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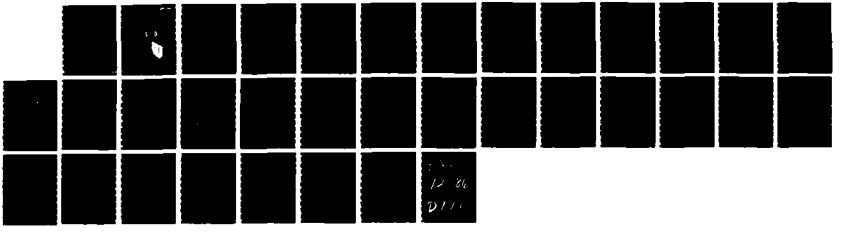

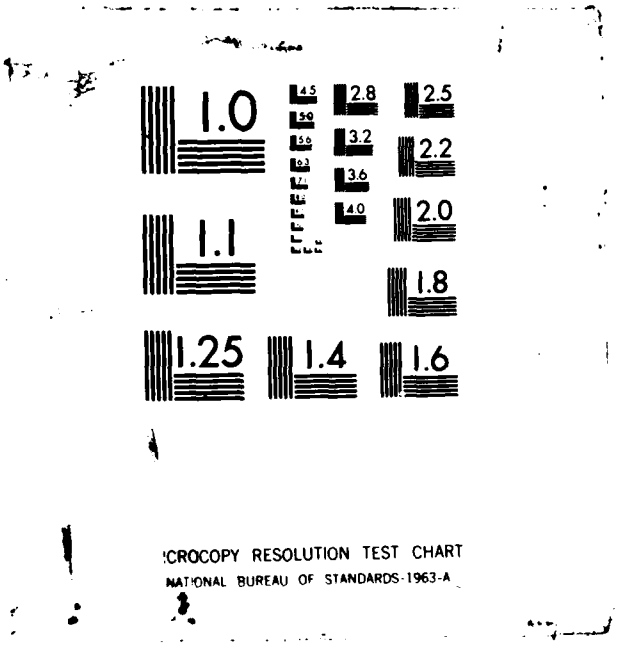
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US Army Corps
of Engineers
Construction Engineering
Research Laboratory

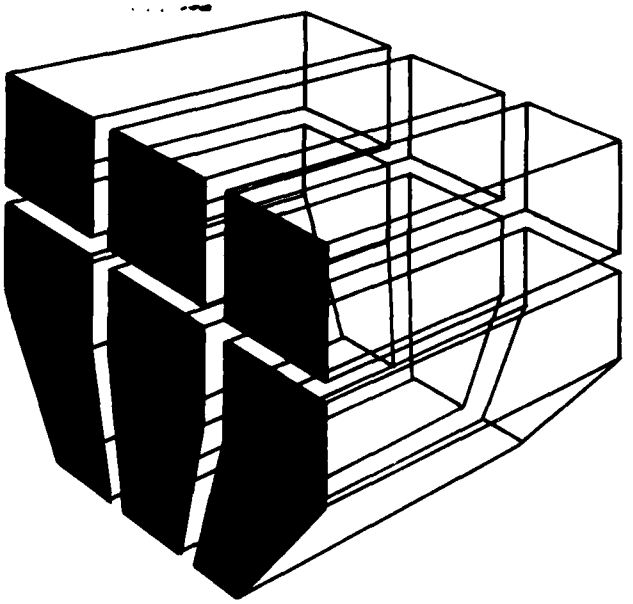
USA-CERL

SPECIAL REPORT M-86/22
September 1986

Modifications to Army Facilities Components System Drawings to Reflect Use of Metric-Sized Lumber

by
Anthony M. Kao
S. R. McBurney

This report describes how the Army Facilities Components System (AFCS) drawings could be modified to use metric-sized lumber. All the drawings from AFCS-Designs (TM 5-302-1 to -5) were reviewed to identify possible problems. Several problems were identified and recommended construction notes were presented.



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This report describes how the Army Facilities Components System (AFCS) drawings could be modified to use metric-sized lumber. All the drawings from AFCS-Designs (Technical Manual [TM] 5-302-1 to -5) were reviewed to identify possible problems. Several problems were identified and recommended construction notes were presented.

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FOREWORD

This investigation was performed for the Office of the Assistant Chief of Engineers (OACE), under OMA FAD 2-000079, dated 15 October 1984. The OACE Technical Monitor was Michael Shama, DAEN-ZCM.

This investigation was performed by the Engineering and Materials Division (EM), U.S. Army Construction Engineering Research Laboratory (USA-CERL). USA-CERL personnel directly involved in the study were Mr. S. R. McBurney, Mr. J. Wilcoski and Dr. A. M. Kao.

Dr. R. F. Quattrone is Chief of EM. COL Norman C. Hintz is Commander and Director of USA-CERL, and Dr. L. R. Shaffer is Technical Director.

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MODIFICATIONS TO ARMY FACILITIES COMPONENTS SYSTEM DRAWINGS TO REFLECT USE OF METRIC-SIZED LUMBER

1 INTRODUCTION

Background

The Army Facilities Components System (AFCS) program was established to provide detailed sets of plans, specifications and drawings for all types of structures to be used in Theater of Operations (TO) environments. The information is presented in English measurements. However, since TO structures can be constructed using local materials, such as those found in Germany and Japan, the impact of local metric-sized lumber is of concern.

Objectives

The objectives of the study were to identify problems that would be encountered in using metric-sized lumber to construct AFCS wood structures in the TO and to develop construction notes that could be incorporated in the AFCS drawings and specifications found in Army Technical Manual (TM) 5-302.[1]

Approach

The AFCS drawings in TM 5-302-1 through -5 were reviewed to identify problems that would occur in the use of metric-sized lumber for construction, and examples were selected to illustrate the various problems. Construction notes to be attached to the AFCS drawings were developed based on the findings.

Technology Transfer

It is recommended that the developed construction notes be incorporated into TM 5-302.

[1] Technical Manual 5-302, *Army Facilities Components System: Designs* (Department of the Army, 1973).

2 POSSIBLE PROBLEM AREAS USING METRIC-SIZED LUMBER FOR CONSTRUCTING AFCS WOOD STRUCTURES

Although lumber is used to some extent for construction throughout the world, only developed countries such as Japan and those in Europe have well-developed lumber industries. Appendix A contains a description of metric sized lumber used in Germany and Appendix B contains a table of typical lumber sizes used in Japan. German lumber sizes and AFCS Panelized Wood Building Designs (Facility No. 93112) from TM 5-302-5 are used to illustrate the problems and the construction notes to solve them. These problems are as follows:

- In most bolted connections, metric sized lumber requires longer bolts than those shown on the drawings because metric lumber is based on actual dimension, rather than nominal size. This is illustrated in Figure 1*.

- Fill is sometimes required because of the difference between actual size and nominal size for American lumber. Since metric lumber does not have this difference, the filler should be left out during construction. Figure 2 shows an example of this.

- The box beam web stiffeners will be too small if converted to metric standard sizes, causing a gap. The 3/4 in. plywood would have to be increased to 1 in. plywood to fill the gap. This is illustrated in Figure 3.

- The filler for the end wall to strut connection should be reduced from a 2 by 4 in. board to a 1 by 4 in. board so the connection assembly can fit properly. This is shown in Figure 4.

- Gaps exist between the boards on the treads and decking in the plans for the stairs and porch assembly. When metric lumber is used, these gaps are virtually eliminated. If the gaps are to be maintained, either the number of boards must be reduced or the lumber must be ripped. A typical cross-section is shown in Figure 5.

- The window wall panels and sliding door framing are 3 in. thick. Since the use of metric lumber would increase the thickness to 4 in., one of the boards on each side would have to be replaced with a 1 by 4 in. or 1 by 6 in. board in the 8 ft and 12 ft panels, respectively. Figure 6 is the cross-section of a window wall panel.

- Currently, the fill in the corner panels consists of five 2 in. pieces and one 1/2 in. piece. This must be reduced to four 2 in. pieces when metric lumber is used. Figure 7 shows a typical 12 ft section and Figure 8 shows a typical 8 ft section.

- The header over the sliding door opening is constructed with 2 by 6 in. and 2 by 12 in. boards. This assembly is 16 in. in size. The equivalent size in metric lumber would be 18 in., so 2 in. should be removed from the assembly. The 2 by 12 in. boards should be reduced to 2 by 10 in. boards. A section of the header is shown in Figure 9.

- The wall to bracing connector (Figure 10) is too large when metric lumber is used. The dimensions should be reduced by 7/8 in.

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*Figures begin on p 10.

• Two things need to be changed in the strut-to-strap connection. One of the 2 by 4 in. boards in the connector should be replaced by a 2 by 2 in. board, and one of the pieces of 5/8 in. plywood in the connection itself should be removed. Figure 11 shows the connection and the connector.

• In many connections, panels, and roof trusses, the length of lumber is to be governed by the width or thickness of lumber, as shown in the example in Figure 12. When a direct conversion of 12 in. = 305 mm is used, the lumber lengths are those given in column 2 of Table 1. The actual required lengths using metric-sized lumber are calculated and given in column 3. Shorter lengths are required for the metric-sized lumber. This discrepancy shown in column 4 of Table 1, is due to the difference in board width. For example, a standard 2 by 4 is 1-1/2 in. by 3-1/2 in., or 38.1 mm by 89.0 mm using the length conversion of 12 in. = 305 mm. The standard metric substitute for a 2 by 4, however, is actually 50 mm by 100 mm.

