

EL DORADO

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RADIATION SHIELDING DOORS

EL DORADO heavy shielding swing doors are manufactured with the highest quality materials and workmanship. Each door and frame is custom designed and fabricated to meet the requirements of your project.

FEATURES

- Bolt on lifting eyes on doors eliminating the need for welding or grinding on site
- Exclusive hinge mounting system ensuring precision pin alignment
- Structural frame anchors specifically designed for vertical and radial door support of the frame
- Operator mounting layout pre-drilled and tapped for accurate alignment
- Offset hinge stop which results in a designed clear opening when the door is open to 90°
- Electric door operators certified by the manufacturer to operate doors at designed weights and torque
- Partial open feature standard
- Engineered for installation of several available safety devices



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LINEAR ACCELERATOR SWING DOOR SECTION

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Linear Accelerator Swing Door
Section 13095

PART 1 - GENERAL

1.01 Summary Furnish all labor, materials, tools, and equipment for the supply and installation of all linear accelerator room doors in accordance with contract documents.

1.02 Submittals As per contract requirements, submit six (6) copies of shop drawings for each linear accelerator door. Shop drawings shall include elevations and plan views as well as details of frame sections.

1.03 Design Radiation shielding materials shall be of consistent thickness in any straight line with no gaps and minimum frame overlap of 1". Allow a maximum of 1/2" gap under bottom of door. Door and frame shall withstand all loads without measurable deflection.

PART 2 - PRODUCTS

2.01 Acceptable Manufacturers

EL DORADO

122 Pellizzari Place • El Dorado, AR 71730
(870) 863-5757 • Fax (870) 863-4230

2.02 Materials

- A.) Frame: 1/4" steel plate roll formed ASTM A36
- B.) Face: 1/4" or 3/8" steel plate ASTM A36
- C.) Edges: 1/2" or 3/4" steel flat bar ASTM A36
- D.) Lead: Federal Specification QQL-201-F
- E.) 5% Borated Polyethylene manufactured for neutron shielding
- F.) Manufacturer's standard rust inhibitive primer
- G.) Hinges: Brookfield Series W
- H.) Pulls: Cast Aluminum US265 finish
- I.) Bolts and Fasteners: Manufacturer's standard units

2.03 Door Operator Electric power door operator is recommended for use with neutron doors. The operator should be selected on the basis of door weight and geometry. Operator literature shall be included with submittals.

2.04 Fabrication Fabricate all metal work in compliance with the submitted door and frame drawings. All welding shall be in accordance with AWS standards. Work shall be free from any defects and shall look neat in appearance.

PART 3 - QUALITY ASSURANCE Comply with the requirements of the National Council on Radiation Protection and Measurement (NCRP) Report No. 49 and NCRP Report 51. Fabricator shall be experienced in and equipped to provide products and services equal to the standards specified herein.

PART 4 - EXECUTION Door frame is manufactured by **EL DORADO** for installation by others. Frame must be installed before final construction of wall. Installer must make sure that the frame is installed within 1/16" of plumb in the vertical direction along hinge line and square. Door shall be installed by **EL DORADO** after adequate cure of the concrete walls. Door may be installed before accelerator equipment if an offset frame has been installed. Any touch ups of the prime coat areas shall be implemented at the time of the door installation. Final preparation and painting of the frame and door is by others. Electric operator shall be installed by **EL DORADO** personnel or by local area door operator technicians.

PART 5 - WARRANTY Manufacturer warranties the door system against defects in workmanship and materials subject to ordinary operation. We will repair this product or replace parts free of charge for one (1) year from the date of occupancy. We do not guarantee against defects due to the failure to exercise normal preventive maintenance.

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DIRECT SHIELDING DOORS

EL DORADO direct shielding doors are manufactured with the highest quality materials and workmanship. Each door system is custom designed and fabricated to meet the requirements of your project.

FEATURES:

- IKO linear motion system with fully machined beam surfaces
- Long bearing block bodies resulting in longer linear motion system life
- Bearing capillary plates reducing requirements for manual lubrication
- Structural steel components epoxy painted and door primed for final finish
- Pressure sensitive leading edges and BEA presence sensors
- Brookfield Series 4000 Electric Operator
- Partial open feature standard
- Battery Back Up
- Manual override
- 3 year linear motion system warranty
- 1 year operator warranty



EL DORADO LINEAR ACCELERATOR SLIDING DOOR SECTION 13095

PART 1 - GENERAL

1.01 SUMMARY

Furnish all labor, materials, tools and equipment for the supply and installation of all linear accelerator room doors in accordance with contract documents.

1.02 SUBMITTALS

- A. Comply with Division 1 submittal procedures. Submit six (6) copies of shop drawings for each sliding door unit. Show arrangement of components, fabrication details, attachment, or junctions with adjacent work, and requirements of related work
- B. Provide coordinated detail drawings showing door pocket assemblies that show work specified elsewhere including concrete assemblies and sheetrock wall assemblies.
- C. Indicate recommended locations for access panel by others to access door operator service and door pocket cleaning.
- D. Indicate routing and requirements for electrical wiring.

