

# UNITIZATION PROCEDURES FOR NAVAL OTTO FUEL II IN 55 GALLON POLYETHYLENE DRUMS ON 4-WAY ENTRY PALLETS

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## U.S. ARMY MATERIEL COMMAND DRAWING

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APPROVED, U.S. ARMY JOINT MUNITIONS COMMAND RUS.ALLEN.J.1230354282 .1230354282 <small>Digitally signed by RUS.ALLEN.J.1230354282 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=RUS.ALLEN.J.1230354282 Date: 2015.09.15 11:51:49 -05'00'</small> <b>AMSJM-LIT</b>		<b>DO NOT SCALE</b>	
APPROVEDBY ORDER OF COMMANDING GENERAL, U.S. ARMY MATERIEL COMMAND SHIMP.UPTON.R.1231257183 .R.1231257183 <small>Digitally signed by SHIMP.UPTON.R.1231257183 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=SHIMP.UPTON.R.1231257183 Date: 2015.10.08 15:32:21 -05'00'</small> U.S. ARMY DEFENSE AMMUNITION CENTER		<b>OCTOBER 2015</b>	
DESIGN ENGINEER		BASIC REV.	
ENGINEERING DIVISON		MADELINE BANKS	
TEST ENGINEER		FIEFFER.LAUR A.A.1230375727 <small>Digitally signed by FIEFFER.LAUR A.A.1230375727 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=FIEFFER.LAUR A.A.1230375727 Date: 2014.10.27 08:06:32 -05'00'</small>	
TEST REPORT		TRAN.CANH.THA NG.1385731813 <small>Digitally signed by TRAN.CANH.THA NG.1385731813 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=TRAN.CANH.THA NG.1385731813 Date: 2014.10.28 13:02:21 -05'00'</small>	
EXPLOSIVE SAFETY DIRECTORATE		TIRONE.JOSEPH.A NDREW.1026683749 <small>Digitally signed by TIRONE.JOSEPH.A NDREW.1026683749 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=TIRONE.JOSEPH.A NDREW.1026683749 Date: 2015.05.28 15:07:33 -05'00'</small>	
CLASS	DIVISION	DRAWING	FILE
19	48	4367	20PK1000