Appendix C contains the recommended construction notes for Drawing Numbers 93111 and 93112.

Table 1

Truss Member Length

Member	Length in American Plans (1)	Converted Length, mm (2)	Metric, Actual, mm (3)	Error, mm (4)=(2)-(3)
tea	18'-0"	5490	5490	0
teb	18'-0"	5490	5490	0
tec	8'-9 5/8"	2685	2684	1
ted	5'-8 1/2"	1741	1730	11
tee	6'-0"	1830	1805	25
tef	8'-3"	2516	2491	25
teg	3'-6 1/16"	1069	1065	4
teh	6'-4"	1932	1903	29
tej	1'-6 1/16"	459	455	4

Note: Members are the same as those used in AFCS drawing No. 93112.

3 CONCLUSIONS AND RECOMMENDATIONS

Possible problems using metric-sized lumber to construct AFCS wood buildings as shown in TM 5-302 have been identified. Most of the problems are at connections, joints, and locations where fillers are required. The problems are due primarily to actual dimensions of metric-sized lumber as opposed to nominal dimensions of English-sized lumber used in the AFCS drawings. Recommended construction notes that can be attached to each AFCS wood building system in TM 5-302 have been developed (Appendix C).

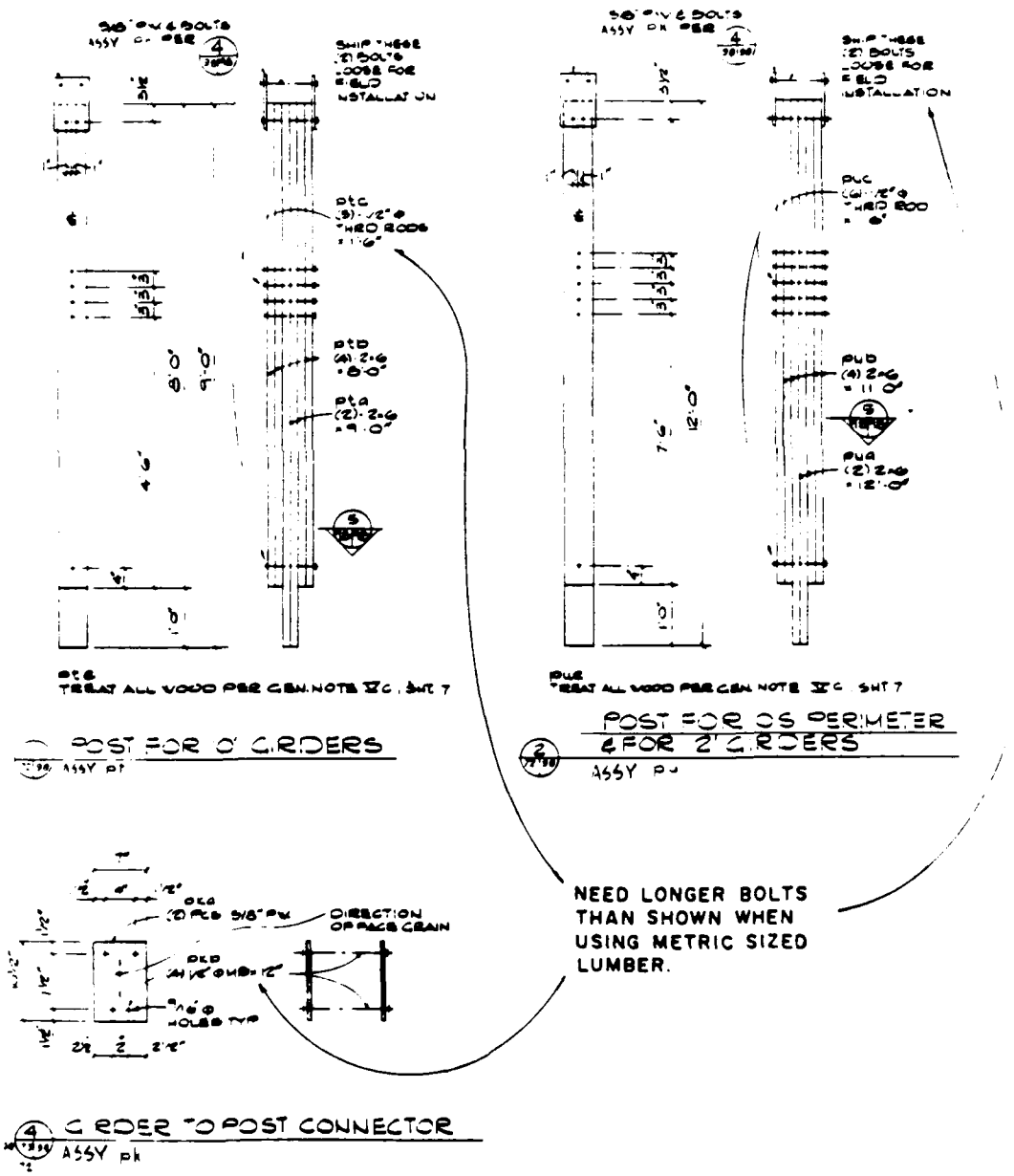
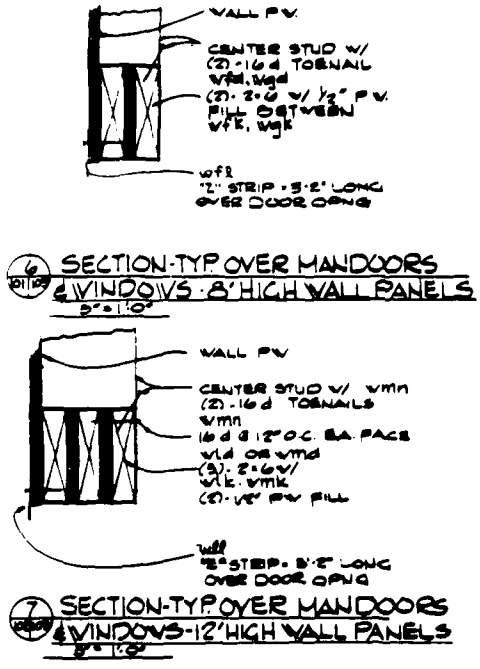


Figure 1. Short bolts.



DELETE PLYWOOD FILL WHEN USING METRIC LUMBER.

DELETE PLYWOOD FILL WHEN USING METRIC LUMBER.

Figure 2. Excess fill.

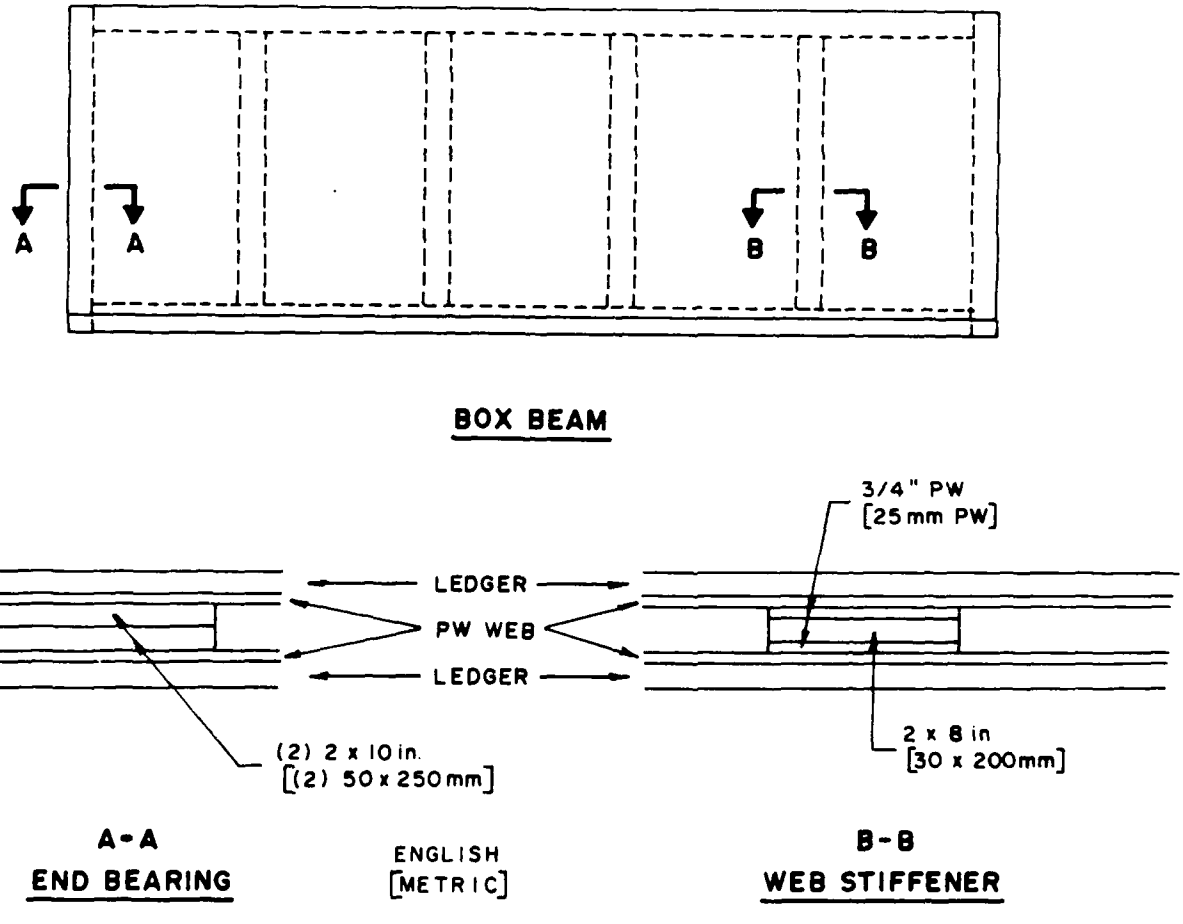
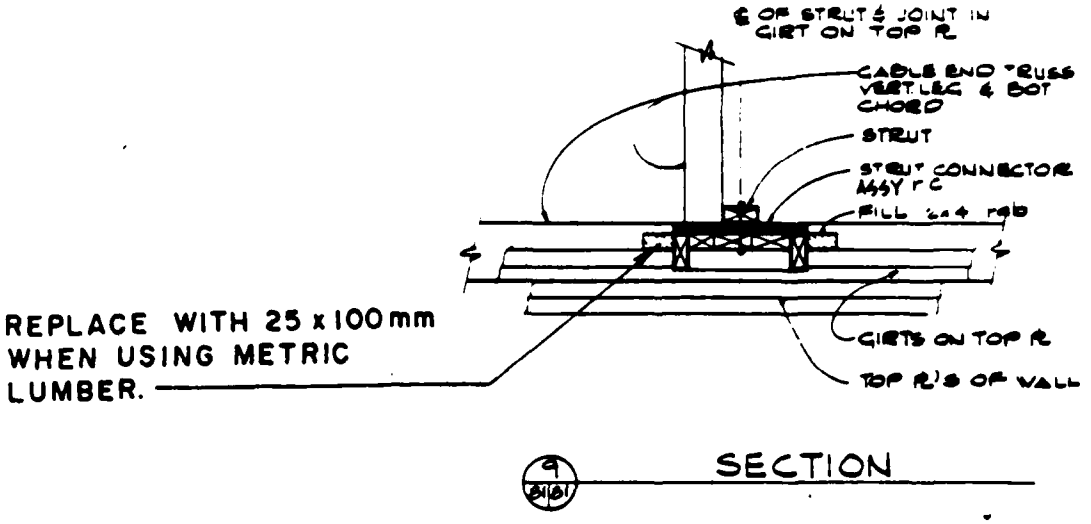


