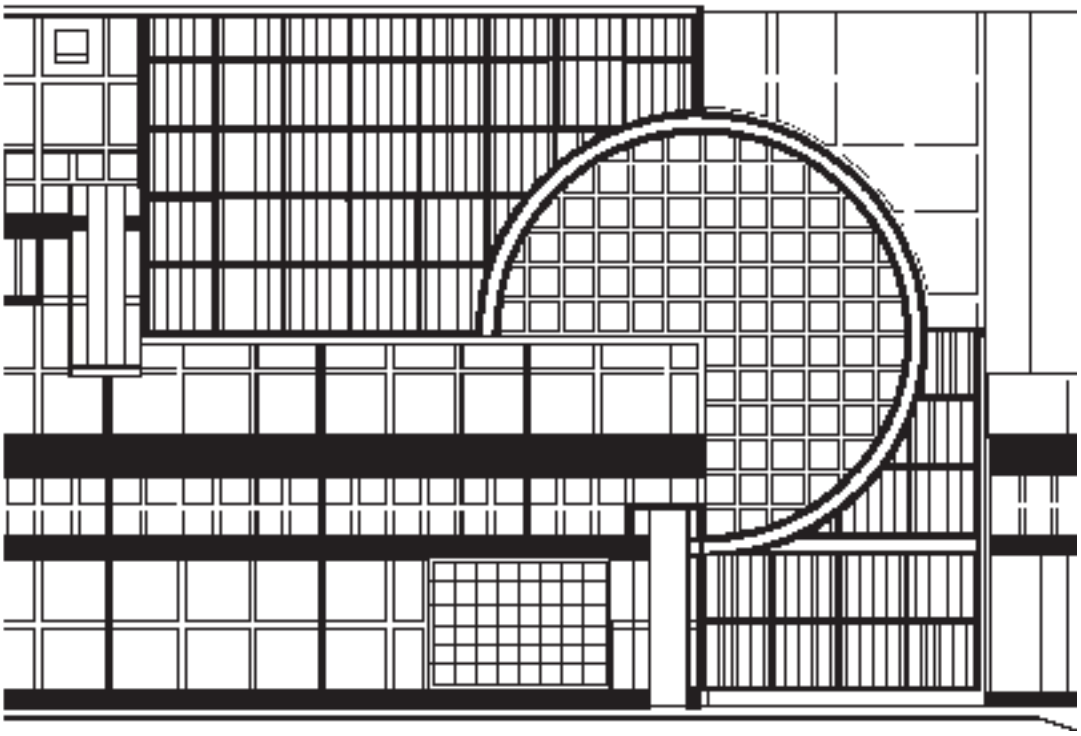
24

Glass and Glazing



Lubrication Engineers, Inc. Wichita, Kansas. (partial elevation)

Gossen Livingston Associates, Inc. Architecture. Wichita, Kansas.

2403 General Requirements for Glass

2403.3 Framing

- A glass edge qualifies as having a firm support where deflection due to the loading indicated below is limited as follows:

  - Deflection:

    The edge deflection to a pane of glass may not be > either of the following:

    1/175 the length of the glass edge.

    3/4".

  - Loading:

    Where the larger of the following loads is applied where loads are combined:

    The positive load.

    The negative load.

Note: Section 1605, "Load Combinations."

2403.4 Interior glazed areas

- Deflection of interior glazing in the following location is limited as indicated below:

  - Location:

    Adjacent to a walking surface.

  - Deflection:

    The differential deflection of adjacent unsupported edges is governed as follows:

    Deflection must be ≤ the thickness of the glass in the following case:

Where a force of 50 lbs/ft is applied as follows:

Horizontally to 1 panel.

At any point ≤ 3'-6" above the walking surface.

2403.5 Louvered windows or jalousies

- In the following conditions, glass must meet the requirements indicated below:

 Conditions:

Glass:

Float.

Wired.

Patterned.

Locations:

Louvered windows.

Jalousies.

 Requirements:

Glass must be ≥ 3/16" thick.

Glass must be ≤ 4' long.

Exposed edges of glass must be smooth.

Wire glass may not be used as follows:

Where wire is exposed on longitudinal edges.

Where other glass types are used, the following applies:

Design must be provided to the building official for approval.

2405 Sloped Glazing and Skylights

2405.1 Scope

- This section applies to the following glazing where sloped as indicated below:
  - Glazing:
    - Glass.
    - Transparent materials.
    - Translucent materials.
    - Opaque glazing materials.
    - Glazing materials in the following:
      - Skylights.
      - Roofs.
      - Sloped walls.
  - Slope:
    - Where sloped > 15 degrees from vertical plane.

