Hardware and Assembly Bulletin 325

MAPESA
MANUFACTURAS PETROLERAS, S.A. DE C.V.

www.mapesamx.com

Basic Weld Symbols

1. *In plan or elevation, near, far and both sides, locations refer to nearest member parallel to plane of drawing and not to others farther behind.*
2. *In section or end views only, when weld is not drawn, the side to which arrow points is considered near side.*
3. *Welds on both sides are of same size unless otherwise shown.*
4. *Symbols govern to break in continuity of structure or to extent of hatching or dimension lines.*
5. *Tail of arrow used for specification reference.*
6. *All welds are continuous and of user's standard proportions and all except V- and bevel-grooved welds are closed unless otherwise shown.*
7. *When welds are drawn in section or end views, obvious information is not given by symbol.*
8. *In joints in which one member only is to be grooved, arrows point to that member.*

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Table Of Contents

Basic Tray Installation Instructions

- *Trays designed by **Mapesa** have the capability to withstand normal operating loads and also for maintaining a concentrated live load of 250 pounds per sq. ft. at any point on the installed assembly. However, they are not designed for use as a platform or scaffold during installation due to the possibility of permanent deformation. Trays are not to be used as a support for internal piping unless indicated by applicable **Mapesa** drawings. Trays should not permanently deflect due to installation work.*

- *Temporarily lay plywood or planks across support members or perpendicular to the trusses where necessary during installation to reinforce tray decks and protect parts such as valves. This applies to routes frequently traveled across trays and also to areas where excessive personnel are working during installation, such as vessel manholes.*

- *To familiarize workers with the task of installing the trays, lay all sections of one tray together before installation begins and loosely attach one fastener assembly of each type, this will assure proper fit up off all tray components and will ensure proper hardware allocation.*

- *Allow headroom for workers by installing the lowest tray first and then work upward. When there are crews working on more than one level at a time, ensure the ones below are provided protection against objects accidentally dropped from above.*

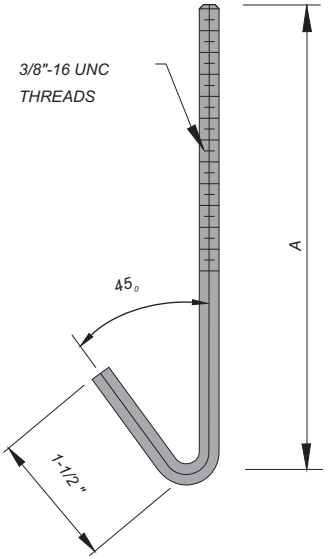
- *Inspect each tray's support ring and other attachment points before they are installed, in particular, to make sure they are free from weld spatter and debris that would interfere with proper fit and leveling. Grind where needed.*

Commonly Used Conversion Factors

To Convert	Multiply By	To Obtain
atmospheres	14.7	pounds/sq.in.
atmospheres	33.9	ft. of H20
atmospheres	760.0	mmHg
bars	100,000.0	Pa (pascals)
barrels (oil)	42.0	gal. (oil)
cu. feet	1,728.0	cu. inches
cu. feet	0.02832	cu. meters
cu. feet	7.48052	gal.(u.s. liq.)
cu. feet/sec.	448.831	gal./min.
dynes	0.00001	newtons
feet	0.3048	meters
feet of water	62.43	pounds/sq.ft.
inHg	0.491154	psi
lbs/hr	0.4536	kg/hr
kg.	2.2046	lbs.
lbs/ft3	16.01846	kg/m^3
mmHg	0.019337	psi
newtons	100,000.0	dynes
pounds / sq. In.	0.0703	kg / sq. cm
pounds / sq. In.	0.0689	bars

Miscellaneous Hardware

Hook Bolts



HB-1, A = 9.437"

HB-2, A = 6.750"

(AVAILABLE IN SS & CS)

Basic Tray Installation Instructions

- *Correctly apply gaskets, as shown in the* ***Mapesa*** *drawing specifications and be sure to use the correct nuts, bolts, washers and clamps. Improper operation of the tower or structural failures may result from any deviations or substitutions no matter how insignificant they may seem.*

- *For fast and efficient installation the use of a power wrench with torque control is recommended. To prevent galling during operation and facilitate removal, in any case, use a lubricant suitable for the tower operating conditions on all threaded fasteners.*

- *Trays are normally installed in the following sequence (listed from start to finish): major beams (if req'd), downcomers, inlet panels, active panels and finally the manway panel. Distribute components evenly and avoid overstressing by using a minimum of fasteners and low torque on bolts until everything is in place. After proper fit is assured throughout the tray, install the remaining fasteners in an even manner to the correct torque.*