Figure 3. Insufficient fill.



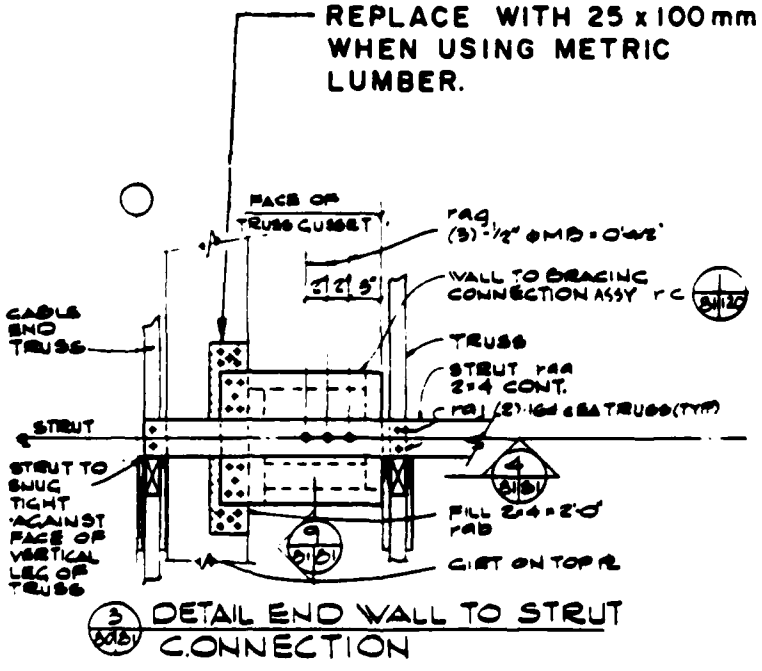
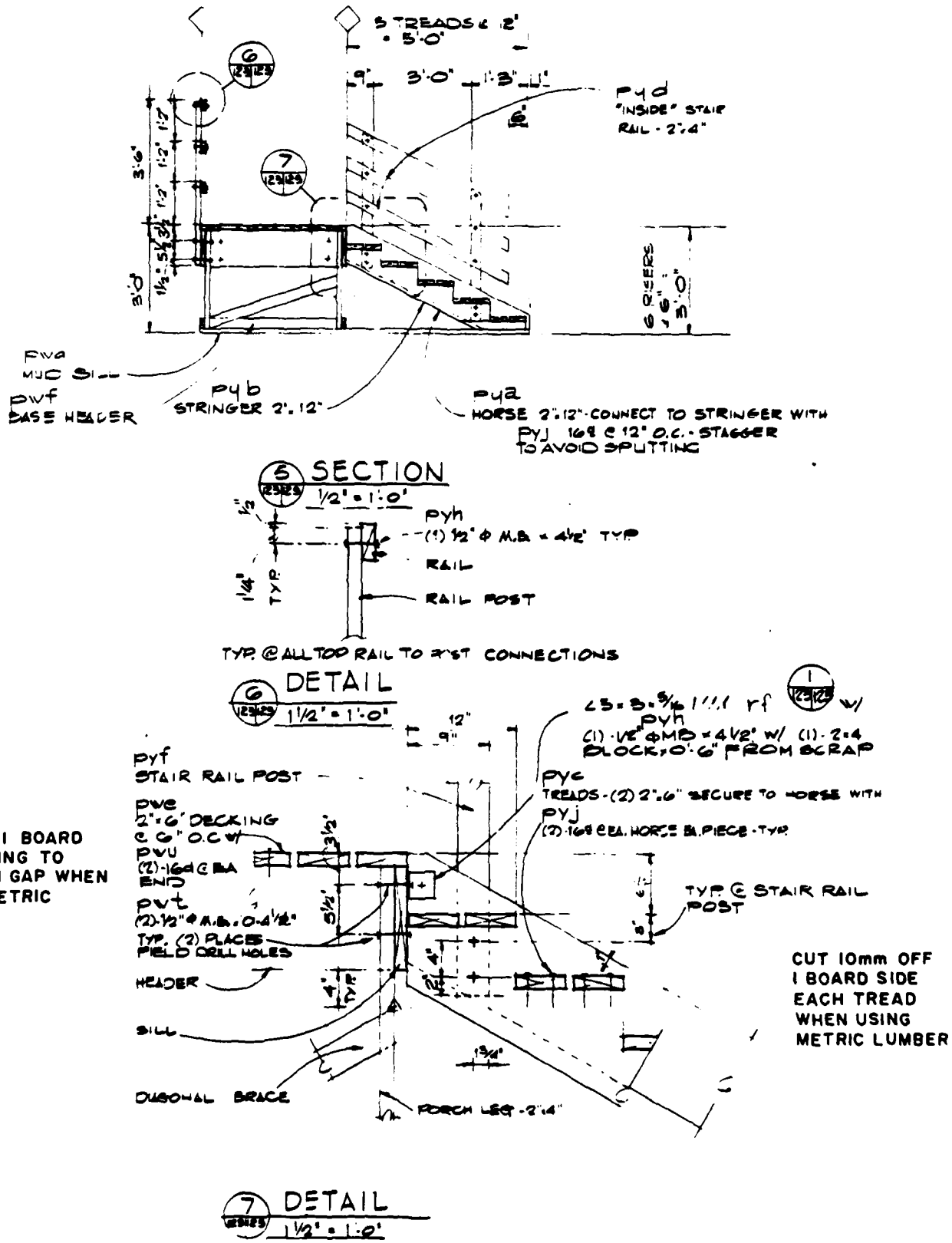


Figure 4. Fill too large.



REMOVE 1 BOARD ON DECKING TO MAINTAIN GAP WHEN USING METRIC LUMBER.

Figure 5. Stair gaps.

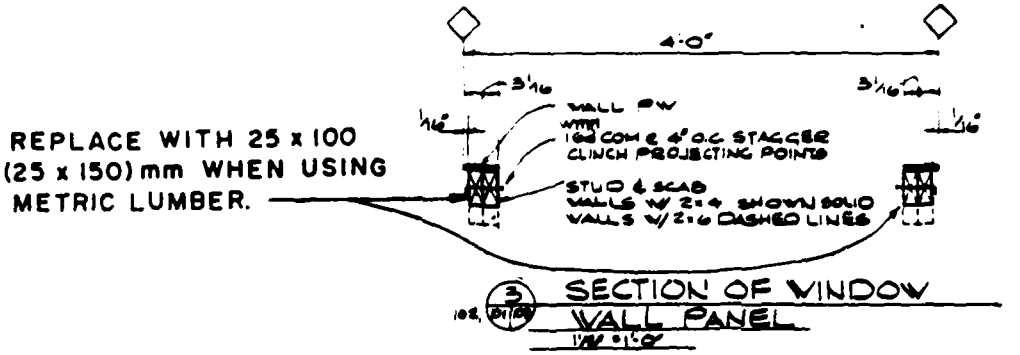


Figure 6. Keeping a uniform opening.