2405.2 Allowable glazing materials and limitations

- The following materials are permitted in sloped glazing:
  - Laminated glass with one of the following:
    - A polyvinyl butyral interlayer ≥ 30 mils thick.
    - An equivalent interlayer.
  - Wired glass.
  - Light-transmitting plastics.

Note: Section 2607, "Light-Transmitting Plastic Wall Panels," is cited as governing these plastics.

☒ Heat-strengthened glass.

☒ Fully tempered glass.

☒ Annealed glass as follows:

Where there is no walking surface below.

Where any walking surface below is protected from falling glass.

In commercial or detached noncombustible greenhouses as follows:

Used only for growing plants.

Closed to the public.

Height of greenhouse at ridge is ≤ 30' above grade.

Note: 2405.3, "Screening," exceptions 2 and 3, are cited as governing annealed glass and are summarized above.

Section 2610, "Light-Transmitting Plastic Skylight Glazing," is cited as the source of additional requirements for plastic skylights.

2101.2.5, "Glass unit masonry," is cited as governing glass block installations.

2405 Sloped Glazing and Skylights

2405.3 Screening (part 1 of 2)

- Screens are not required under fully tempered glass in the following case:
  - Where the glazing occurs between floors as follows:
    - Glazing is sloped ≤ 30 degrees from a vertical plane.
    - Highest point of glass is ≤ 10' above the walking surface.
- Screens are not required below the following glazing for the conditions indicated below:
  - Glazing:
    - Any glazing including annealed glass.
  - Conditions:
    - Where one of the following conditions applies:
      - Where there is no walking surface below.
      - Where any walking surface below is protected from falling glass.
- Screens are not required below the following glazing in the locations indicated below:
  - Glazing:
    - Any glazing including annealed glass.
  - Locations:
    - In commercial or detached noncombustible greenhouses as follows:
      - Used only for growing plants.
      - Closed to the public.
      - Height of greenhouse at ridge is ≤ 30' above grade.
- Screens are not required in the following locations for the conditions indicated below:

- Locations:

  In occupancies R-2, R-3, R-4.

- Conditions:

  Area of each pane of glass is ≤ 16 sf.

  Highest point of glass is ≤ 12' above either of the following:

    A walking surface.

    Any other area which may be accessed.

  Where glazing is fully tempered glass:

    Glass thickness is ≤ 3/16".

  Where glazing is laminated glass:

    One of the following interlayers must be provided:

      Polyvinyl butyral ≥ 15 mils thick.

      An equivalent interlayer.

2405 Sloped Glazing and Skylights

2405.3 Screening (part 2 of 2)

- Screens as indicated below are required under the following sloped glazing:
  - Glazing:
    - Includes the following glass in the formats listed below:
      - Glass:
        - Heat-strengthened glass.
        - Fully tempered glass.
      - Formats:
        - Glazing with a single layer of glass.
        - The bottom layer among multiple layers of glass.
  - Screens:
    - Must be able to support 2 × the weight of the glazing.
    - Must be securely fastened to framing.
    - Must be installed ≤ 4" of the glass.
    - Must be noncombustible.
    - Must be ≥ #12 B&S gage (0.0808") mesh ≤ 1" × 1".
    - Where located in a corrosive atmosphere:
      - Equivalent noncorrosive screening is required.

2405.4 Framing (part 1 of 2)

- The following must be noncombustible in Type I and II construction:

- Frames for sloped glazing.
- Frames for skylights.

- In environments with acid fumes that damage metals, the following applies:
  - The following components may be constructed of the materials listed below:

    Components:

    Sash and frames of skylights.

    Sash and frames of sloped glazing.

    Materials:

    Approved pressure-treated wood.

    Other approved noncorrosive material.

- Curbs for skylights are governed as follows:
  - Occupancy R-3 has the following requirements regarding curbs:

    On roofs sloping ≥ 3:12 curbs are not required.

    On roofs sloping < 3:12 curbs are required as follows:

    Skylights must be mounted ≥ 4" above the roof on a curb.

    Curb must be constructed according to one of the following:

    As required for the framing.

    As per manufacturer's instructions.
  - In other locations, the following is required regarding curbs:

    Where the roof slope is < 45° the following applies:

    Curbs ≥ 4" high are required for skylights.

    Curbs must be constructed as required for the framing.