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1.03 DESIGN

Radiation shielding materials shall be of consistent thickness in any straight line with no gaps and minimum overlap to insure sufficient radiation shielding.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

EL DORADO

122 Pellizzari Place • El Dorado, AR 71730
(870) 863-5757 Fax: (870) 863-4230

2.02 MATERIALS

- A. Doors: Type A36. 1" thick steel flat bar around perimeter of door with 1/2" thick.
- B. Structural Steel Supports: Type ASTM A36 beam and ASTM 500 rectangular tubing.
- C. Linear Motion System: IKO LRXDG series bearing blocks with matching dual rails; (2) blocks per rail.
- D. Lead: Federal Specification QQL-201-F.
- E. 5% Borated Polyethylene manufactured for neutron shielding.
- F. Primer: rust-inhibiting paint suitable as base for specified finish paints.
- G. Paint: (Structural Members) Sherwin Williams Fast Clad® DTM water based Epoxy.

2.03 DOOR OPERATOR

Brookfield Industries Sliding Door Operator designed for linear accelerator sliding doors weighing up to 30,000 lbs.

2.04 STANDARD SAFETY FEATURES

- A. Electric Safety Edges: Pressure sensitive switches on the leading edge of door.
- B. Presence Sensors: Ceiling mounted devices located inside and outside the treatment room.
- C. Emergency Hand Crank
- D. Battery Back-up
- E. Interlock switches

2.05 FABRICATION

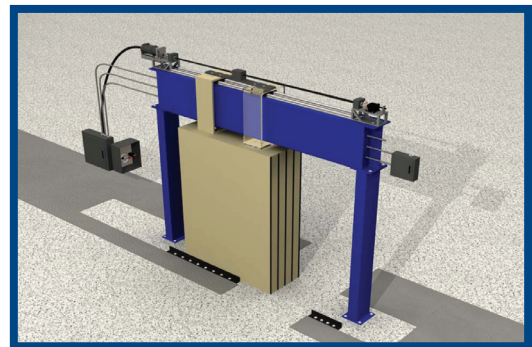
- A. All welding in accordance with AWS Standards. All assembly to be performed in shop, wherever practical. Door to be neat in appearance and free from defects.
- B. All weld joints continuous, with profiles dressed smooth and flush. Prep for finish hardware, to be installed in field.
- C. Neutron Shielded Door shall be absent of all mill scale and foreign materials prior to application of shop primer coat.

PART 3 - EXECUTION

- A. Schedule and coordinate adjacent work by others to facilitate delivery of doors.
- B. Set steel tube column and beam system as detailed on approved shop drawings. Touch up compatible paint.
- C. Set door leaf and linear motion hardware as detailed on an approved shop drawings. Touch up prime coat with compatible primer.
- D. Electric door operator to be installed and maintained by trained **EL DORADO** personnel or a qualified local area door operator service company.
- E. All set speeds will meet requirements in the ANSI/BHMA A156.19-1990 but shall not exceed 1ft./5 sec.

PART 4 – WARRANTY

Door and linear motion system warrantied for three (3) years. Operator warrantied for one (1) year.



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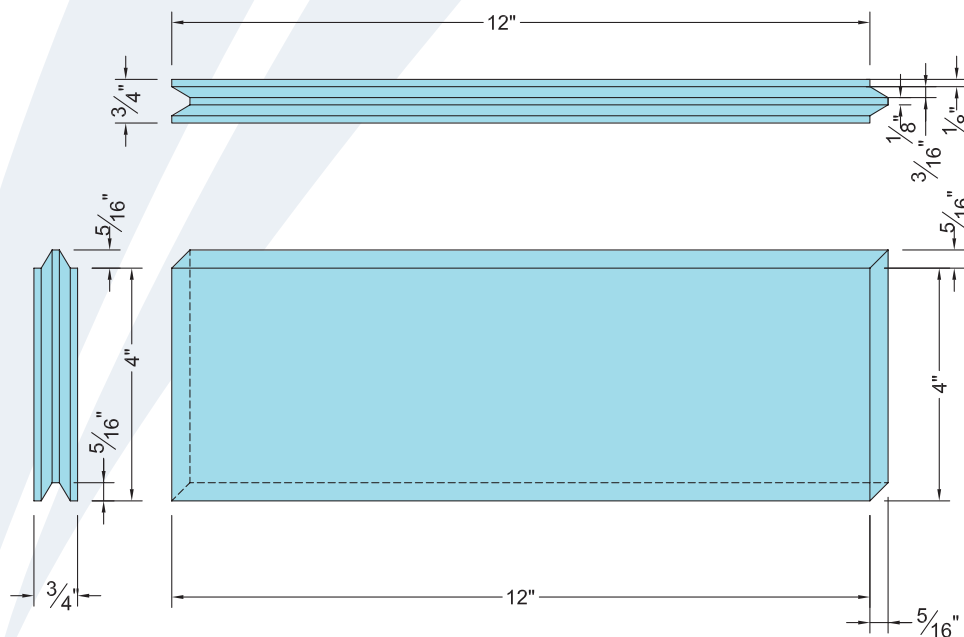
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INTERLOCKING LEAD BRICK

EL DORADO offers a wide range of shielding design services which include lead brick wall and ceiling systems. We have crews trained in the safe and quality installation of lead brick and plate and the associated steel structures that often are required.