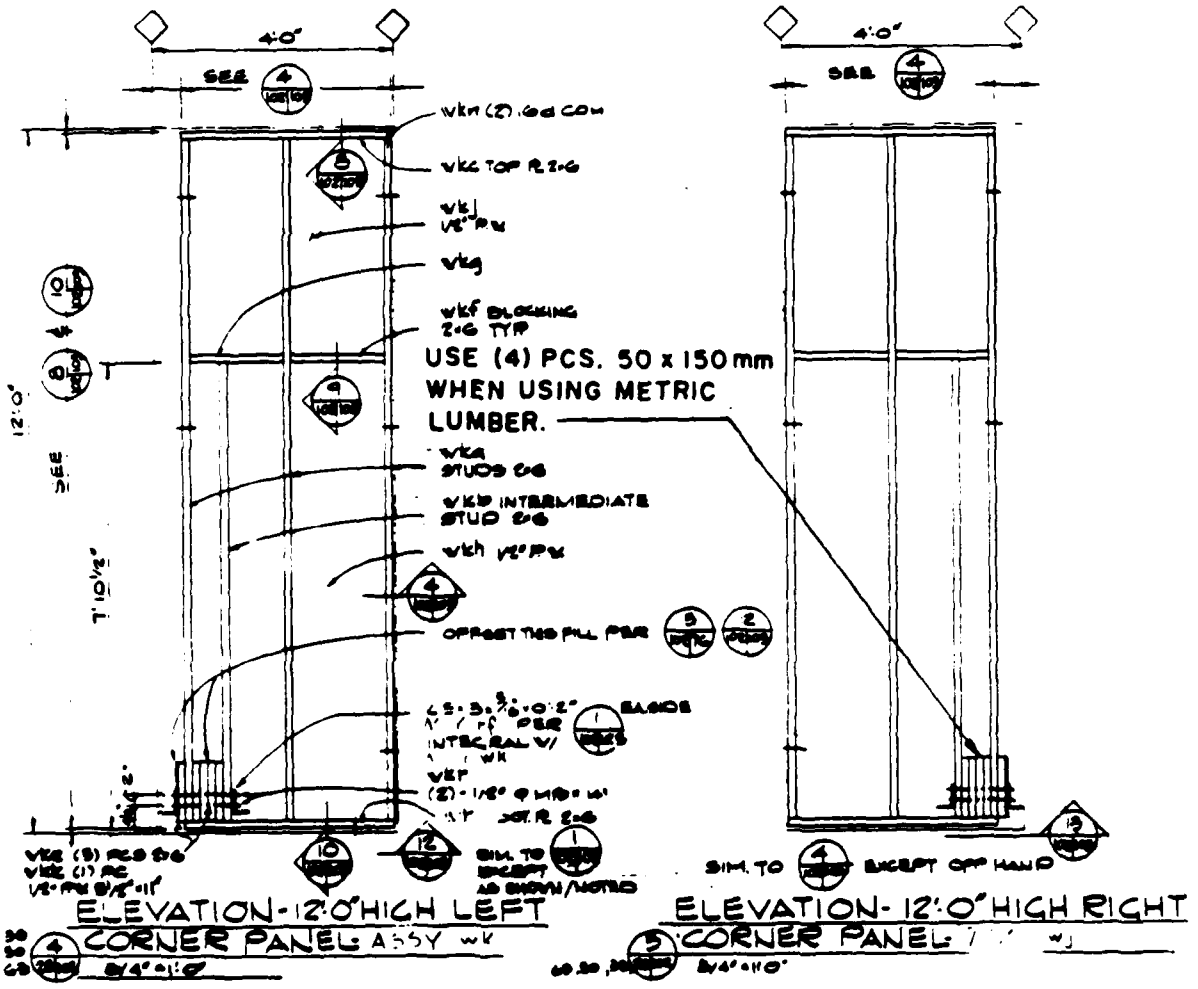


Figure 7. Reduced fill, 12-ft section.

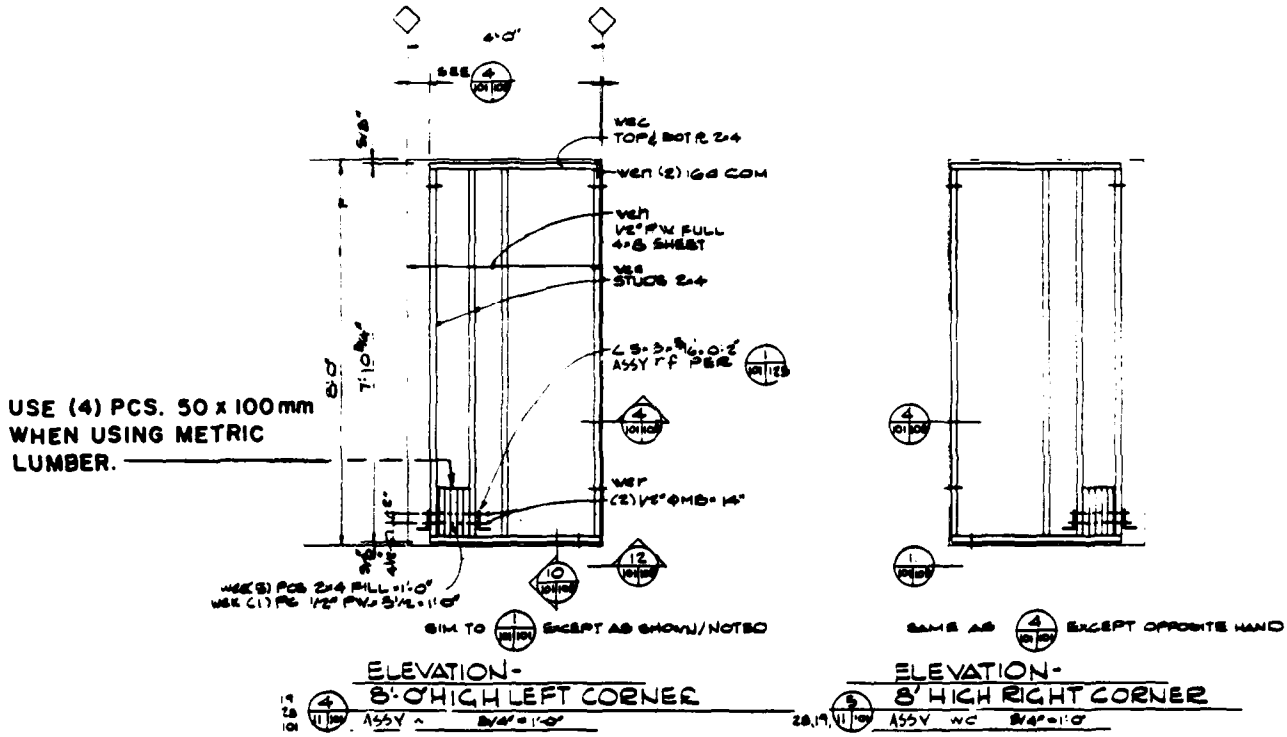


Figure 8. Reduced fill, 8-ft section.

