ANSWERS. SOLUTIONS. RESULTS. CORRE

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STRUCTURAL CALCULATIONS

Anchorage of Dental Equipment to Interior Wall:

Oak Board over Wood Studs

Prepared for: Henry Schein Dental

Digitally signed by Eric Price,PE
Reason: I attest to the accuracy and integrity of this document
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Date: 2022.02.10 10:36:56-06'00'

February 10, 2022

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SUMMARY OF RESULTS

- Use (8) 3/8” diameter x 4” long lag screws (2 lags/stud) to anchor the 2x10 oak board to the wall.
- To adequately secure the KAVO Orthopantomograph OP 3D unit to wall, use (2) 3/8” diameter x 1-1/2” long lag screws anchored into the oak board.
- To adequately secure the Planmeca Viso unit to wall/backing, use (4) 3/8” diameter x 1-1/2” long lag screws anchored into the oak board.
- Refer to attached Backing Installation Detail for additional information.

LAG SCREW ANALYSIS

Client: Henry Schein Dental
Project Description: Anchorage of Oak Board to Wall Studs
Designed By: ETP
Date: 2/4/2022

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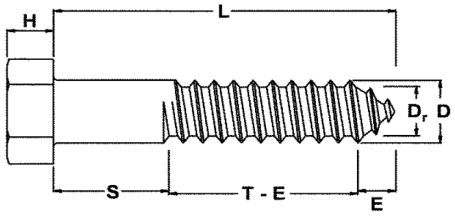
LAG SCREW WITHDRAWAL ANALYSIS

Analyzed in Accordance with the 2018 NDS Design Specifications (ASD & LRFD)

LOADING INFORMATION:

Withdrawal Load (ASD), P =		1,400	lbs.	*per Viso manual (p18)*
Factored Withdrawal Load (LRFD), P =	= 1,400 x 1.4	1,960	lbs.	*Factored as noted*
Load Duration Factor, C_D (ASD) =	*Dead Load*	0.90		*Table 2.3.2*
Time Effect Factor, λ (LRFD) =	*1.4D*	0.60		*Appendix N; N.3.3*

LAG SCREW INFORMATION:



Lag Screw Diameter, D =	3/8"		
Selected Length, L =	4"		
Root Diameter, D_r =	0.265	in.	*Appendix A; Table L2*
Overall Thread Length, T =	2.500	in.	*Appendix A; Table L2*
Unthreaded Length, S =	1.500	in.	*Appendix A; Table L2*
Tapered Tip Length, E =	0.219	in.	*Appendix A; Table L2*
Maximum Effective Thread Length = L - S - E =	2.281	in.	
Standard Washer Thickness =	0.083	in.	*override*
No. of Lag Screws Provided =	8		

MEMBER GEOMETRY:

Side Member/Sheathing Thickness =		2.500	in.	*thickness of bracket + board + drywall*
Actual Thread Length Embedment Into Member, p_t =		1.198	in.	*Thread length into stud*
Specific Gravity of Member, G =	*Average SG for studs*	0.42		*Table 12.3.3A*

ANALYSIS:

Unadjusted Withdrawal Value, $W = 1800\ G^{3/2}\ D^{3/4}$ = 235 lbs/in. *(12.2-1)*

Adjusted Withdrawal Values:

For ASD: W' = W C_D =	211	lbs/in.
For LRFD: W' = W 3.32 0.65 λ =	304	lbs/in.

No. Lag Screws Req'd:

		Check:
ASD = $P_{ASD}/(p_t \times W'_{ASD})$ =	5.5 lags	OK
LRFD = $P_{LRFD}/(p_t \times W'_{LRFD})$ =	5.4 lags	OK

RESULTS:

Use (8) 3/8" dia. x 4" lag screws (anchored into studs) to properly secure the 2x10 Oak board to wall.