Interlocking lead bricks are excellent for adding additional shielding to existing therapy vaults or treatment rooms as well as in new construction where available space is an issue. Lead brick can be installed in walls and ceilings where access is limited or difficult.

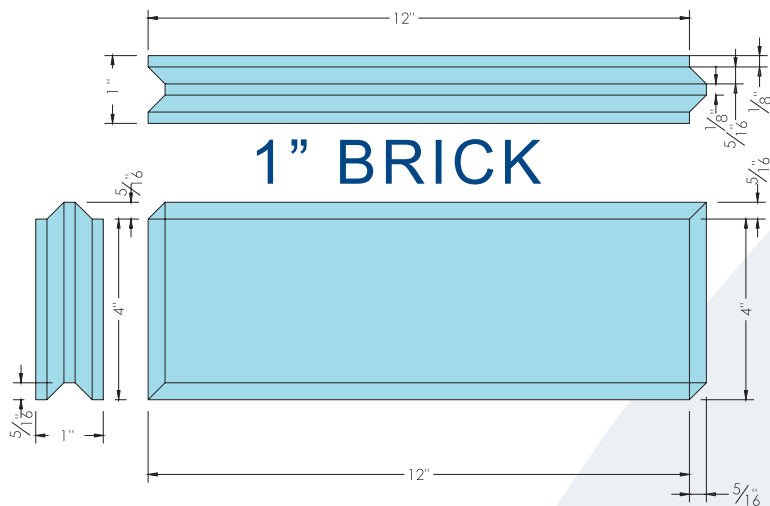
Bricks are available in $\frac{3}{4}$ ", 1", $1\frac{1}{2}$ " and 2" thicknesses. Each brick features a tongue and groove design that eliminates streaming at the joints.



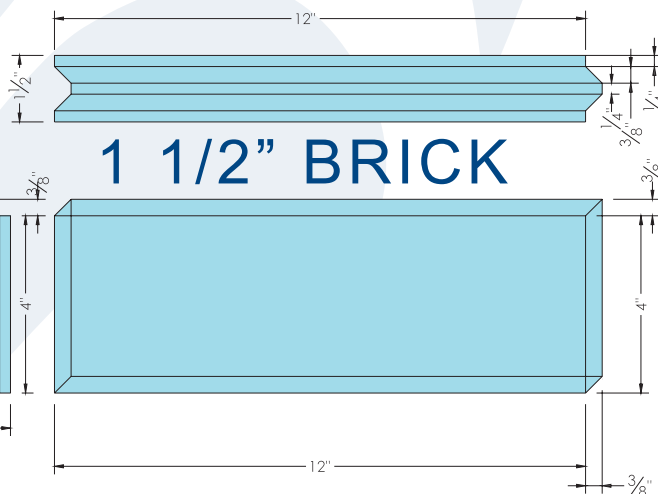
3/4" BRICK

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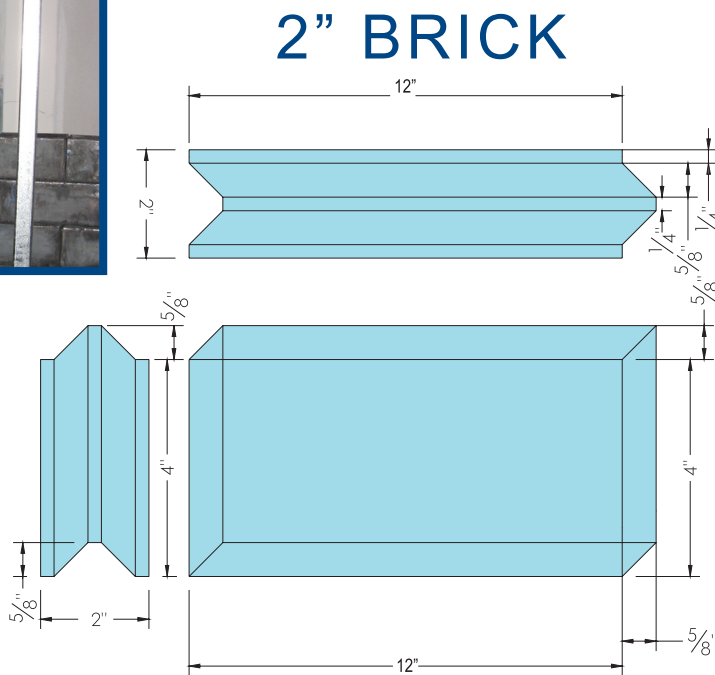
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1" BRICK



1 1/2" BRICK



2" BRICK



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PET / CT SHIELDING

EL DORADO manufactures and installs comprehensive PET and PET/ CT shielding systems consisting of plywood panels laminated with lead sheets of varying thicknesses or interlocking lead brick systems, based on physical requirements.

We offer custom plywood panels for lead thicknesses ranging from 3/16" to less than 3/4" and interlocking lead brick in 3/4", 1", 1 1/2", and 2" thickness. We also incorporate shielding glass that is specifically manufactured for PET facilities and manufacture both wood and steel doors with heavy lead shielding.