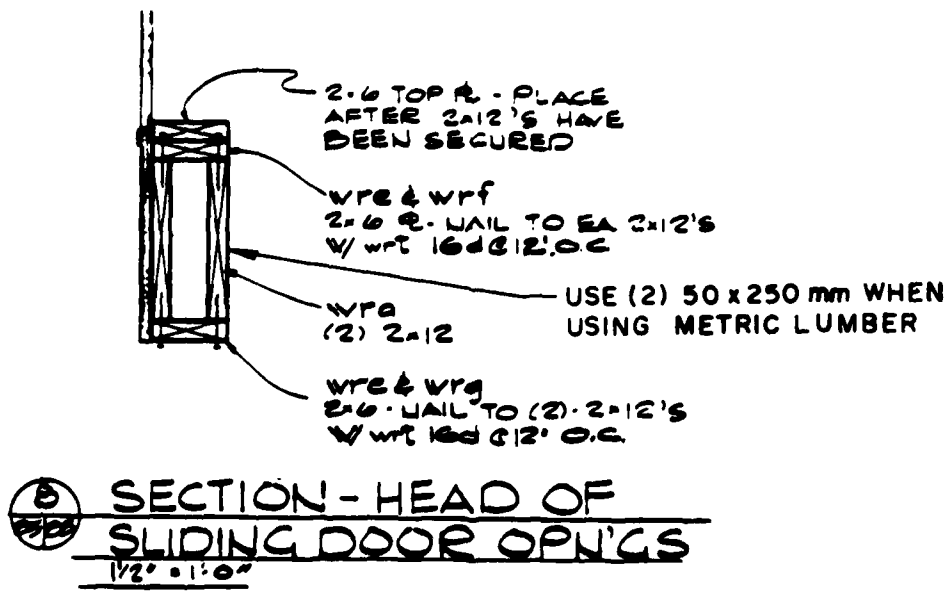
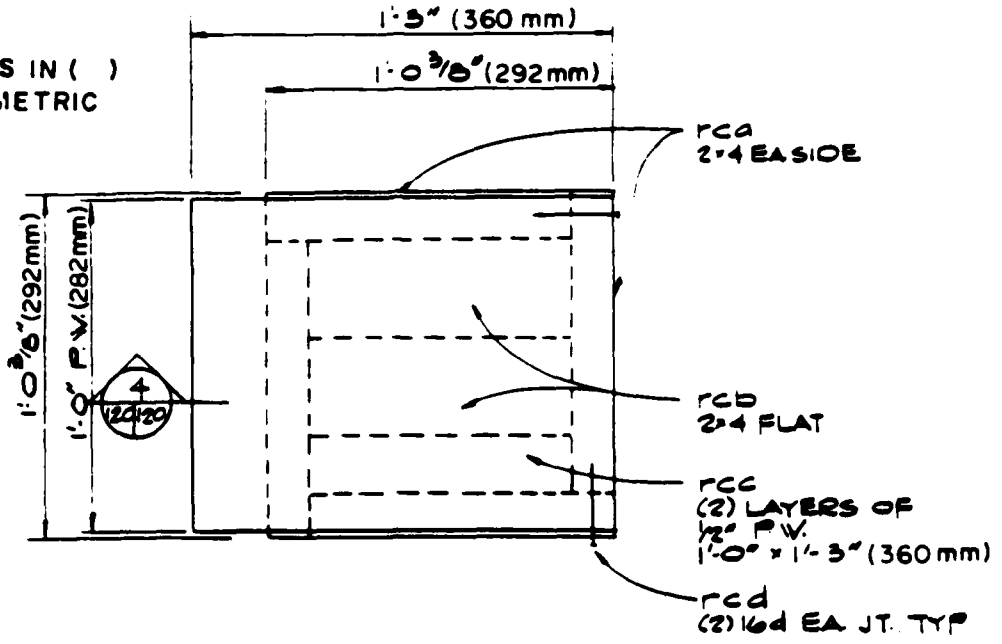
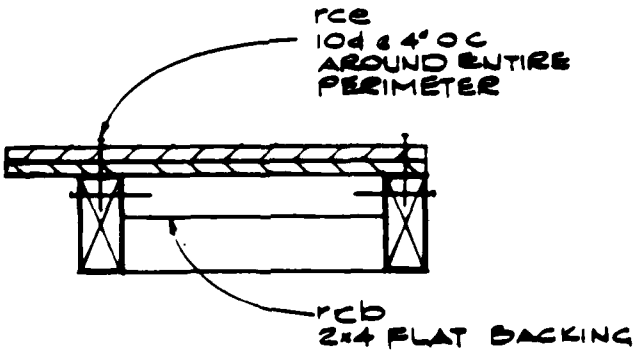


Figure 9. Uniform header size.

USE QUANITIES IN ( )
WHEN USING METRIC
LUMBER.



1/81/120 PLAN-WALL TO BRACING CONNECTOR ASSY rc
3" = 1'-0"



4/120/120 SECTION
3" = 1'-0"

Figure 10. First connector.

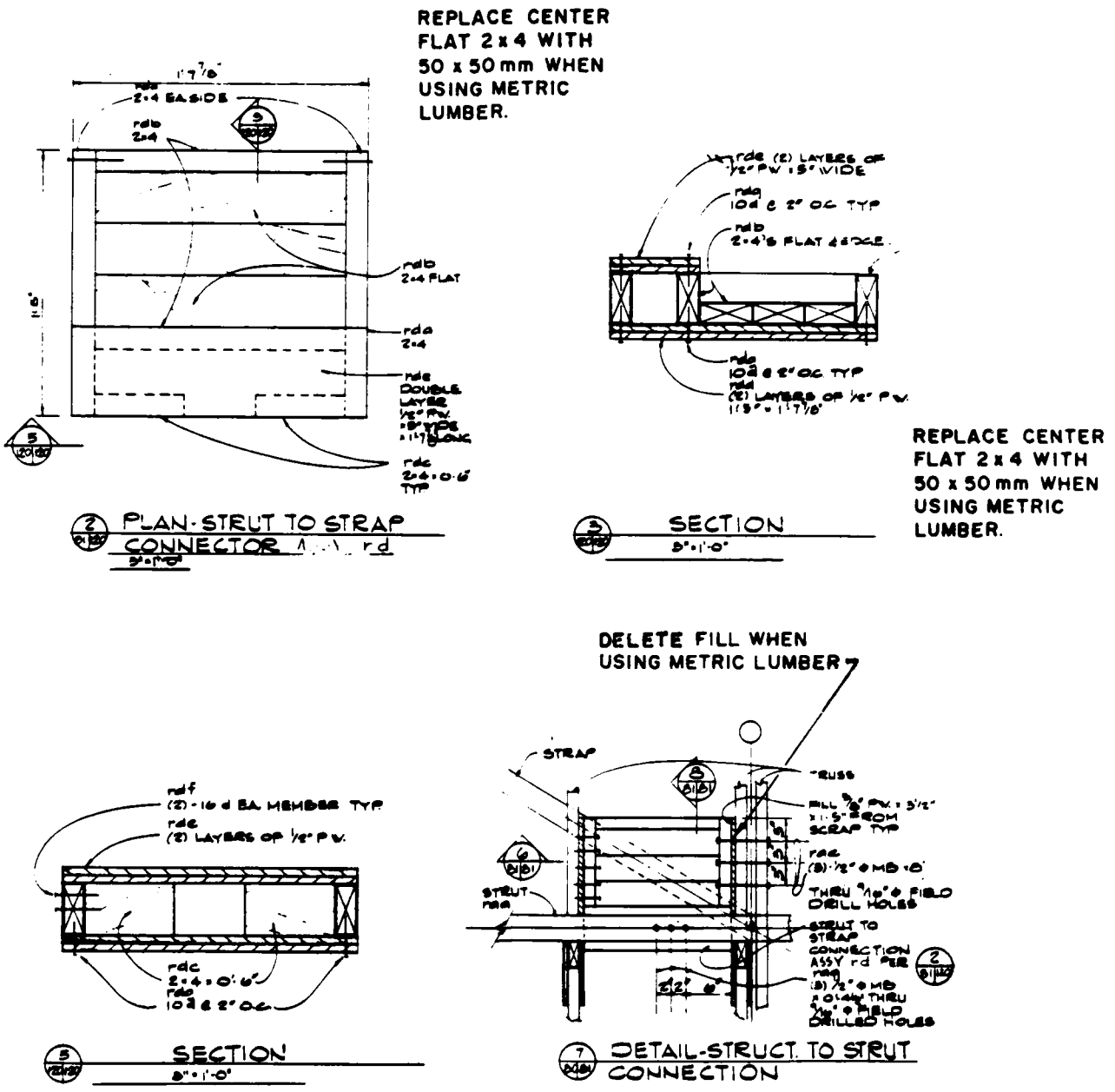


Figure 11. Second connector.

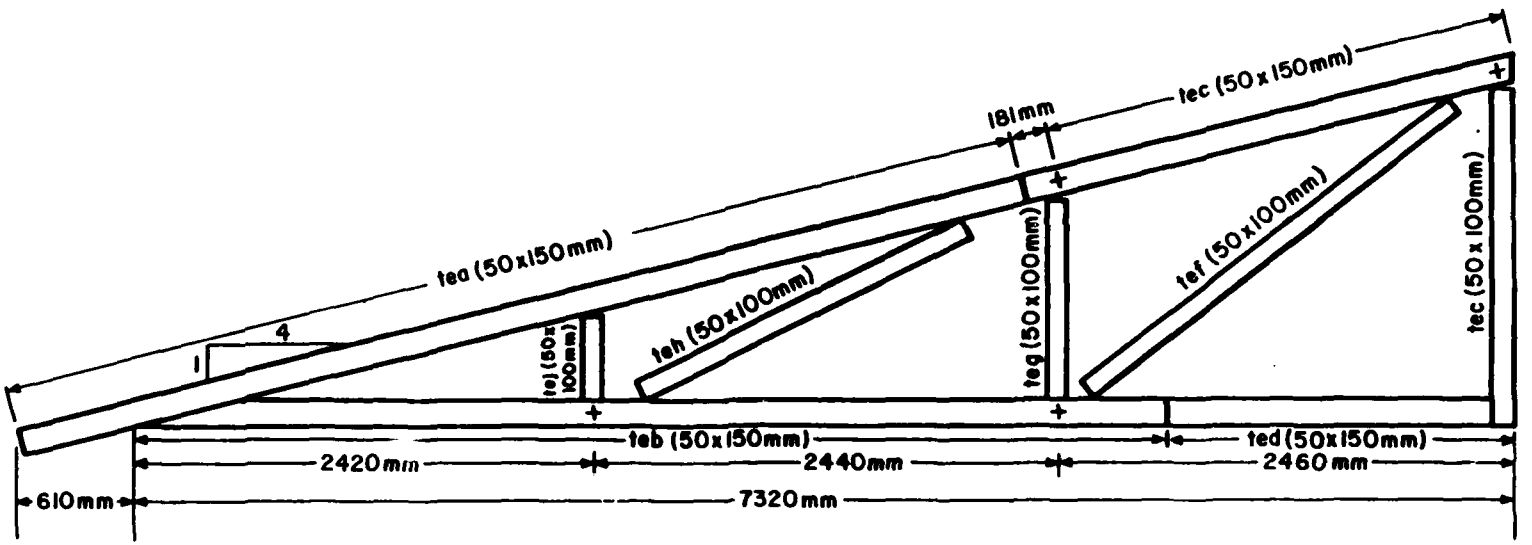


Figure 12. Truss.