- *The recommended torque for 3/8-inch bolt threads is 10 to 14 foot-pounds for carbon or stainless steel and 7 to 10 foot-pounds for softer metals. Torque values should be reduced where appropriate to avoid deformation of parts, for instance, when securing bubble caps to risers use a torque of about 6 to 10 foot-pounds.*

- *All hardware should be verified to ensure it was installed properly before installing the next tray.*

- *Remove all loose parts, tools, planks, debris and such from the trays, also spot-check bolts with a torque wrench. Wait for inspection and a water test (if called for in the job specifications).*

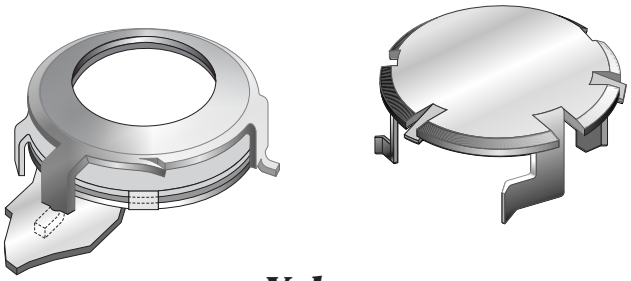
Mission Statement

Although competitive pricing is automatic, ***Mapesa*** *maintains a constant focus on its Mission: to successfully achieve complete customer satisfaction by providing consistent on-time delivery of superior products which are designed and manufactured by an experienced and knowledgeable staff to surpass all customer expectations.*

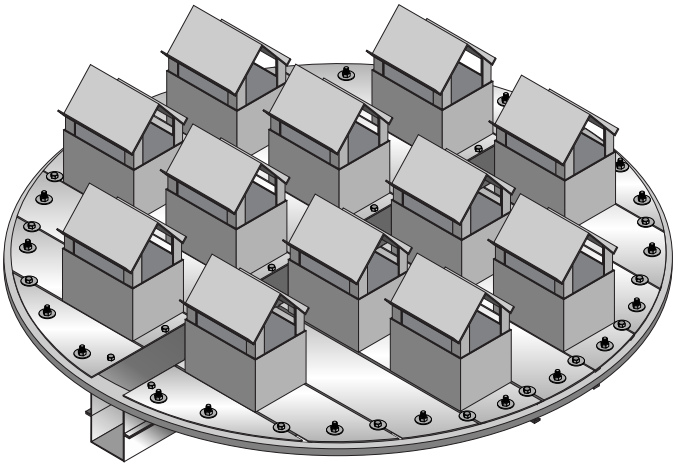
Mapesa *is focused on the ultimate success of its customers.*

Mapesa *specializes in the design and manufacture of mass transfer equipment for the Chemical Process Industries. Our primary products include conventional sieve, valve, and bubble cap trays; packed tower internals and random dumped packing.*

Mapesa *also designs and manufactures speciality trays such as dislodgement resistant trays, dual flow, disc & donut, cartridge trays and shed trays. Our manufacturing facility incorporates state-of-the-art equipment capable of high volume precision sheet metal fabrication. This allows* ***Mapesa*** *to offer competitive equipment pricing and delivery. Our process and mechanical designs are based on methods which have been thoroughly tested and proven.*



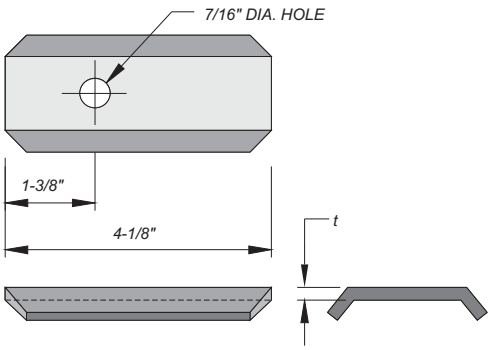
Valves



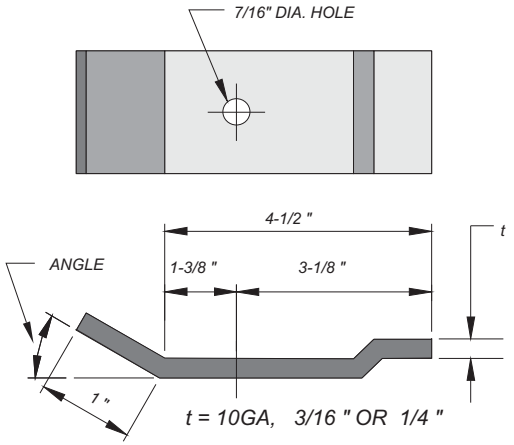
Internals

Miscellaneous Hardware

Bottom Clamps



BC-510, t = 10 GA.
BC-512, t = 12 GA.
(AVAILABLE IN SS & CS)