Depending on the owner's needs, **EL DORADO** can simply provide materials or turn-key services including design, construction, and installation. Our professional team will ensure that every installation is completed on time and follows rigorous adherence to safety specifications and regulatory mandates.

All quality controlled materials are manufactured in our plant. We offer competitively priced, quality controlled products that are manufactured in house and shipped directly to project site. Our experienced union and non-union installation teams work throughout North America and **EL DORADO's** design personnel have extensive PET experience. In addition, **EL DORADO** utilizes a comprehensive safety and environmental program in working with all lead products.



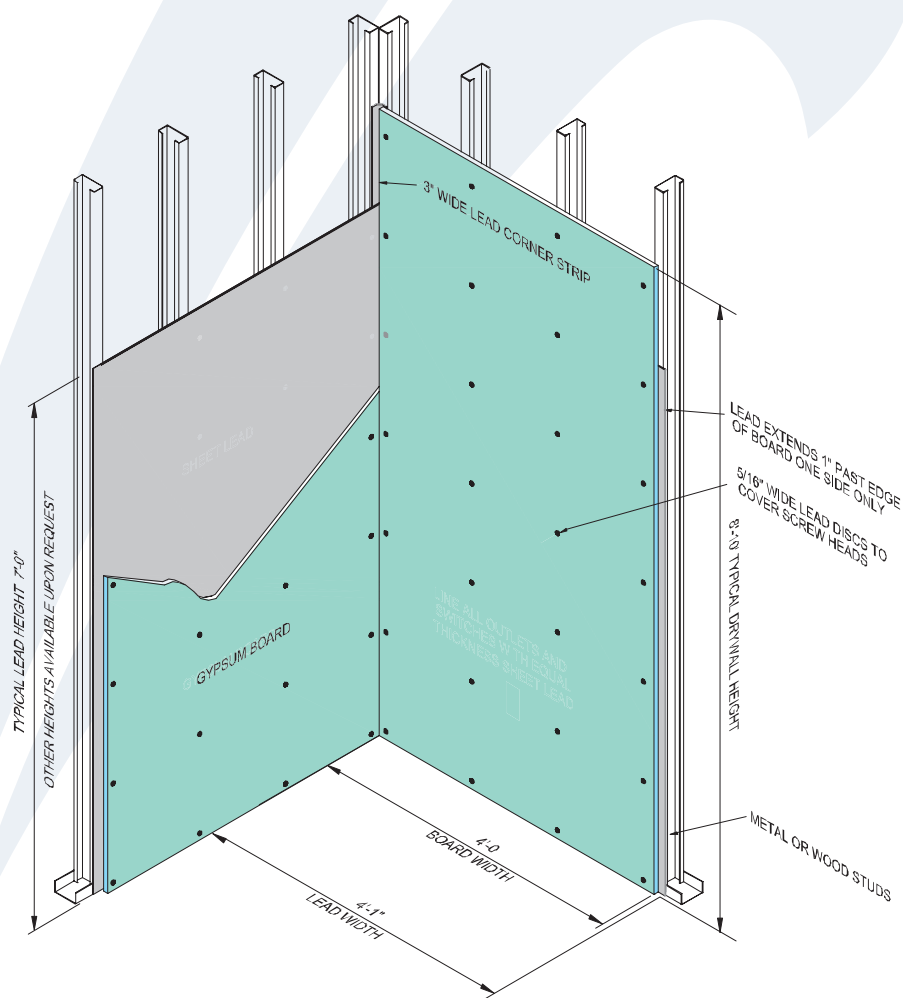
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LEAD LINED SHEETROCK

EL DORADO lead back gypsum wallboard is furnished as 1/2" or 5/8" type X fire code gypsum board meeting classification ASTM C 36, with pure lead sheet meeting federal specification QQ-L-201-F, Grade C, factory laminated to the back side of the gypsum panel. The lead extends 1" beyond one vertical edge of the gypsum board to allow for overlapping of joints eliminating the need for separate lead joint strips. 2" strips in lieu of the 49" lead width are available.

Shielding accessories for installation include sheet lead for backing and shielding of cut-outs for electrical, plumbing, medical gas, or other penetrations as well as corners with lead discs for screw penetrations. Lead discs may not be required as per NCRP 147.