APPENDIX A:

COMMON LUMBER SIZES IN GERMANY

LUMBER, softwood, board, Grade 1, edged, rough
SPEC PAE-L-3107A, para 3.1.4, Table 3

Nadelholz, Bretter, besaeumt, ungehobelt,
Gueteklasse 1
SPEC PAE-L-3107A, Par 3.1.4, Tabelle 3

ACT CODE	NSN/MCN 5510	Ordering Size Bestellgroesse inch	Sizes (approx.) Masse (zirka) mm	Specif. Index Number	U/I
A	00-V52-0038	3/4 x 8 x R/L	20/200	102	BF
A	00-V52-0302	3/4 x 10 x R/L	20/250	-	BF
-*)	00-V52-0695	1 x 2 x R/L	24/50	103	BF
-	00-V52-0039	1 x 4 x R/L	24/100	104	BF
-	00-V52-0040	1 x 6 x R/L	24/150	105	BF
-	00-V52-0041	1 x 8 x R/L	24/200	106	BF
-	00-V52-0042	1 x 10 x R/L	24/250	107	BF
-	00-V52-0043	1 x 12 x R/L	24/300	108	BF

LUMBER, softwood, board, Grade 1, edged,
surfaces (S4S)
SPEC PAE-L-3107A, para 3.1.4, Table 3 and 4

Nadelholz, Bretter, gehobelt, Gueteklasse 1
SPEC PAE-L-3107A, Par 3.1.4, Tabelle 3 und 4

ACT CODE	NSN/MCN 5510	Ordering Size Bestellgroesse inch	Sizes (approx.) Masse (zirka) mm	Specif. Index Number	U/I
A	00-V52-0060	3/4 x 8 x R/L	20/200	121	BF
A	00-V52-0061	3/4 x 10 x R/L	20/250	122	BF
-	00-167-6851	1 x 6 x R/L	24/150	124	BF
-	00-167-6852	1 x 8 x R/L	24/200	125	BF
-	00-167-6853	1 x 10 x R/L	24/250	126	BF
-	00-167-6854	1 x 12 x R/L	24/300	127	BF
A	00-V52-0670	2 x 2 x R/L	50/50	160	BF

LUMBER, softwood, dimension, Grade 1, edged, rough
SPEC PAE-L-3107A, para 3.1.5, Table 5

Nadelholz, Bohlen und Kantholz, besaeumt,
ungehobelt, Gueteklasse 1
SPEC PAE-L-3107A, Par 3.1.5, Tabelle 5

ACT CODE	NSN/MCN 5510	Ordering Size Bestellgroesse inch	Sizes (approx.) Masse (zirka) mm	Specif. Index Number	U/I
-	00-V52-0102	2 x 4 x R/L	50/100	140	BF
-	00-V52-0103	2 x 6 x R/L	50/150	141	BF
-	00-V52-0104	2 x 8 x R/L	50/200	142	BF
-	00-V52-0105	2 x 10 x R/L	50/250	143	BF
-	00-V52-0106	2 x 12 x R/L	50/300	144	BF
-	00-V52-0107	3 x 6 x R/L	75/150	145	BF
-	00-V52-0108	3 x 8 x R/L	75/200	146	BF
-	00-V52-0110	3 x 12 x R/L	75/300	148	BF
-	00-V52-0111	4 x 4 x R/L	100/100	149	BF
-	00-V52-0112	4 x 6 x R/L	100/150	150	BF
-	00-V52-0113	4 x 8 x R/L	100/200	151	BF
-	00-V52-0115	4 x 12 x R/L	100/300	153	BF
A	00-V52-0697	6 x 6 x R/L	150/150	181	BF
A	00-V52-0698	6 x 8 x R/L	150/200	182	BF
A	00-V52-0702	8 x 8 x R/L	200/200	187	BF

REMARKS: If larger dimensions (timber) are required, use Grade 2 shown on Page 5510-15.

ANMERKUNG: Falls groessere Abmessungen (Kanthoelzer oder Bohlen) benoetigt werden, Gueteklasse 2 von Seite 5510-15 verwenden.

LUMBER, softwood, dimension, grade 1, edged, surfaced (S4S), in accord. with PAE-L-3107A, para 3.1.5, Table 5 and 6

Nadelholz, Bohlen, gehobelt, Gueteklasse 1, gemaess PAE-L-3107A, Par 3.1.5, Tabelle 5 und 6

NSN FSC 5510	Ordering Size Bestellgroesse	Sizes (approxm.) Masse (zirka)	Index No PAE Spec	U/I
	inch	mm		
00-220-6146	2 x 4 x R/L	50/100	161	BF
00-220-6148	2 x 6 x R/L	50/150	162	BF
00-220-6150	2 x 8 x R/L	50/200	163	BF
00-220-6152	2 x 10 x R/L	50/250	164	BF

LUMBER, softwood, board, Grade 2, edged, rough
SPEC PAE-L-3107A, para 3.1.7, Table 8

Nadelholz, Bretter, besaeumt, ungehobelt, Gueteklasse 2
SPEC PAE-L-3107A, Par 3.1.7, Tabelle 8

ACT CODE	NSN/MCN 5510	Ordering Size Bestellgroesse	Sizes (approx.) Masse (zirka)	Specif. Index Number	U/I
		inch	mm		
-	00-V52-0187	3/4 x 6 x R/L	20/150	202	BF
A	00-V52-0022	3/4 x 8 x R/L	20/200	203	BF
-*)	00-V52-0189	1 x 2 x R/L	24/50	204	BF
-	00-V52-0671	1 x 4 x R/L	24/100	205	BF
-	00-V52-0672	1 x 6 x R/L	24/150	206	BF
-	00-V52-0673	1 x 8 x R/L	24/200	207	BF
-	00-V52-0674	1 x 10 x R/L	24/250	208	BF
-	00-V52-0675	1 x 12 x R/L	24/300	209	BF

REMARKS: *) Laths/Latten

LUMBER, softwood, dimension, grade 2, edged, rough, in accord. with PAE-L-3107A, para 3.1.8, Table 10

Nadelholz, Bohlen und Kantholz, besaeumt, ungehobelt, Gueteklasse 2, gemaess PAE-L-3107A, Par 3.1.8, Tabelle 10

MCN FSC 5510	Ordering Size Bestellgroesse inch	Sizes (approxm.) Masse (zirka) mm	Index No PAE Spec	U/I
00-V52-0676	2 x 4 x R/L	50/100	241	BF
00-V52-0677	2 x 6 x R/L	50/150	242	BF
00-V52-0678	2 x 8 x R/L	50/200	243	BF
00-V52-0679	2 x 10 x R/L	50/250	244	BF
00-V52-0680	2 x 12 x R/L	50/300	245	BF
00-V52-0681	3 x 4 x R/L	75/100	246	BF
00-V52-0682	3 x 8 x R/L	75/200	247	BF
00-V52-0686	4 x 4 x R/L	100/100	251	BF
00-V52-0687	4 x 6 x R/L	100/150	252	BF
00-V52-0688	4 x 8 x R/L	100/200	253	BF
00-V52-0689	4 x 10 x R/L	100/250	254	BF
00-V52-0690	4 x 12 x R/L	100/300	255	BF

LUMBER, softwood, timber, grade 2, rough, in accord. with PAE-L-3107A, para 3.1.9, Table 12

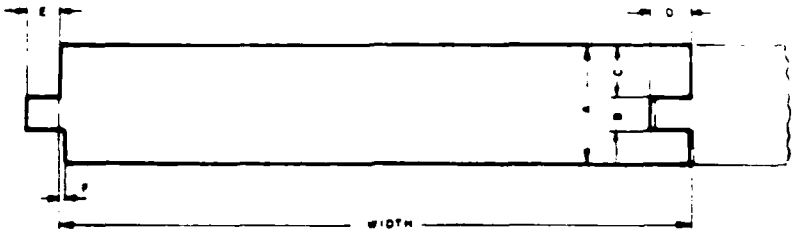
Nadelholz, Kantholz, ungehobelt, besaeumt, Gueteklasse 2, gemaess PAE-L-3107A, Par 3.1.9, Tabelle 12

MCN FSC 5510	Ordering Size Bestellgroesse inch	Sizes (approxm.) Masse (zirka) mm	Index No PAE Spec	U/I
00-V52-0719	6 x 6 x R/L	150/150	280	BF
00-V52-0720	6 x 8 x R/L	150/200	281	BF
00-V52-0721	6 x 10 x R/L	150/250	282	BF
00-V52-0691	6 x 12 x R/L	150/300	283	BF
00-V52-0722	8 x 8 x R/L	200/200	284	BF
00-V52-0723	8 x 10 x R/L	200/250	285	BF
00-V52-0692	8 x 12 x R/L	200/300	286	BF
00-V52-0693	10 x 10 x R/L	250/250	287	BF
00-V52-0694	12 x 12 x R/L	300/300	288	BF