## GENERAL NOTES

## (GENERAL NOTES CONTINUED)

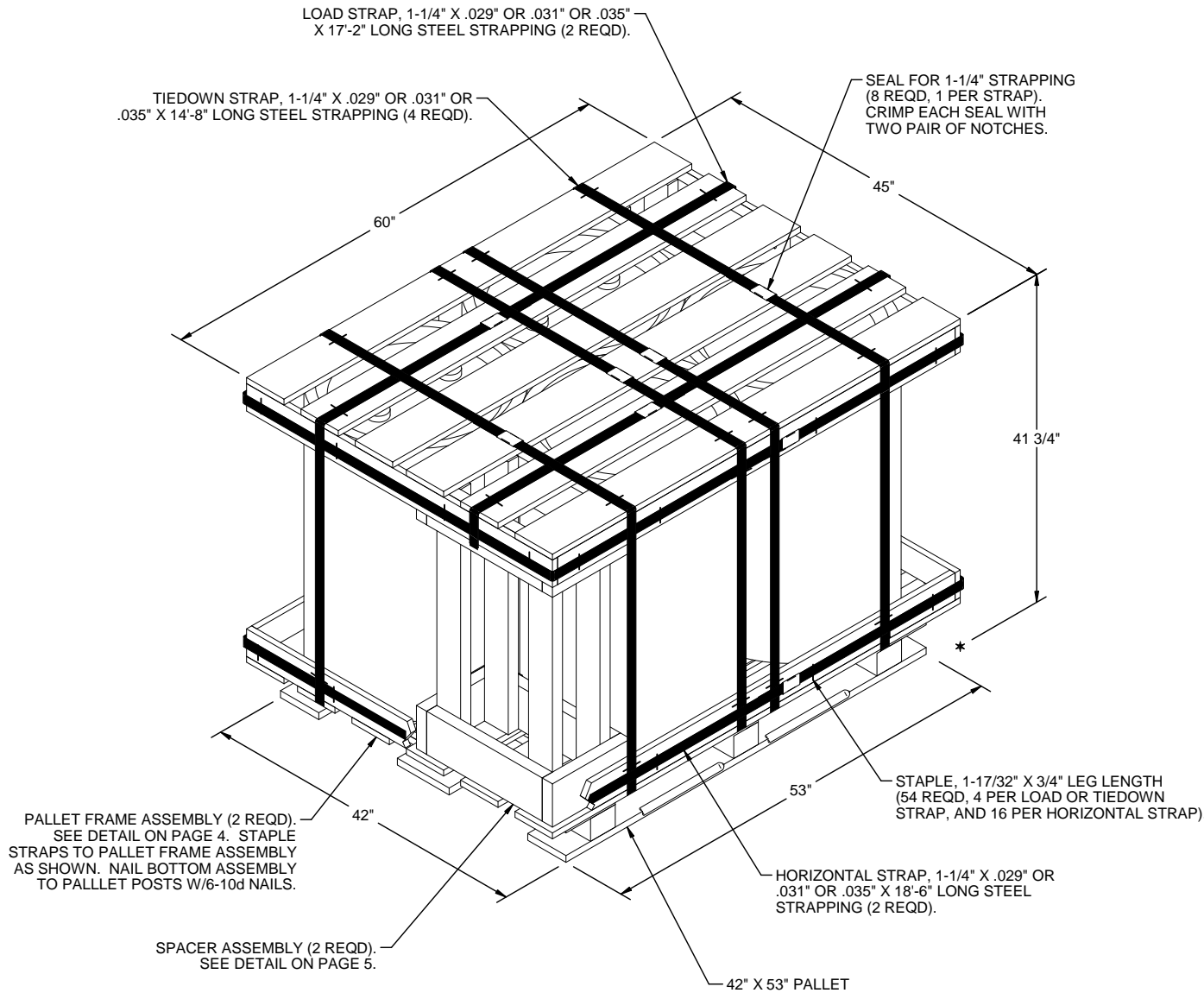
- A. THIS DOCUMENT HAS BEEN PREPARED AND ISSUED IN ACCORDANCE WITH AR 740-1 AND AUGMENTS TM 743-200-1 (CHAPTER 5).
- B. FOR DETAILS OF THE 55 GALLON POLYETHYLENE DRUM SEE NAVAL SEA SYSTEMS COMMAND DRAWING 8601502.
- DRUM DIMENSIONS - - - - 23.25" DIAMETER X 34.75" HIGH  
DRUM GROSS WEIGHT - - - - - 587 LBS (APPROX)  
DRUM CUBE - - - - - 34.15 CU FT (APPROX)
- C. APPROVED SPECIFICATIONS, COVERING THE ASSEMBLAGE AND UNITIZATION OF 55 GALLON POLYETHYLENE DRUMS INTO UNIT LOADS, ARE SET FORTH IN THIS DRAWING. THIS DOCUMENT INCLUDES MATERIAL SPECIFICATIONS AND UNITIZING STANDARDS APPLICABLE TO UNITIZATION, PLUS INFORMATION RELATIVE TO TYPICAL POSITIONING OF POLYETHYLENE DRUMS ON A PALLET AND INSTALLATION OF UNITIZING STEEL STRAPPING.
- D. THE FOLLOWING AMC DRAWINGS ARE APPLICABLE FOR OUTLOADING AND STORAGE OF THE ITEMS COVERED BY THIS DRAWING.
- CARLOADING - - - - 19-48-4115-5PA1002  
TRUCKLOADING - - - - 19-48-4117-11PA1003  
STORAGE - - - - - 19-48-4118-1-2-3-4-14-22PA1002  
END OPENING ISO  
CONTAINER - - - - 19-48-4153-15PA1002  
MILVAN - - - - - 19-48-4166-15PA1003  
SIDE OPENING ISO  
CONTAINER - - - - 19-48-4267-15PA1009
- E. DIMENSIONS, CUBE AND WEIGHT OF A PALLET UNIT WILL VARY SLIGHTLY DEPENDING UPON THE ACTUAL DIMENSIONS OF THE DRUMS AND THE WEIGHT OF THE SPECIFIC ITEM BEING UNITIZED.
- F. DUNNAGE LUMBER SPECIFIED IS OF NOMINAL SIZE. FOR EXAMPLE, 1" X 4" MATERIAL IS ACTUALLY 3/4" THICK BY 3-1/2" WIDE AND 2" X 6" MATERIAL IS ACTUALLY 1-1/2" THICK BY 5-1/2" WIDE.
- G. CONVERSION TO METRIC EQUIVALENTS: DIMENSIONS WITHIN THIS DOCUMENT ARE EXPRESSED IN INCHES, AND WEIGHTS ARE EXPRESSED IN POUNDS. WHEN NECESSARY, THE METRIC EQUIVALENTS MAY BE COMPUTED ON THE BASIS OF ONE INCH EQUALS 25.4MM AND ONE POUND EQUALS 0.454 KG.