2405 Sloped Glazing and Skylights

2405.4 Framing (part 2 of 2)

- Framing supporting skylights and sloped glazing must be designed as follows:

  ☒ To resist tributary roof loads assigned by the code.

  Note: Chapter 16, "Structural Design," is cited as the source of tributary roof loads.

Case study: Fig. 2405.4. The roof of the occupancy B building slopes 4:12, thus requiring a 4" curb at skylights. Such a curb is provided as indicated in the illustration. Consequently the skylight is in compliance with code requirements.

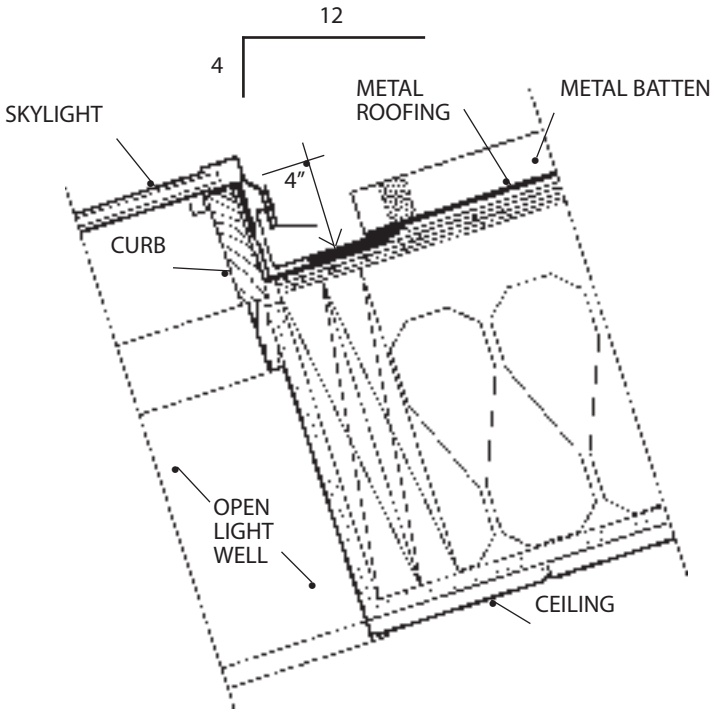


Fig. 2405.4. Detail at skylight. Central Kitchen. Lompoc Unified School District. Lompoc, California. Phillips Metsch Sweeney Moore Architects. Santa Barbara, California.

2406 Safety Glazing

2406.3 Hazardous locations (part 1 of 3)

- This section addresses the requirement for safety glazing where glazing is used.
- Safety glazing is not required in nonhazardous locations as noted in the next section.

Note: 2406.3.1, "Exceptions," lists locations not hazardous for glazing.

- The following locations require safety glazing:
  - Sliding door units as follows:
    - Sliding panels.
    - Fixed panels.
  - Sliding and bifold closet doors.
  - Storm doors.
  - Unframed swinging doors.
  - In the following elements at the bathing-type locations listed below:
    - Elements:
      - Doors.
      - Enclosures.
      - Any building wall serving as an enclosure as follows:
        - Where the lowest exposed glazing is < 5' above the standing surface.
    - Locations:
      - Hot tubs
      - Whirlpools
      - Saunas
      - Steam rooms
      - Bathtubs
      - Showers

- The following glazing near doors is governed as indicated below:

  ☒ Glazing:

    Fixed or operable.

    Adjacent to a door with both the following characteristics:

      Exposed glazing is ≤ 2' from the door as follows:

        Measured on the shortest line to the nearest edge of the closed door.

      Lowest exposed glazing is < 5' above the walking surface.

  ☒ Requirements:

    The following conditions do not require safety glazing:

      Where the glazing is decorative glass.

      Where there is a wall or barrier as follows:

        Between the door and the glazing.

      Where the door opens to one of the following spaces ≤ 3' deep:

        Closet.

        Storage.

  Note: 2406.3, "Hazardous locations," item 7, is cited as governing this glazing.

      Where the glazing is ☒ to the closed door where both the following apply:

        In 1- and 2-family dwellings.

        In occupancy R-2.

    Other conditions require safety glazing.

Case study: Fig. 2406.3. Safety glazing is required on either side of the entry doors since it is within 2' of the door. The glazing above the door is not required to be safety glazing as it is above a height of 5'. Safety glazing is required in the swinging doors. Tempered glass is provided in the doors and on each side of the doors, thus, the entry is in compliance with the code.