LUMBER, softwood, flooring, tongue and groove (T&G), grade C, surfaced, in accord. with PAE-L-3107A, para 3.1.11, Table 14

Nadelholz, Fussbodenbretter, Nut und Feder, gehobelt, Gueteklasse C, gemaess PAE-L-3107A, Par 3.1.11, Tabelle 14

MCN FSC 5510	Ordering Size Bestellgroesse	Thickness Staerke(A)	Face Width Breite der Nutzflaeche	Index No PAE Spec	U/I
	inch	mm	mm		
00-V52-0724	1 x 4 x R/L	19.5 ± 0.5	90 ± 1.5	400	BF
00-V52-0725	1 x 6 x R/L	19.5 ± 0.5	130 ± 2.0	401	BF
00-V52-0726	1 1/4 x 4 x R/L	27.0 ± 1.5	90 ± 1.5	402	BF

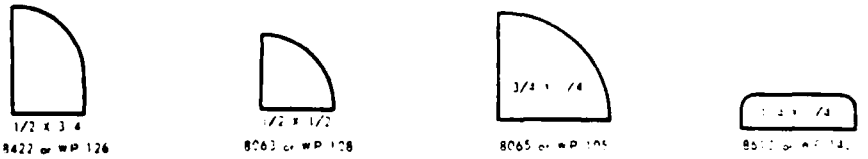


DIMENSIONS OF TONGUE & GROOVE FLOORING

MOULDING, softwood, fir or pine,
4 - 7 ft long
SPEC FED NN-L-751

Profil-Abdeckleiste, Fichte oder Kiefer,
1.20 - 2.10 mr lang
SPEC FED NN-L-751

ACT CODE	NSN/MCN 5510	Pattern Profil	Size Groesse		Pattern Number Profilnummer	U/I
			inch	mm		
-	00-224-7622	Base Shoe Sockelleiste	1/2x3/4	13x19	8422/WP 126	FT
-	00-224-7630	Quarter Round Viertelrund	1/2x1/2	13x13	8063/WP 108	FT
-	00-222-1700	Quarter Round Viertelrund	3/4x3/4	19x19	8065/WP 105	FT
-	00-274-7448	Screen Moulding Fliegendraht-Abdeckleiste	1/4x3/4	6x19	8610/WP 142	FT



MOULDING

REMARKS: NSN's not listed in AMDF.

TIE, railroad, wood, cross, coal tar creosote pressure treated, in accord. with PAE-L-3107A, para 3.6, Table 32

Eisenbahnschwelle, Holz, Kesseldruck-traenkung mit Steinkohlenteeroel, gemaess PAE-L-3107A, Par 3.6, Tabelle 32

MCN FSC 5510	Type of Wood Holzart	Thickness Staerke mm	Width Breite mm	Length Laenge mr	Index No PAE Spec	U/I
00-V52-8107	Oak Eiche	150	240	2.50	1511	EA
00-V52-8313	Oak Eiche	160	260	2.60	1512	EA
00-V52-8109	Pine Kiefer	150	240	2.50	1520	EA

BOARD, floor, particle, flat pressed, sanded, waterproof glue, tongue and groove edge, DIN 68761, Sheet 3
Typical use: Subflooring and repair of old wood flooring

Holzspanplatte, Verlegeplatte, geschliffen, mit Nut-und Federprofil, Verleimung V 100, DIN 68761, Blatt 3
Verwendungszweck: Fuer Fussboden-Unterboeden und zur Erneuerung von abgenutzten Dielenboeden

ACT CODE	NSN/MCN 5530	Thick-ness Staerke mm	Total Dimensions Gesamtmass mm	Effective Dimensions Deckendes Mass mm	Trade Name Handelsbe-zeichnung	Reference Bezugnahme	U/I
A	00-V02-4737	10.0	2050 x 925	2040 x 915	PHENAPAN ISO-Verle-geplatte V 100	DEUTSCHE NOVOPAN NSCM: XN003	SH
-	00-V02-4731	19.0	2050 x 925	2040 x 915	ditto	ditto	SH
-	00-V02-4732	19.0	2050 x 860	2035 x 845	AGEPAN	AGEPAN HOLZWERKE NSCM: XA010	SH

BOARD, particle, laminated, both sides sanded, Grade A/A
Typical use: Build-in furniture

Spanplatte, beide Seiten geschliffen, Gueteklasse I-I
Verwendungszweck: Fuer Einbaumoebel

ACT CODE	NSN/MCN 5530	Thickness Staerke mm	Dimensions Abmessungen mm	Veneer Type Furnierart	Trade Name Handelsbezeichnung	U/I
A	00-V02-7244	19.0	2600 x 2000	Walnut, both sides Nussbaum, beidseitig	THERMOSPAN	SH

BOARD, particle, wood, laminated, flat pressed, both sides sanded, for general purpose; DIN 68761

Holzspanplatte (Flachpressplatte), beide Seiten geschliffen, fuer allgemeine Zwecke; DIN 68761

ACT CODE	NSN/MCN 5530	Thickenss Dicke	Dimensions Abmessungen	Reference or DIN Short Symbol	U/I
A	00-V02-4738	19 mm	1850x4100mm	DIN Kurzz. DIN 68761 19x1850x4100	SH

BOARD, particle, laminated, synthetic resin face cover, light gray line structure (Brilliant 67), reverse side white or ivory
Typical use: Build-in kitchen furniture and top of kitchen counters

Spanplatte, beidseitig Schichtstoffpressplatten, Vorderseite grau, Leinenstruktur (Brilliant 67), Rueckseite weiss oder elfenbein
Verwendungszweck: Fuer Einbaumoebel in Kuechen und Abdeckplatten von Kuechenschraenken

ACT CODE	NSN/MCN 5530	Thickness Staerke mm	Dimensions Abmessungen mm	Stand. Packing Verpackung	Trade Name Handelsbezeichnung	U/I
A	00-V02-7238	13.0	920 x 2400	15 Sheet per Bundle 15 Platten pro Buendel	THERMOSPAN	SH
-	00-V02-7240	19.0	2010 x 2730	ditto	THERMOSPAN	SH
A	00-V02-7241	28.0	1860 x 4110	ditto	THERMOSPAN	SH

PLYWOOD, softwood, interior, moisture resistant glues, grade A-A, both sides sanded, Fed Spec NN-P-530
Typical use: Interior works requiring both sides to be natural finished, such as cabinets or furniture.

Sperrholz, Weichholzfurnier, fuer Innen, mit feuchtigkeitsbestaendiger Verleimung, Gueteklasse I-I, beide Seiten geschliffen
Verwendung: Fuer Einbauschraenke und Moebelschreinerei, wobei beide Seiten hohen Ansprueche n und gutem Aussehen gerecht werden muessen, z.B. bei Naturlasierungen.

NSN FSC 5530	Ply Lagen	Dimensions Abmessungen		Thickness Staerke		Sheets per Pack Tafeln pro Buendel	U/I
		inch	mm	inch	mm		
00-051-0497	3	48x96	1220x2440	1/4	6	12	SH
00-051-0498	3	48x96	1220x2440	3/8	10	8	SH
00-051-0499	5	48x96	1220x2440	1/2	13	6	SH
00-051-0501	5	48x96	1220x2440	3/4	20	4	SH

PLYWOOD, softwood, exterior, grade A-C, sanded, Fed Spec NN-P-530
Typical use: Store fronts, breeze ways, and gable ends.

Sperrholz, Weichholzfurnier, fuer Aussen, Gueteklasse I-III, beide Seiten geschliffen
Verwendung: Aussenverkleidung von Baracken und sonstigen Holzkonstruktionen von Aussen.

NSN FSC 5530	Ply Lagen	Dimensions Abmessungen		Thickness Staerke		Sheets per Pack Tafeln pro Buendel	U/I
		inch	mm	inch	mm		
00-129-7721	3	48x96	1220x2440	1/4	6	120	SH
00-129-7749	3	48x96	1220x2440	3/8	10	80	SH
00-129-7777	5	48x96	1220x2440	1/2	13	60	SH
	5	48x96	1220x2440	3/4	20	40	SH

PLYWOOD, softwood, exterior, grade B-B, concrete form, Fed Spec NN-P-530
Typical use: Concrete forms with blemish-free surface; can be reused.

Sperrholz, Weichholzfurnier, fuer Schalungen, Gueteklasse II-II
Verwendung: Verschalungen fuer Betonierarbeiten, mit fehlerfreier Oberflaeche; kann mehrmals verwendet werden.

NSN FSC 5530	Ply Lagen	Dimensions Abmessungen		Thickness Staerke		Sheets per Pack Tafeln pro Buendel	U/I
		inch	mm	inch	mm		
00-128-5133	5	48x96	1220x2440	5/8	16	50	SH
00-128-5134	5	48x96	1220x2440	3/4	20	40	SH

PLYWOOD, softwood, interior, grade A-b, sanded, Fed Spec NN-P-530
Typical use: Interior works requiring one side to be natural finished and the other side painted. For Carpenters.

Sperrholz, Weichholzfurnier, fuer Innen, Gueteklasse I-II, beide Seiten geschliffen
Verwendung: Fuer Innenarbeiten, wobei eine Seite mit farblosem Lack und die andere Seite mit Farbe gestrichen werden soll. Fuer Schreiner.