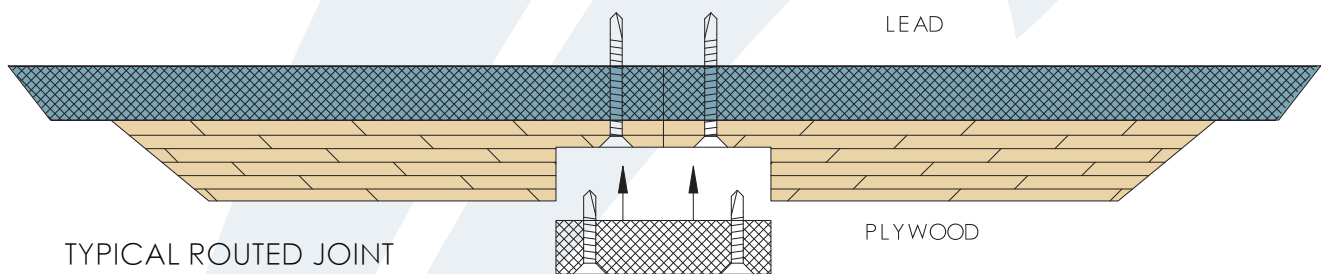
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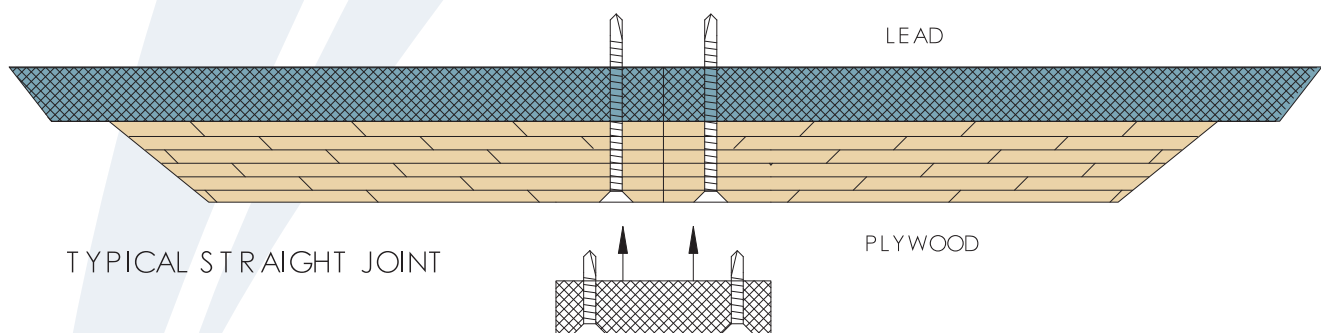
LEAD LINED PLYWOOD

EL DORADO offers lead lined plywood paneling for lead lining walls, ceilings and floors. Like EL DORADO's lead lined sheetrock, lead lined plywood is mastic bonded under heavy pressure to a single un-pierced piece of lead and comes complete with one seam strip.

Lead lined plywood is generally used where a lead thickness in excess of 3/4" but less than 5/8" is required. Panels can be fabricated in any width $\leq 48"$ and lengths $\leq 96"$. Sizes should be based on stud spacing and panel weights. Each panel should be sized to fully sustain its own weight without requiring intermediate fastening between joints. Plywood can be fire rated and is available in any grade and thickness. We offer full design and installation services for any lead plywood systems including PET.



For lead thickness less than or equal to 3/8"



For lead thickness greater than 3/8"

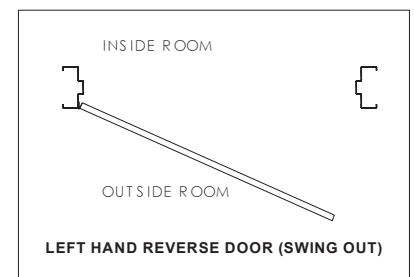
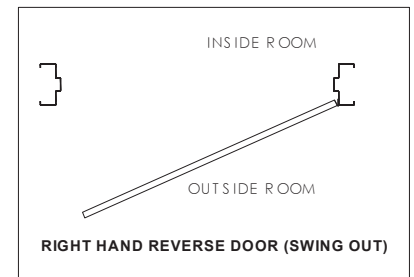
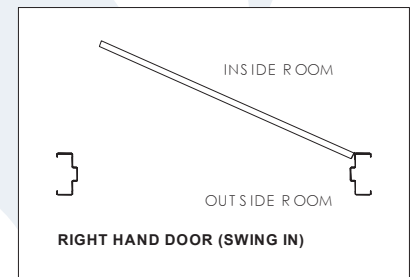
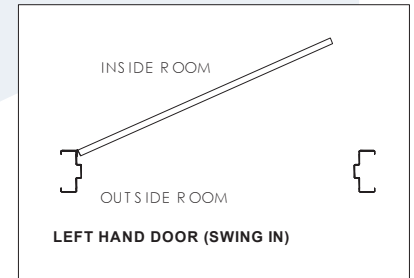
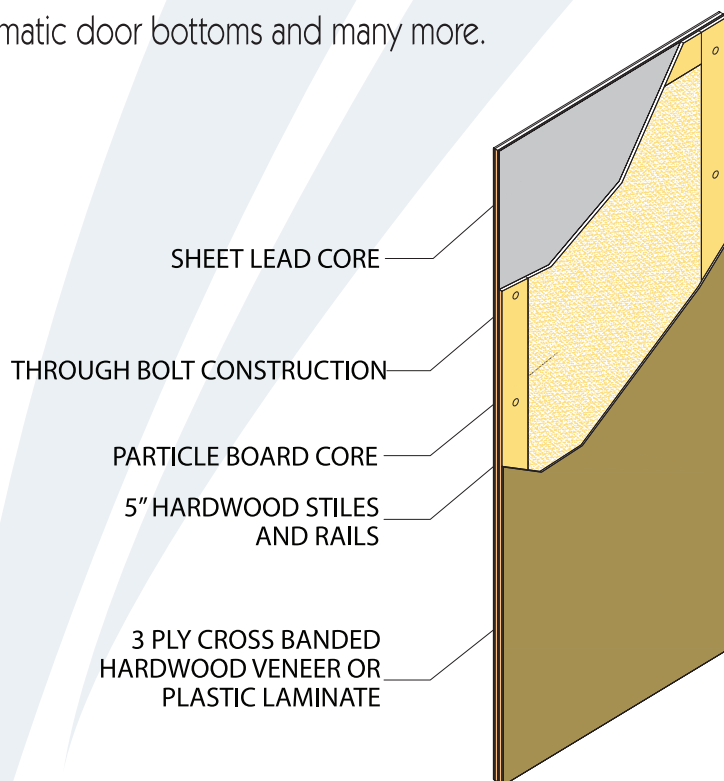
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LEAD LINED SOLID CORE DOORS