Fig. 2406.3. Partial elevation at east entry. Hot Springs Police Department New Headquarters. Hot Springs National Park, Arkansas. Cromwell Architects Engineers. Little Rock, Arkansas.

2406 Safety Glazing

2406.3 Hazardous locations (part 2 of 3)

- Safety glazing in swinging doors is governed as follows:

  ☒ It is not required in swinging jalousie doors.

  ☒ It is not required where the glazing is decorative glass.

  ☒ It is required in other swinging doors.

  Note: 2406.3.1, "Exceptions," is cited as the source of requirements for jalousies without safety glazing.

- The following glazing is governed as indicated:

  ☒ The following glazing is not required to be safety glazing:

  That which is protected by a bar as follows:

  Bar has a vertical dimension ≥ 1-1/2".

  Bar is able to resist a 50-lb/ft load applied horizontally as follows:

  Without deflecting to contact the glazing.

  Bar is located as follows:

  On the side of glazing to which there is access.

  ≥ 2'-10" and ≤ 3'-2" above the walking surface.

  The exterior pane of multiple layers of glazing as follows:

  Where the lowest exposed glazing is ≥ 25' above the following:

  Above any of the following surfaces adjacent to the exterior of the glazing:

Grade.

Roof.

Walking surface.

Other horizontal or sloped surface.

 The following glazing is governed elsewhere in this section:

That which is required by this section to have safety glazing as follows:

Where glazing is < 5' above a standing surface in the following locations:

Bathing-type locations.

Near doors.

 Glazing in locations other than those indicated above is governed as follows:

Decorative glass is not required to be safety glazing.

Otherwise, safety glazing is required where all of the following conditions apply:

Exposed surface has all the following characteristics:

Area of any pane is > 9 sf.

Bottom edge is < 1'-6" above the floor.

Top edge is > 3' above the floor.

Plane of glazing is ≤ 3' from a walking surface as follows:

Measured horizontally.

- Safety glazing is required for the following components in the locations listed below:

 Components:

The following components with any area or height are included:

Structural baluster panels.

Nonstructural in-fill panels.

- Locations:

  Guards and railings.

2406 Safety Glazing

2406.3 Hazardous locations (part 3 of 3)

- Safety glazing is required in the following locations where the conditions listed apply:

  ☒ Locations:

    Walls and fences as follows:

      Enclosing the following both indoors and outdoors:

        Swimming pools.

        Hot tubs and spas.

  ☒ Conditions:

    Where all of the following conditions apply:

      Bottom edge of glazing is < 5' above the walking surface as follows:

        On the side where water is contained.

      Glazing is ≤ 5' from the edge of the water as follows:

        Measured horizontally.

  ☒ Glazing adjacent to the following elements is governed as indicated below:

    Elements:

      Stairways and ramps.

      Landings.

    Requirements:

      Safety glazing is not required where the following conditions apply:

        The side of the element has the following:

          Guard or handrail as follows:

With one of the following components:

Balusters or in-fill panels.

Located ≥ 1'-6" from the glazing.

Note: The following are cited as governing the guards and handrails:

Section 1013, "Guards."

1607.7, "Loads on handrails, guards, grab bars and vehicle barriers."

Safety glazing is required where the glazing is located with both of the following:

Glazing is ≤ 3' from a walking surface as follows:

Measured horizontally.

Bottom edge of glazing is < 5' above the adjacent walking surface.

Safety glazing is required at stairways where it is located with both of the following:

Glazing is ≤ 5' from the bottom stairway tread as follows:

Measured horizontally in any direction.

Bottom edge of glazing is < 5' above the tread nosing.

2406 Safety Glazing

2406.3.1 Exceptions

- The following are not hazardous locations requiring safety glazing:

  Openings in doors as follows:

  Able to pass a 3" sphere.

  Decorative glass.

  Note: 2406.3, "Hazardous locations," item 1, 6, or 7 is cited as specifying locations and conditions wherein decorative glass need not be safety glazing.

  Curved glazing as follows:

  In revolving doors.

  Glazed doors as follows:

  In commercial refrigeration.

  Glass block.

  Note: 2101.2.5, "Glass masonry," is cited as governing glass block.

  Louvered glazing as follows:

  Windows.

  Jalousies.

Note: 2403.5, "Louvered windows or jalousies," is cited as governing this glazing.

☒ The following glazing located as indicated below:

Glazing:

Mirrors.

Other glass panels.

Location:

On a surface providing the following:

Support across the entire back of the glazing.