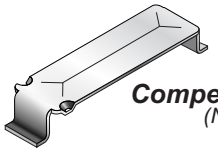


BC-1, ANGLE = 30 ^{0}
BC-2, ANGLE = 45 ^{0}
(AVAILABLE IN SS & CS)

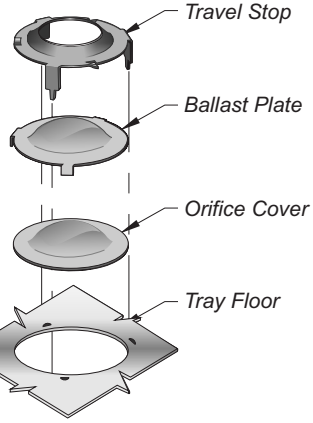
Valve Types

Mapesa *offers many different types of valves.* ***Mapesa*** *equivalent valves are identical to the original manufacturers design. These high quality valves allow us to offer very competitive prices on replacement of existing valve trays regardless of who originally manufactured the trays.*

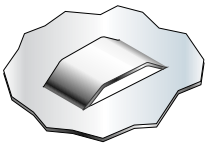
All patents on the popular valve trays have expired, so there is no longer any need to pay excessive prices for replacing existing equipment. Since we have tooling to provide extruded deck openings when needed, we can offer individual valves, active panels with



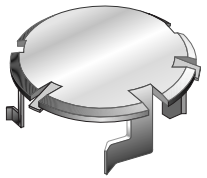
Competitor Valve
(Nutter)



MP-A1
(three piece valve)



MP-SVG



MP-V1
(one piece valve)

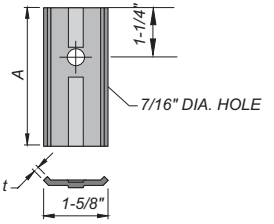
Leak Test for Collector Trays

The leak test that is to be performed on the entire collector tray is as follows:

- *Temporarily plug any drain holes.*
- *Personnel on bottom side of tray should be watching for liquid streams or excessive leakage as the collector tray is being filled. Filling should stop if significant leakage is detected and leaks be sealed prior to proceeding. Water is to remain for 1 hour after liquid level is equal to the stack height and then the water level should be re-checked. The rate of permitted leakage should not exceed 1 gph per sq. ft. of the tower area and should be distributed uniformly across the tested area. If the leakage rate is above this value, further sealing is required.*
- *Austenetic stainless steel leak tests should be performed with water that has less than 250 ppm chloride ion content.*
- *Drain the water from the system after testing.*

Miscellaneous Hardware

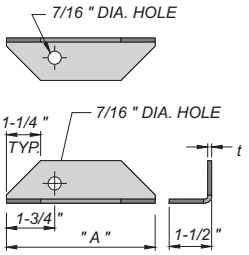
Seal Plates



t = 12 GA & 10 GA
(AVAILABLE IN SS & CS)

12 GA		10 GA	
SEAL PL. No.	A	SEAL PL. No.	A
SP-12	3-1/2"	SP-10	3-1/2"
SP-12A	4"	SP-10A	4"
SP-12B	4-1/2"	SP-10B	4-1/2"
SP-12C	5"	SP-10C	5"
SP-12D	5-1/2"	SP-10D	5-1/2"

Angle Hangers

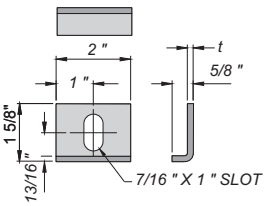


t = 12 GA & 10 GA
(AVAILABLE IN SS & CS)

12 GA		10 GA	
ANG. HGR. No.	A	ANG. HGR. No.	A
AH-10	5 "	AH-40	5 "
AH-20	6 "	AH-50	6 "
AH-30	✳	AH-60	✳

✳ *SPECIFY LENGTH REQUIRED WHEN ORDERING TAH30 & TAH60*

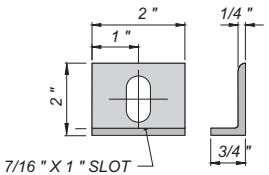
Clip Angle



CA-8, t = 14 GA.
CA-10, t = 10 GA.