EL DORADO lead core doors are manufactured to order, with lead thickness from 1/32" to 1/2". A continuous lead sheet is placed in the center of a divided wood core and securely fastened with lead covered bolts. Our doors are available with a variety of wood veneers including Red Oak, White Oak, Birch, and Maple. Many other veneers are available upon request. Plastic laminates with optional edge strips are also available. Edge strips are available for wood venues and are standard on plastic laminates.

Our standard undercut is 1/8" on each side of the door, 1/8" at the top of the doors and 1/2" at the bottom of the door. We machine door slabs for almost any hardware as long as it is compatible with the lead core. This includes cylindrical and mortised locksets, butt hinges, pivot hinges, flush bolts, automatic door bottoms and many more.

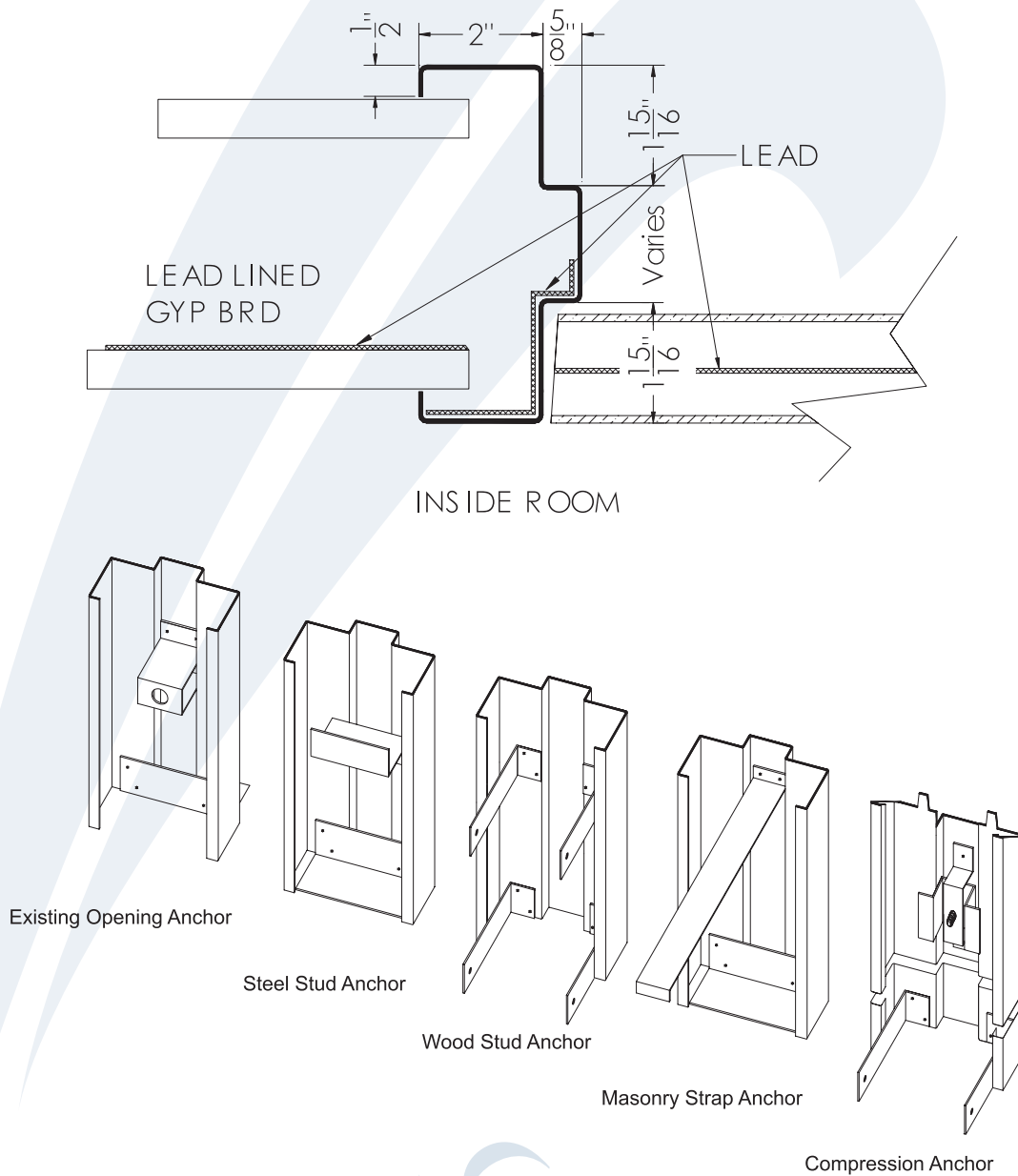


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LEAD LINED HM DOOR FRAMES

EL DORADO lead lined frames are manufactured from cold rolled 16-ga steel. 14-ga and 12-ga are available upon request. We offer either fully welded frames or knock-down frames although knock-down frames are not recommended for use with pivot hinges. Frames shall be suitably reinforced for closers, brackets and all other surface applied hardware. Drilling and tapping of surface hardware to be done in the field by the installer. Frames are painted with a coat of rust inhibiting primer paint.