Client: Henry Schein Dental
Project Description: Bracket Anchorage to Oak Board (OP 3D unit)
Designed By: ETP
Date: 2/7/2022

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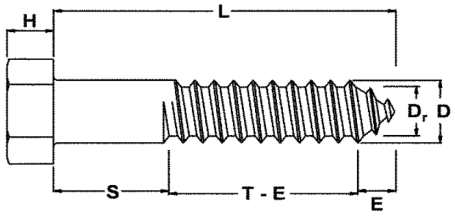
LAG SCREW WITHDRAWAL ANALYSIS

Analyzed in Accordance with the 2018 NDS Design Specifications (ASD & LRFD)

LOADING INFORMATION:

Withdrawal Load (ASD), P =		340	lbs.	*per OP 3D manual (p8)*
Factored Withdrawal Load (LRFD), P =	= 340 x 1.4	476	lbs.	*Factored as noted*
Load Duration Factor, C_D (ASD) =	*Dead Load*	0.90		*Table 2.3.2*
Time Effect Factor, λ (LRFD) =	*1.4D*	0.60		*Appendix N; N.3.3*

LAG SCREW INFORMATION:



Lag Screw Diameter, D =	3/8"		
Selected Length, L =	1-1/2"		
Root Diameter, D_r =	0.265	in.	*Appendix A; Table L2*
Overall Thread Length, T =	1.250	in.	*Appendix A; Table L2*
Unthreaded Length, S =	0.250	in.	*Appendix A; Table L2*
Tapered Tip Length, E =	0.219	in.	*Appendix A; Table L2*
Maximum Effective Thread Length = L - S - E =	1.031	in.	
Standard Washer Thickness =	0.083	in.	*override*
No. of Lag Screws Provided =	2		

MEMBER GEOMETRY:

Side Member/Sheathing Thickness =		0.250	in.	*thickness of bracket*
Actual Thread Length Embedment Into Member, p_t =		0.948	in.	*Embedment into oak board*
Specific Gravity of Member, G =	*Average SG for Oak*	0.67		*Table 12.3.3A*

ANALYSIS:

Unadjusted Withdrawal Value, $W = 1800\ G^{3/2}\ D^{3/4}$ = 473 lbs/in. *(12.2-1)*

Adjusted Withdrawal Values:

For ASD: W' = W C_D =	426	lbs/in.
For LRFD: W' = W 3.32 0.65 λ =	613	lbs/in.

No. Lag Screws Req'd:

		Check:
ASD = $P_{ASD}/(p_t \times W'_{ASD})$ =	0.8 lags	OK
LRFD = $P_{LRFD}/(p_t \times W'_{LRFD})$ =	0.8 lags	OK

RESULTS:

Use (2) 3/8" dia. x 1-1/2" lag screws to properly secure the OP 3D bracket to oak board.

Client: Henry Schein Dental
Project Description: Bracket Anchorage to Oak Board (Viso unit)
Designed By: ETP
Date: 2/7/2022

CORRE ANSWERS. SOLUTIONS. RESULTS.

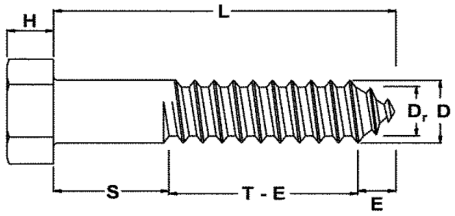
LAG SCREW WITHDRAWAL ANALYSIS

Analyzed in Accordance with the 2018 NDS Design Specifications (ASD & LRFD)

LOADING INFORMATION:

Withdrawal Load (ASD), P =		1,400	lbs.	*per Viso manual (p18)*
Factored Withdrawal Load (LRFD), P =	= 1,400 x 1.4	1,960	lbs.	*Factored as noted*
Load Duration Factor, C_D (ASD) =	*Dead Load*	0.90		*Table 2.3.2*
Time Effect Factor, λ (LRFD) =	*1.4D*	0.60		*Appendix N; N.3.3*

LAG SCREW INFORMATION:



Lag Screw Diameter, D =	3/8"		
Selected Length, L =	1-1/2"		
Root Diameter, D_r =	0.265	in.	*Appendix A; Table L2*
Overall Thread Length, T =	1.250	in.	*Appendix A; Table L2*
Unthreaded Length, S =	0.250	in.	*Appendix A; Table L2*
Tapered Tip Length, E =	0.219	in.	*Appendix A; Table L2*
Maximum Effective Thread Length = L - S - E =	1.031	in.	
Standard Washer Thickness =	0.083	in.	*override*
No. of Lag Screws Provided =	4		