- H. WHEN ASSEMBLING A COMPLETE PALLET UNIT, CARE SHALL BE TAKEN TO ENSURE THAT THE DRUMS AND DUNNAGE ASSEMBLIES OR PIECES ARE EVENLY ALIGNED SO THAT THE SIDES AND ENDS OF THE PALLET UNIT DO NOT EXCEED A 1/2" TOLERANCE, RELATIVE TO THE PALLET.
- J. INSTALL EACH HORIZONTAL STRAP TO ENCIRCLE A PALLET FRAME ASSEMBLY. NOTE THAT THE STRAPS WILL BE CENTERED ALONG THE BATTENS OF THE FRAME. HORIZONTAL STRAPS MUST BE TENSIONED AND SEALED PRIOR TO THE APPLICATION OF LOAD STRAPS.
- K. THE LOAD STRAPS MAY BE THREADED THROUGH THE STRAP SLOTS OF A PALLET OR PREPOSITIONED ON THE PALLET DECK PRIOR TO PLACING THE PALLET FRAME ASSEMBLY ON THE PALLET. LOAD STRAPS MUST BE TENSIONED AND SEALED PRIOR TO APPLICATION OF TIEDOWN STRAPS.
- L. INSTALL EACH TIEDOWN STRAP TO PASS UNDER THE TOP DECK BOARDS OF THE PALLET AND TO BE LOCATED AS SHOWN. TIEDOWN STRAPS WILL NOT BE APPLIED UNTIL THE LOAD STRAPS HAVE BEEN TENSIONED AND SEALED.
- M. WHEN APPLYING ANY STRAP, CARE MUST BE EXERCISED TO ASSURE THAT THE END OF THE STRAP ON THE UNDERSIDE OF THE JOINT EXTENDS AT LEAST 6" BEYOND THE SEAL. THIS EXTRA MINIMUM LENGTH OF STRAP IS REQUIRED TO PERMIT SUBSEQUENT TIGHTENING OF LOOSENED STRAPPING. RETENSIONING CAN BE ACCOMPLISHED WITHOUT REPLACING STRAPPING OR SPLICING STRAPPING THROUGH THE USE OF MANUAL OR PNEUMATIC FEED-WHEEL TYPE TENSIONING TOOL AND THE APPLICATION OF ONE ADDITIONAL SEAL.
- N. IN ORDER TO OBTAIN COMPACT (SOUND) UNITS, ALL STRAPS SHALL BE LOCATED IN PROPER ALIGNMENT AND TENSIONED UNTIL THEY CUT INTO THE EDGE OF THE DUNNAGE ASSEMBLY AND THE PALLET DECK. AFTER TENSIONING, ALL STRAPS WILL BE SECURED USING ONE SEAL AND TWO PAIR OF NOTCHES PER SEAL. ALL STRAPPING MUST BE STRAIGHT WITHIN 2" ON ANY SURFACE OF THE UNITIZED LOAD I.E., TOP, BOTTOM, SIDES, OR ENDS THAT IT ENCOMPASSES.
- O. DIMENSIONS GIVEN FOR DUNNAGE ASSEMBLIES AND THE PALLET DUNNAGE LOCATION WILL BE FIELD CHECKED PRIOR TO ASSEMBLY OF PALLET UNIT. DRUMS MUST FIT SNUGLY AGAINST THE DUNNAGE ASSEMBLIES.