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X-RAY PROTECTIVE GLASS PROPERTIES

Minimum Lead Equiv in mm at stated X-Ray Potential

Thickness Range (mm)	100 kV	110 kV	150 kV	200 kV	250 kV	300 kV
7.0–8.5	2.3	2.3	2.1	1.8	1.8	1.8
8.5–10.0	2.8	2.8	2.5	2.2	2.2	2.2
11.0–13.0	3.6	3.6	3.3	2.8	2.7	2.8

Optical Properties

Refractive Index	Nd	1,757
Abbe Value	vd	29.7
Transmittance in % for 5mm path	315 nm	Nil
Transmittance in % for 5mm path	350 nm	0.05

Mechanical / Electrical Properties

Density (minimum)	G/cm ³	4.8
Knoop Hardness	Kg/mm ²	440
Youngs Modulus	N/mm ² x 10 ³	62.7
Poissons Ratio		0.23
Brewster Coefficient		0.88
Dielectric Constant		11.0

Heavy Metal Content

Lead (pb)	48%
Barium (Ba)	15%

Thermal Properties

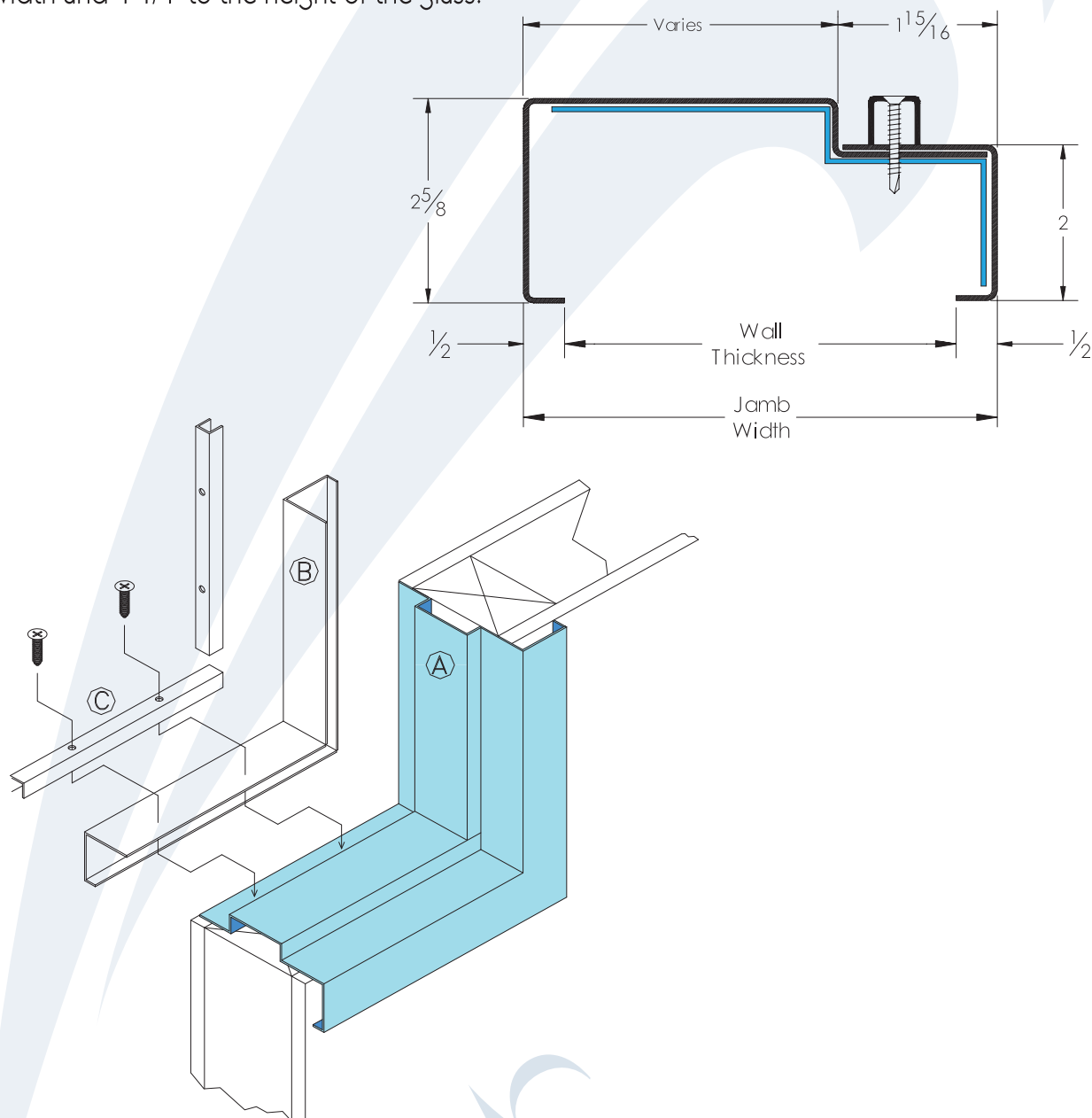
Exp. Coefficient (20—300°C)	x10 ⁻⁷ /°C	81.8
Annealing Temperature	10 ¹³ Poise	558
Softening Temperature	10 ^{7.6} Poise	685