MEMBER GEOMETRY:

Side Member/Sheathing Thickness =		0.250	in.	*thickness of bracket*
Actual Thread Length Embedment Into Member, p_t =		0.948	in.	*Embedment into oak board*
Specific Gravity of Member, G =	*Average SG for Oak*	0.67		*Table 12.3.3A*

ANALYSIS:

Unadjusted Withdrawal Value, $W = 1800\ G^{3/2}\ D^{3/4}$ = 473 lbs/in. *(12.2-1)*

Adjusted Withdrawal Values:

For ASD: $W' = W\ C_D$ =	426	lbs/in.
For LRFD: W' = W 3.32 0.65 λ =	613	lbs/in.

No. Lag Screws Req'd:			Check:
ASD = $P_{ASD}/(p_t \times W'_{ASD})$ =	3.5	lags	OK
LRFD = $P_{LRFD}/(p_t \times W'_{LRFD})$ =	3.4	lags	OK

RESULTS:

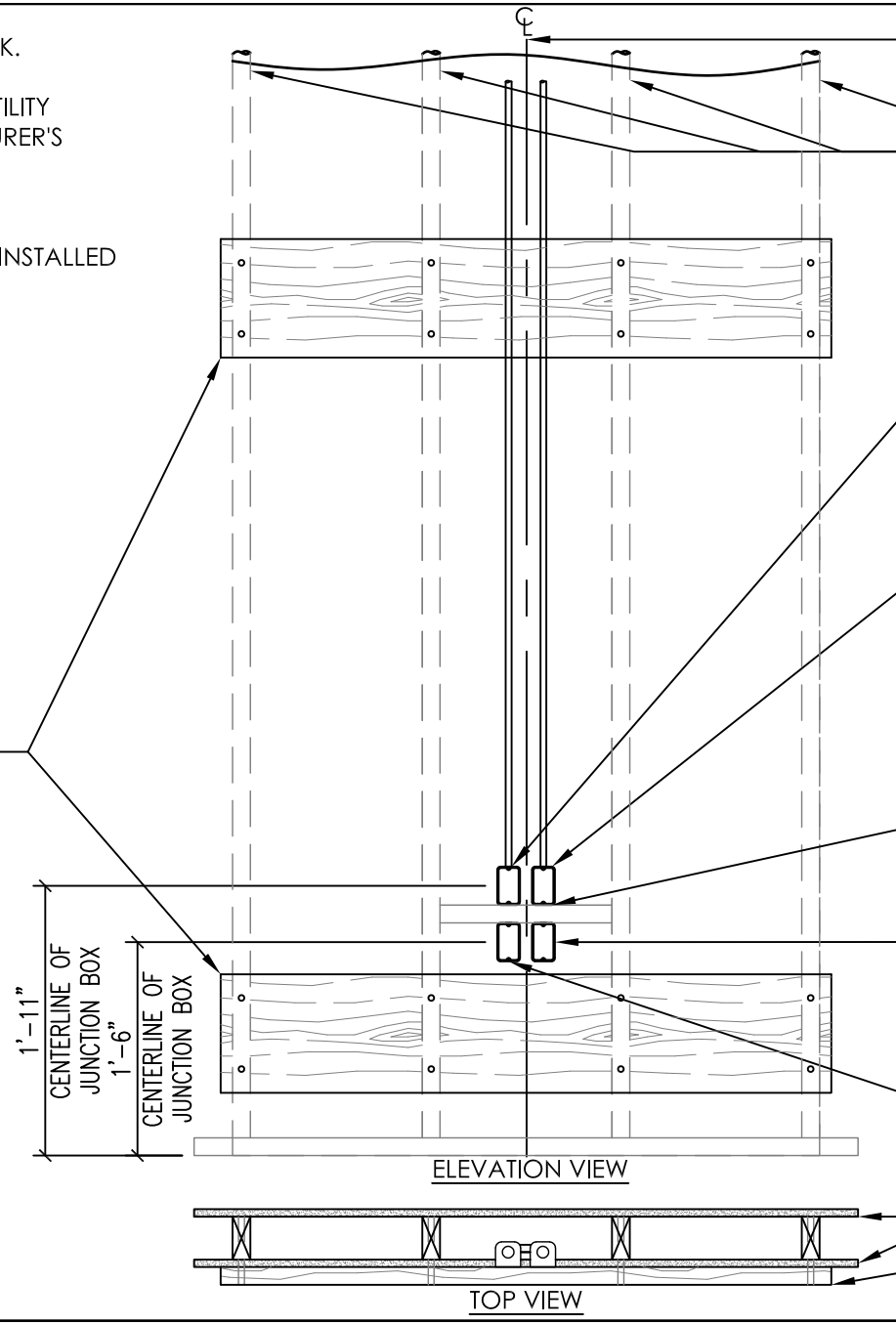
Use (4) 3/8" dia. x 1-1/2" lag screws to properly secure the Viso bracket to oak board.