(CONTINUED AT RIGHT)

- P. UNLESS OTHERWISE SPECIFIED, A PLUS-OR-MINUS 1/4" IS ALLOWED ON OVERALL DIMENSIONS OF ANY PIECE OF DUNNAGE OR DUNNAGE ASSEMBLY. HOWEVER, SIMILAR PIECES IN AN ASSEMBLY MUST BE WITHIN 1/8" OF THE SAME DIMENSION.
- Q. THE STYLE 1B PALLET DELINEATED IN THE DETAIL ON PAGE 3 NEED NOT HAVE CHAMFERS OR STRAP SLOTS AS SPECIFIED WITHIN MILITARY SPECIFICATION MIL-DTL-15011 WHEN USED FOR THE UNITIZATION OF ITEMS COVERED BY THIS DRAWING.
- R. ALL WOODEN DUNNAGE USED IN UNIT LOADS SHALL BE PRESERVATIVE TREATED IN ACCORDANCE WITH THE PROCEDURES SPECIFIED IN MIL-DTL-2427 FOR CLEATED WOODEN BOXES. IF THE DUNNAGE CONSISTS OF MORE THAN ONE COMPONENT, IT MUST BE ASSEMBLED PRIOR TO TREATMENT. THE LETTERS PA DENOTING PQ56 (COPPER-8-QUINOLINOLATE), PB DENOTING M-GARD W550 (ZINC NAPHTHENATE EMULSIFIABLE), OR PC DENOTING M-GARD W510 OR CUNAPSOL 5 (COPPER NAPHTHENATE) MUST BE APPLIED TO THE DUNNAGE IN LETTERS AT LEAST ONE INCH HIGH.
- S. UNIT LOAD MARKING WILL BE ACCOMPLISHED IN ACCORDANCE WITH DAC DRAWING ACV00561, UNIT LOAD MARKING FOR SHIPMENT AND STORAGE, AMMUNITION AND EXPLOSIVE.
- T. ALL NON-MANUFACTURED WOOD USED IN PALLETIZED LOAD SHALL BE HEAT TREATED AND MARKED TO SHOW CONFORMANCE TO THE INTERNATIONAL PLANT PROTECTION CONVENTION STANDARD (IPPC), ISPM-15. SEE DAC DRAWING ACV00831 FOR ISPM-15 CERTIFICATION MARKING AND PLACEMENT DETAILS.
- U. ALL NAILS DRIVEN INTO THE DUNNAGE ASSEMBLIES, FILLER ASSEMBLIES, OR PALLET SHALL BE DRIVEN SO THAT THE NAILHEADS ARE FLUSH OR SLIGHTLY BELOW THE SURFACE OF THE PIECE THAT THEY ARE BEING DRIVEN THROUGH.
- V. IF LESS THAN FOUR DRUMS ARE TO BE LOADED ON A PALLET, IT SHALL BE ACCOMPLISHED BY SUBSTITUTING FILLER ASSEMBLIES, AS DEPICTED ON PAGE 5, FOR ONE, TWO OR THREE OMITTED DRUMS. **NOTE:** EMPTY OR REJECT DRUMS MAY BE USED IN PLACE OF FILLER ASSEMBLIES AS NECESSARY. WHEN (EMPTY) FILLER DRUMS ARE USED IN PLACE OF OMITTED DRUMS TO COMPLETELY FILL OUT A PALLET, THEY WILL BE MARKED AS SPECIFIED IN ARDEC DRAWING NO. 12982865.
- W. ANTI-CHAFING MATERIAL MAY BE INSTALLED AT POINTS OF CONTACT BETWEEN DRUMS, BETWEEN DRUMS AND SPACER ASSEMBLIES, AND BETWEEN DRUMS AND FILLER ASSEMBLIES, IF DESIRED, TO PREVENT CHAFING DAMAGE TO DRUM PAINT AND MARKINGS.

## MATERIAL SPECIFICATIONS

- PALLET** - - - - - : MIL SPEC MIL-DTL-15011; 4-WAY ENTRY, STYLE 1B, TYPE 1, CLASS 1, PRESERVATIVE TREATED. SEE GENERAL NOTE "P" AND DAC DRAWING ACV00831.
- LUMBER** - - - - - : ASTM D 6199; CLASS 2, GROUP II, III, OR IV PRESERVATIVE AND HEAT TREATED FOR ALL ASSEMBLIES.
- NAILS** - - - - - : ASTM F1667; COMMON STEEL NAIL (NLCMS OR NLCMMS).
- STRAPPING, STEEL** - - : ASTM D3953; FLAT STRAPPING, TYPE 1, HEAVY DUTY, FINISH A, B (GRADE 2), OR C.
- SEAL, STRAP** - - - - : ASTM D3953; CLASS H, FINISH A, B (GRADE 2), OR C, DOUBLE NOTCH TYPE, STYLE I, II OR IV.
- STAPLE** - - - - - : ASTM F1667; STFC5-224, 1-17/32" CROWN WIDTH X 3/4" LEG LENGTH FOR 1-1/4" STRAPPING.
- ANTI-CHAFING MATERIAL** - - - - : MIL-PRF-121 (OR EQUAL); NEUTRAL BARRIER MATERIAL.