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LEAD LINED 2-PIECE SLIP FRAME

With **EL DORADO** two-piece slip frames, any existing rough opening can be wrapped with a lead lined welded window frame that is very close in appearance to a borrowed light frame. Frames are made standard with a single rabbet (double rabbet shown in isometric drawing) and removable stop and, unlike typical telescoping view frames, are available with mullions. Frames are ordered from **EL DORADO** using actual glass size. To calculate the rough opening necessary from the actual glass size, add 1 3/4" to the width and 3/4" to the height of the glass. To calculate the overall frame dimensions from the actual glass size, add 4 1/4" to the width and 4 1/4" to the height of the glass.



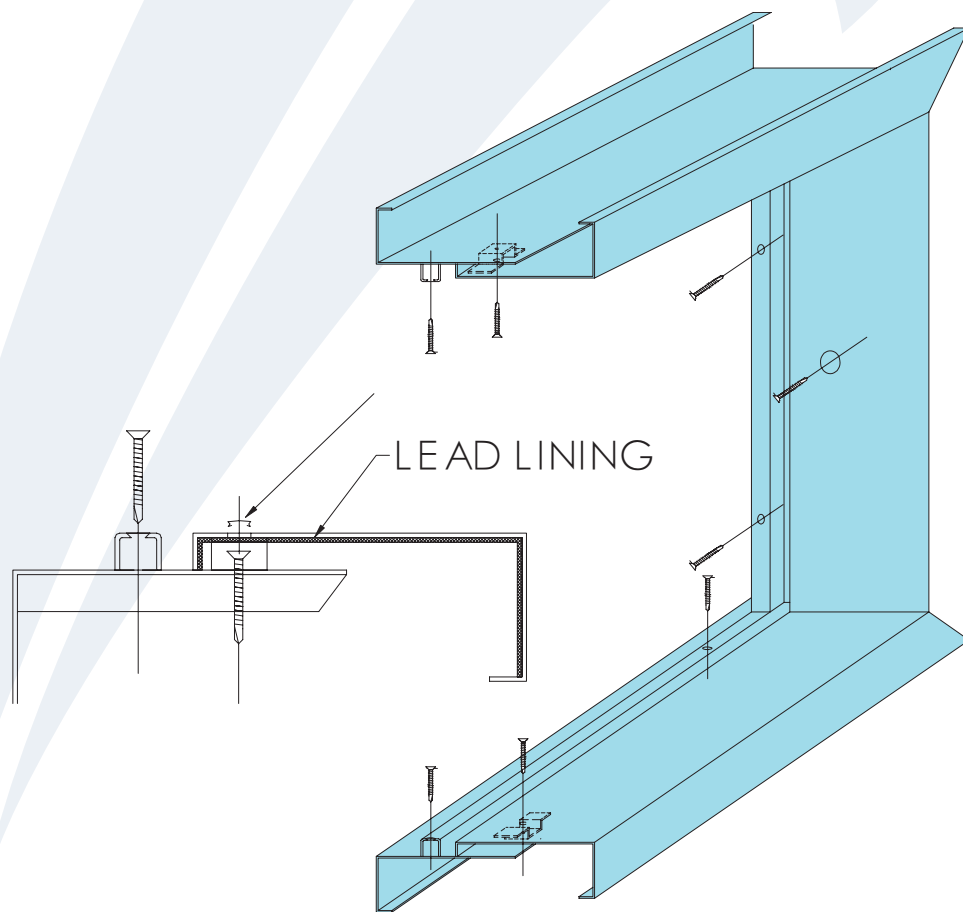
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LEAD LINED TELESCOPIC FRAMES

Quick delivery and installation are possible, with smaller control windows, with **EL DORADO**'s stock of standard sized telescopic view frames. Telescoping control window frames are supplied fully lead lined with an integral all purpose telescoping section to accommodate all types of wall construction. Frames are designed to fit walls ranging from 4 inches to 6 1/4 inches thick. The standard 2 inch face x 1/2 inch deep face return is aesthetically pleasing and is constructed of 16 gauge steel with corners fully welded and ground smooth.

Frames are ordered from **EL DORADO** using actual glass size. To calculate the rough opening necessary from the actual glass size, add 1 1/2" to the width and 1 1/2" to the height of the glass. To calculate the overall frame dimensions from the actual glass size, add 4 1/4" to the width and 4 1/4" to the height of the glass.



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