INSTALLATION DETAIL

FOLLOW LOCAL CODES FOR ALL WORK.

DETAIL PROVIDED FOR BLOCKING & UTILITY REQUIREMENTS. REFER TO MANUFACTURER'S INSTALLATION GUIDE FOR ADDITIONAL INFORMATION.

MOUNTING MATERIALS SUPPLIED AND INSTALLED BY CONTRACTOR.



CENTERLINE OF X-RAY COLUMN. SEE SHEET SA.1 FOR LOCATION.

PROPERLY SECURE FRAMING (2X4 WOOD STUDS - FIRE TREATED WHERE REQUIRED) TO STRUCTURE ABOVE FOLLOWING LOCAL CODES

SINGLE-GANG JUNCTION BOX AND 1" CONDUIT TO ABOVE CEILING (OR PER CODE) WITH PULL-STRING BY ELECTRICIAN TO 9B LOCATION. SEE SHEET SE.1.

2X10 OAK BOARD ON FRONT FACE OF WALL, MOUNT DIRECTLY TO STUDS WITH (2) 3/8" DIA. X 4" LAG SCREWS PER STUD - 8 SCREWS TOTAL PER BOARD. EXTEND BOARD 1" BEYOND OUTERMOST STUDS. CONFIRM HEIGHT PER MANUFACTURER SPECIFICATIONS.

SINGLE-GANG JUNCTION BOX AND 1" CONDUIT TO ABOVE CEILING (OR PER CODE) BY ELECTRICIAN FOR CONNECTION TO DEDICATED COMPUTER OR SERVER. DATA CABLING & RJ45 OUTLET BY OWNER'S I.T. COMPANY.

CONFIRM HEIGHTS WILL NOT CONFLICT WITH X-RAY BRACKET HEIGHTS. SEE HENRY SCHEIN REP.

SINGLE-GANG JUNCTION BOX W/ 230V SIMPLEX OUTLET ON DEDICATED 25A CIRCUIT BY ELECTRICIAN (VERIFY WITH HENRY SCHEIN EQUIPMENT REP).

SINGLE-GANG JUNCTION BOX W/ 115V SIMPLEX OUTLET ON DEDICATED 20A CIRCUIT BY ELECTRICIAN.

5/8" GYP. BRD. AT FINISH

2 X 10 OAK BOARD ON FRONT FACE OF WALL

WISCONSIN
ERIC T. PRICE
E-39027
MADISON
WI
PROFESSIONAL ENGINEER

February 10, 2022

9C PANORAMIC X-RAY - WOOD STUD RETROFIT

NOT TO SCALE

SUPPORTING DOCUMENTATION

- Ensure the proper tightness and attachment of all of the screws and bolts when installing the device.
- All device covers must be properly installed before handing the device to the user.
- Ensure the electrical safety of the device by inspecting the proper grounding of user touchable metallic parts before handing the dev

1500 newtons (N) = 337.2 lbs

2.5.2 Device installation requirements

2.5.2.1 Installation location requirements

WARNING! *Ensure that each of the wall mount fixing screws and the wall can withstand pull-out force of at least 1500 N.*

- The place where the device is to be installed and the position from where the user takes images must be correctly shielded from the radiation that is generated when the device is operated. Follow the local radiation and safety requirements.
- The device must be fixed to the wall and the floor.