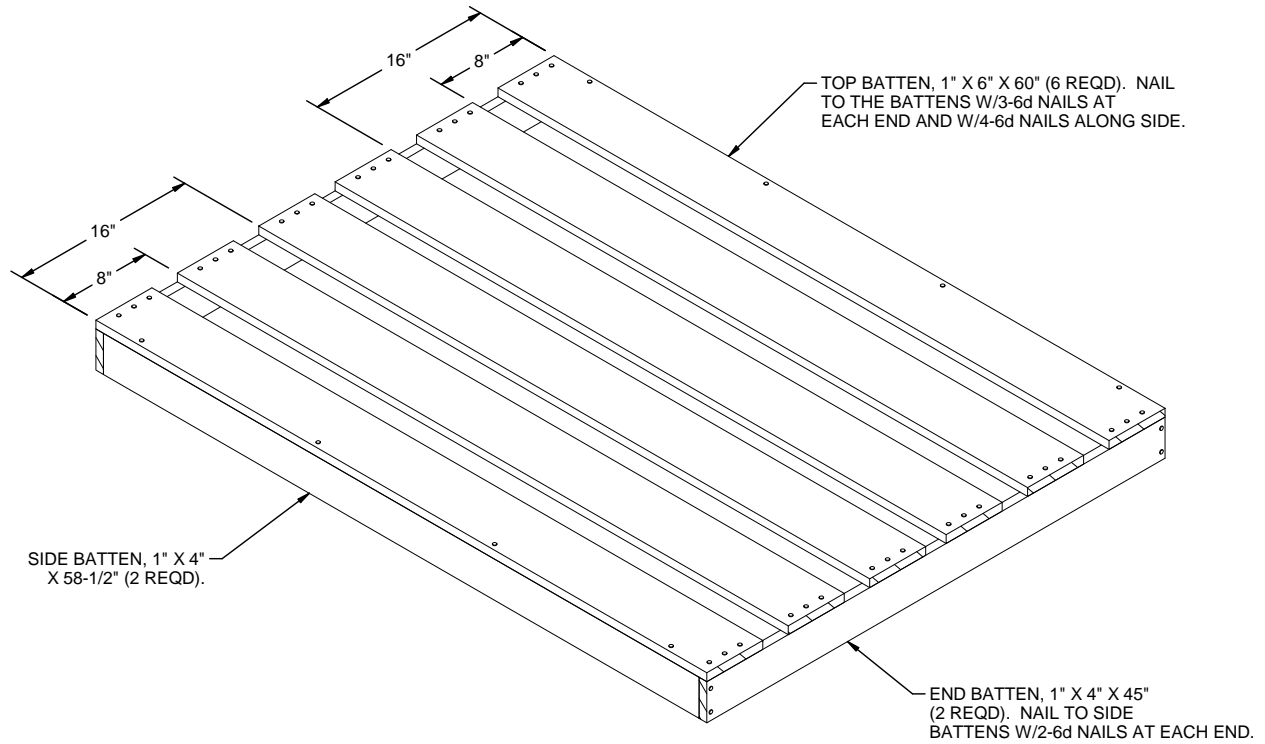


**PALLET UNIT**

SEE GENERAL NOTE "E" ON PAGE 2.

55 GAL POLYETHYLENE DRUMS (4 @ 587 LBS)	-----	2,348 LBS
DUNNAGE	-----	175 LBS
PALLET	-----	90 LBS
<hr/>		
TOTAL WEIGHT	-----	2,613 LBS (APPROX)
CUBE	-----	65.3 CU FT (APPROX)