NSN FSC 5530	Ply Lagen	Dimensions Abmessungen		Thickness Staerke		Sheets per Pack Tafeln pro Buendel	U/I
		inch	mm	inch	mm		
00-128-5419	3	48x96	1220x2440	1/4	6	120	SH
00-128-5475	5	48x96	1220x2440	1/2	13	60	SH
00-128-5531	5	48x96	1220x2440	3/4	20	40	SH

PLYWOOD, softwood, exterior, grade A-b, sanded, Fed Spec NN-P-530
Typical use: Exterior works requiring high quality appearance on one side with other side solid and paintable, such as signs and carports.

Sperrholz, Weichholzfurnier, fuer Aussen, Gueteklasse I-II, beide Seiten geschliffen,
Verwendung: Fuer Aussen, wobei eine Seite hohen Anspruechen und gutem Aussehen gerecht werden muss und die andere Seite gestrichen wird und zur Befestigung dient. Besonders geeignet fuer Schilder und Fahrzeugaufbauten.

NSN FSC 5530	Ply Lagen	Dimensions Abmessungen		Thickness Staerke		Sheets per Pack Tafeln pro Buendel	U/I
		inch	mm	inch	mm		
00-262-8180	3	48x96	1220x2440	1/4	6	120	SH
00-262-8181	3	48x96	1220x2440	3/8	10	80	SH
00-262-8195	5	48x96	1220x2440	1/2	13	60	SH
00-262-8182	5	48x96	1220x2440	3/4	20	40	SH

PLYWOOD, softwood, standard, interior with exterior glue, unsanded, Fed Spec NN-P-530
Typical use: Packing, wall and roof sheating, subflooring, temporary partitions and construction.

Sperrholz, Weichholzfurnier, Standardqualitaet fuer Innen mit feuchtigkeitsbestaendigem Bindemittel, beide Seiten rauh;
Verwendung: Fuer Verpackungszwecke (Kisten), Wand-und Dachschalungen, Unterboeden, kurzzeitlich benoetigte Zwischenwaende und sonstige Konstruktionen.

NSN FSC 5530	Ply Lagen	Dimensions Abmessungen		Thickness Staerke		Sheets per Pack Tafeln pro Buendel	U/I
		inch	mm	inch	mm		
00-555-9095	3 or 5	48x96	1220x2440	1/2	13	60	SH
00-555-9096	5	48x96	1220x2440	5/8	16	50	SH

PLYWOOD, softwood, interior, grade A-D, sanded, Fed Spec NN-P-530
Typical use: Where only one side will show, such as wall panelling, ceiling, and displays.

Sperrholz, Weichholzfurnier, fuer Innen, Gueteklasse I-III und schlechter, beide Seiten geschliffen
Verwendung: Wo nur eine Seite sichtbar ist, wie z.B. bei Zwischenwaenden, Deckenverkleidungen und Regalen.

NSN FSC 5530	Ply Lagen	Dimensions Abmessungen		Thickness Staerke		Sheets per Pack Tafeln pro Buendel	U/I
		inch	mm	inch	mm		
00-051-0535	3	48x96	1220x2440	1/4	6	120	PG
00-128-4779	3	48x96	1220x2440	3/8	10	80	SH
00-128-4005	5	48x96	1220x2440	1/2	13	60	SH
00-128-4061	5	48x96	1220x2440	3/4	20	40	SH

PLYWOOD, softwood, interior, laminated board construction, limba veneer, sanded two sides, bond moisture resistant, heat resistant up to 150 Deg F, IW 67, DIN 68705

Tischlerplatte, dreifach, mit Stab-Mittellage, Limba-Deckfurnier, beidseitig geschliffen, Verleimung bestaendig gegen erhoehte Luftfeuchtigkeit und Temperaturen bis zu 67°C, IW 67, DIN 68705

MCN FSC 5530	Ply Lagen	Dimensions Abmessungen		Thickness Staerke		U/I
		inch	mm	inch	mm	
00-V02-4733	3	60 x 138	1530 x 3500	1/2	13	SH
00-V02-4734	3	60 x 138	1530 x 3500	3/4	19	SH
00-V02-4735	3	60 x 138	1530 x 3500	1	25	SH

PLYWOOD, softwood, interior, laminated board construction, sanded two sides, bond moisture resistant, heat resistant up to 150 Deg F, IW 67

Tischlerplatte, mit Stabmittellage, beidseitig geschliffen, Verleimung bestaendig gegen erhoehte Luftfeuchtigkeit und Temperaturen bis 67°C, IW 67

ACT CODE	NSN/MCN 5530	Ply Lagen	Dimensions Abmessungen		Thickness Dicke		Veneer Type Deckfurnier	DIN Reference	U/I
			Inch	mm	Inch	mm			
A	00-V02-4741	5	49.21x98.43	1250x2500	0.6299	16	Macore	DIN 68705	SH

PLYWOOD, softwood, interior, laminated board construction, gabun veneer, sanded two sides, bond moisture resistant, heat resistant up to 150 Deg F, IW 67, DIN 68705

Tischlerplatte, dreifach, mit Stabmittellage, Gabun-Deckfurnier, beidseitig geschliffen, Verleimung bestaendig gegen erhoehte Luftfeuchtigkeit und Temperaturen bis zu 67°C, IW 67, DIN 68705

ACT CODE	NSN/MCN 5530	Ply Lagen	Dimensions Abmessungen	Thickness Staerke	U/I
			mm	mm	
A	00-V02-4736	3	1830 x 5200	22.0	SH

APPENDIX B:

COMMON LUMBER SIZES IN JAPAN

Length (m)	Thickness (cm)	Width (cm)	Length (m)	Thickness (cm)	Width (cm)
2.0	0.75	21.0	4.0	1.8	4.5
2.0	0.9	9.0	4.0	1.8	9.0
2.0	1.1	15.0	4.0	1.8	24.0
2.0	1.1	18.0	4.0	2.4	9.0
2.0	1.2	18.0	4.0	2.4	15.0
2.0	1.5	15.0	4.0	2.4	24.0
2.0	1.5	18.0	4.0	2.4	30.0
2.0	2.4	15.0	4.0	3.0	4.0
2.0	2.4	24.0	4.0	3.0	8.5
2.0	4.5	10.5	4.0	3.0	9.0
3.0	3.0	8.5	4.0	3.3	4.0
3.0	3.0	9.0	4.0	3.6	24.0
3.0	3.0	10.5	4.0	4.0	4.5
3.0	4.5	4.5	4.0	4.5	4.5
3.0	6.0	6.0	4.0	4.5	10.5
3.0	7.5	7.5	4.0	6.0	6.0
3.0	9.0	9.0	4.0	7.5	7.5
3.0	10.0	10.0	4.0	8.5	8.5
			4.0	9.0	9.0
3.0	10.5	10.5	4.0	10.0	10.0
3.0	12.0	12.0	4.0	10.5	10.5
3.0	12.0	15.0	4.0	12.0	12.0
3.0	12.0	18.0	4.0	12.0	15.0
3.0	12.0	21.0	4.0	12.0	18.0
3.0	12.0	24.0	4.0	12.0	21.0
3.0	12.0	30.0	4.0	12.0	24.0
4.0	1.1	9.0	4.0	12.0	30.0
4.0	1.1	15.0	6.0	10.5	10.5
4.0	1.3	4.5	6.0	12.0	12.0
4.0	1.3	8.5	6.0	12.0	24.0
4.0	1.3	9.0	6.0	12.0	30.0
4.0	1.3	15.0			
4.0	1.3	18.0			
4.0	1.5	4.5			
4.0	1.5	8.5			
4.0	1.5	9.0			
4.0	1.5	12.0			
4.0	1.5	15.0			
4.0	1.5	18.0			

APPENDIX C:

RECOMMENDED CONSTRUCTION NOTES

1. AFCS Wood Frame Construction (Drawing Number 93111).

a. Evaluate all bolted connections to assure that bolts are the proper length.

b. For stairs and porch or loading platform assemblies, maintain the specified gap by either cutting the edge of a board or eliminating a board from the construction.

c. Adjust all member lengths to correspond with overall design dimensions.

d. Maintain all opening dimensions so the item that fits in them need not be redesigned.

2. AFCS Panelized Wood Building (Drawing Number 93112).

a. Evaluate all bolted connections to assure that bolts are the proper length.

b. Some of the filler used to maintain design dimensions is no longer necessary; eliminate this filler during construction.

c. In the box beam assembly, replace the 3/4 in. plywood used in the stiffener with 25 mm plywood.

d. For the stairs and porch assembly, maintain the specified gap by either cutting the edge of a board or eliminating a board from the construction.

e. Adjust all member lengths to correspond with overall design dimensions.

f. In the endwall, to start construction, replace the 2 by 4 in. filler with 25 by 100 mm filler.

g. Maintain all opening dimensions so the item that fits in them need not be redesigned.

h. The header over the sliding door opening need not be reduced unless the opening height is critical.

i. Reduce all dimensions in the wall-to-bracing connector by 22 mm.

j. In the strut-to-strap connector, replace the center 2 by 4 in. board with a 50 by 50 mm board.

k. Remove one of the 5/8 in. plywood fillers in the strut-to-strap connection.

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