  NOTICE! *If the device cannot be fixed to the floor, install the device to an exhibition stand. See chapter Exhibition stand installation on page 108 for instructions.*

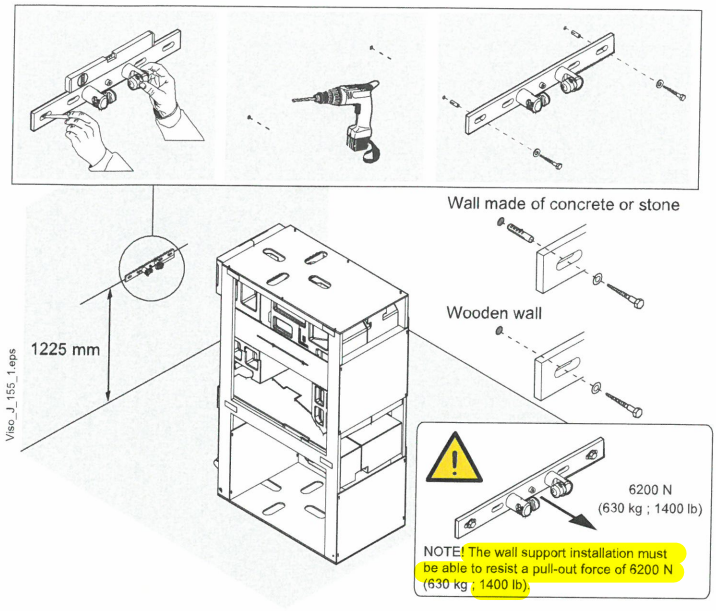
- The wall material should be suitable for fixing the device. If the wall is made of a weak material, you may have to use a reinforcing plate on the rear side of the wall to hold the fixing hardware.
- Make sure that the floor, where the device is to be installed, can support its weight. To avoid the device from tipping over, fix the device with floor bolts appropriate to the floor material. The floor bolts and the floor material must withstand pull-out force of at least 1500 N.
- The device must be installed on a hard floor surface. All soft and elastic material, such as a carpet, must be removed from under the column floor plate.
- Do not install the device in environments where corrosive or explosive vapours or flammable anaesthics are present.
- Special steps regarding EMC need to be taken when installing the device. For more information, refer to the chapter *Electromagnetic Compatibility (EMC) tables* on page 149.
- The device is supplied with a 3 m (10 ft) long power cord. Ensure that the connected power cord and Ethernet cables are long enough, as they need to move along with the device's up/down movements.

  NOTICE! *It's recommended to route the power feed and Ethernet connection to behind the device to ensure unobstructed movement of the cables.*

- It's recommended to use a max. 30 A circuit breaker with the device.
- Maximum allowed mains line impedance is 0.2 Ω.
- For permanent installation, a separate lockable mains switch (not supplied) is required to be installed to the mains feed.
- Recommended mains over-current releases:

  100-120 V: 16 A

  220-240 V: 10 A



1.b. Drill the holes to the wall.

Note the following requirements.

- If the wall is made of concrete or brick, use the M10x70 DIN 571 screws and the 14x70 expansion anchors to secure the wall bracket in position. Drill securing holes ø14 mm (0.55 in.), 85 mm (3.3 in.) in depth, and insert the expansion anchors into the holes.
- If the wall is made of wood, use the M10x70 DIN 571 screws. Do not use expansion anchors with wooden wall. Drill securing holes ø7 mm (0.3 in.), 70-75 mm (2.75-3 in.) in depth, for the mounting screws.

NOTE

Use four mounting screws (instead of two) if you use smaller anchors and/or screws than recommended.

CAUTION

The wall support installation must be able to resist a pull-out force of 6200 N (630 kg; 1400 lb).

1.c. Attach the wall support and tighten the screws firmly.