BILL OF MATERIAL		
LUMBER	LINEAR FEET	BOARD FEET
1" X 4"	35	12
1" X 6"	60	30
2" X 4"	24	16
2" X 6"	19	19
NAI LS	NO. REQD	POUNDS
6d (2")	110	3/4
10d (3")	192	3
ANTI-CHAFING MATERIAL - - - AS REQD - - - - NIL		
PALLET, 42" X 53" - - - - - 1 REQD - - - 90 LBS		
STEEL STRAPPING, 1-1/4" - 130.00' REQD -18.68 LBS		
SEAL FOR 1-1/4" STRAPPING - - 8 REQD - - - - NIL		
STAPLE, 1-17/32" X 3/4" - - 54 REQD - 0.50 LBS		



**PALLET FRAME ASSEMBLY**

THE DISPLAY DEPICTED ABOVE IS OF THE PALLET FRAME ASSEMBLY. TWO ASSEMBLIES ARE REQUIRED PER PALLET, A TOP AND A BOTTOM FRAME. THE BOTTOM FRAME IS TO BE CENTERED AND SECURED TO THE PALLET POSTS W/6-10d NAILS PRIOR TO LOADING.

HORIZONTAL PIECE, 2" X 6" X 17"  
(4 REQD). NAIL TO THE VERTICAL  
PIECES W/3-10d NAILS AT EACH JOINT.

VERTICAL PIECE, 2" X 4"  
X 34-3/4" (4 REQD).

LATERAL PIECE, 2" X 6" X 11-1/2"  
(4 REQD). NAIL TO THE VERTICAL  
PIECES W/3-10d NAILS AT EACH JOINT.

ANTI-CHAFING MATERIAL (4 REQD. BOTTOM  
PIECE NOT SHOWN FOR CLARITY PURPOSES).  
SECURE TO THE ASSEMBLY ALONG THE  
CHAMFERS WITH FASTENERS.

CHAMFER, 1" AT 45° (2 PLACES).

### **SPACER ASSEMBLY**

(2 REQD)

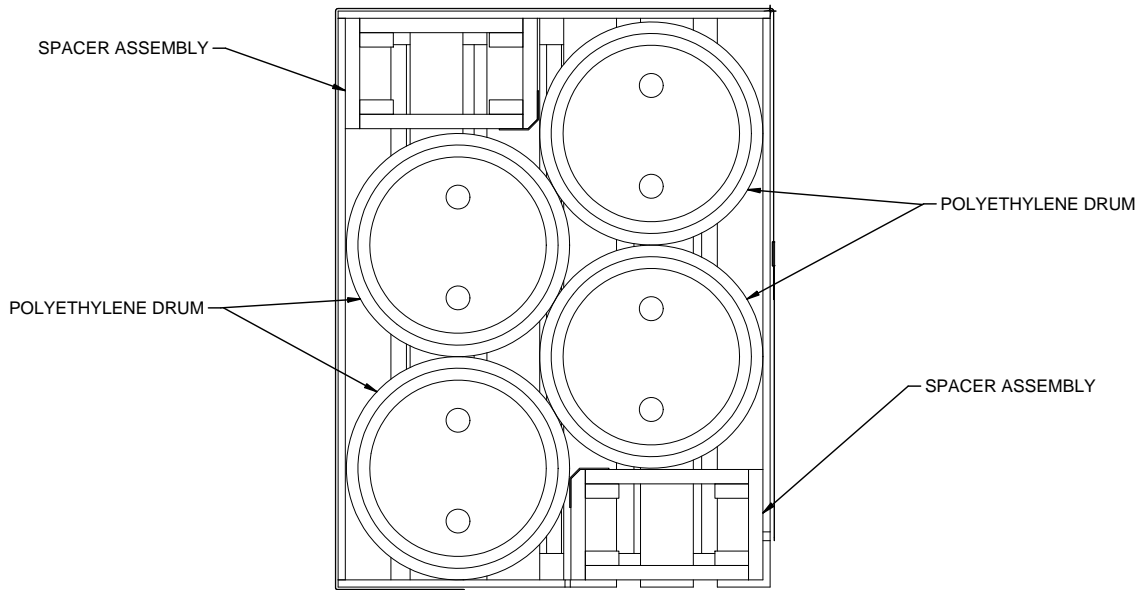
LATERAL PIECE, 2" X 6" X 34-3/4"  
(4 REQD). NAIL TO THE VERTICAL  
PIECES W/3-10d NAILS AT EACH JOINT.

VERTICAL PIECE, 2" X 4"  
X 34-3/4" (4 REQD).

HORIZONTAL PIECE, 2" X 6" X 17"  
(4 REQD). NAIL TO THE VERTICAL  
PIECES W/3-10d NAILS AT EACH JOINT.

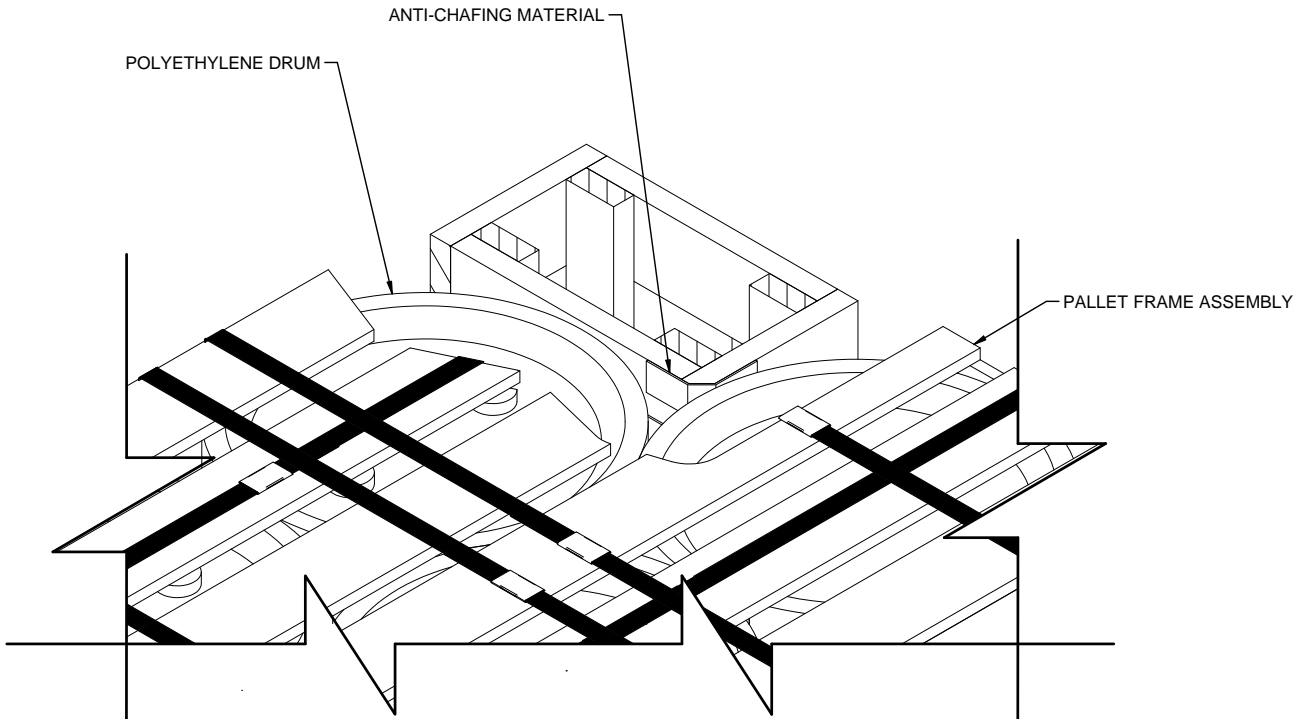
### **FILLER ASSEMBLY**

THE DISPLAY DEPICTED ABOVE IS FOR MINUS ONE DRUM AND  
SPACER ASSEMBLY. **NOTE:** FOR AN ASSEMBLY TO REPLACE A  
DRUM ONLY, REDUCE THE LENGTH OF THE LATERAL PIECES TO  
23-1/4".



**TOP VIEW OF PALLET**

PALLET IS SHOWN WITHOUT THE TOP FRAME AND STRAPPING. THE VIEW ABOVE DEPICTS PLACEMENT OF THE POLYETHYLENE DRUMS AND SPACER ASSEMBLIES. ENSURE THAT SPACER ASSEMBLIES FILL THE VOID BETWEEN THE DRUMS AND THE EDGE OF THE FRAME ASSEMBLIES.



**SPACER ASSEMBLY PLACEMENT**

THE VIEW ABOVE DEPICTS PLACEMENT OF THE ANTI-CHAFING MATERIAL ON THE SPACER ASSEMBLY. ENSURE THAT THE CHAMFER AND THE ANTI-CHAFING MATERIAL IS POSITIONED AGAINST THE CORNER-MOST DRUM WITHIN THE PALLET.