(AVAILABLE IN SS & CS)

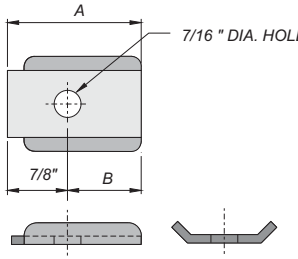
Clip Angle



CA-11

(AVAILABLE IN SS & CS)

Top Tray Clamps



TTC-1, A = 2-3/8" & B= 1-1/2 "
TTC-2, A = 2-7/8" & B= 2 "
(AVAILABLE IN 12 GA. & 10 GA SS & CS)

Mapesa Dislodgement Resistant Trays

Mapesa *"D.R." (Dislodgement Resistant) trays are specifically designed for applications where unusual uplift surges exist so that mechanical failure is prevented. These trays are equipped with special heavy duty features which allow the individual tray components to act as a network, whereby, the fully assembled tray is capable of withstanding pressure surges of up to one, two or even three p.s.i. without permanent deformation or dislodgement of any of the components. Depending upon the specific design criteria, such as vessel design temperature, anticipated magnitude of overpressure, consideration of possible pulsation or excessive vibration, material analysis, corrosion allowance and tower diameter, any combination of the following* ***Mapesa*** *"D.R." features (shown on pages 9 - 11) may be utilized in tray design:*

- *Increased tray thickness (trays which are normally 14 ga. for stainless are increased to 12 ga., 10 ga., 3/16" or even 1/4" thick as needed).*

- *Thru-bolted integral beams, (normal design allows for a frictional holddown of tray panel edges).*

- *Increased quantity of bolting and hardware assemblies to utilize 3" spacing (normal spacing for holddown on tray panel edges is approximately 6").*

- *Lock washers or double nuts (for use when excessive vibration is anticipated as a possibility).*

- *Thru-bolted clips at ends of integral beams for attachment to adjacent beams (see* ***figure a****) or tray support ring (see* ***figure b*** *).*

Mapesa Dislodgement Resistant Trays

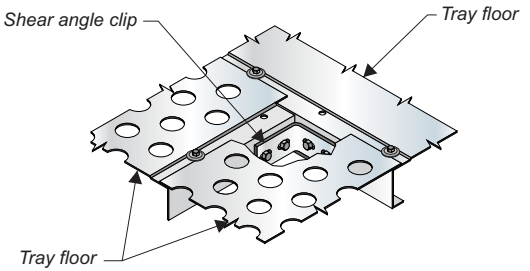


Figure a
(Integral truss to integral truss connection)

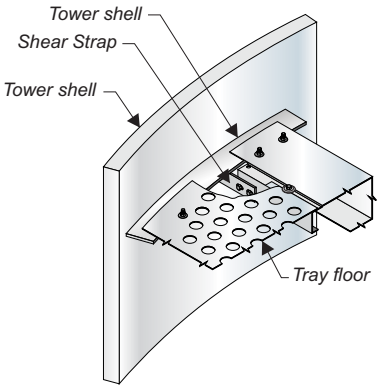


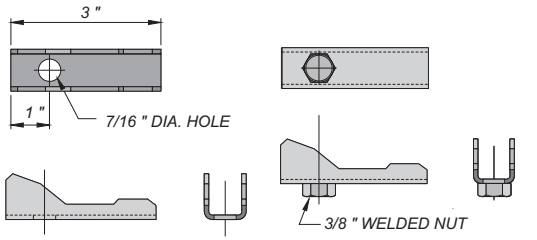
Figure b
(Integral truss to tray support ring connection)

- *Thru-bolted clip angles at ends of integral beams for attachments to downcomer truss (see **figure c** page 11)*

- *Welded tray design (for use when installation time and future removal considerations allow).*

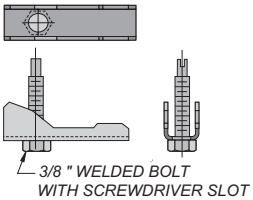
- *Additional major beams or support channels (these beams are bolted to welded-in attachments at tower shell).*

Bottom Tray Clamps



BTC-50

BTC-51
(BTC-50 CLAMP WITH 3/8" WELDED NUT)



BTC-52 ,A = 2"
BTC-52A ,A = 2-1/2 "
BTC-52B ,A = 3"

(BTC-50 CLAMP WITH 3/8" WELDED BOLT)
(AVAILABLE IN SS & CS)

General Installation Procedures

- *Verify (upon delivery of material from **Mapesa**) that all necessary parts and hardware were received. This will avoid any unnecessary delays for the beginning of installation.*

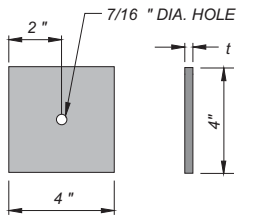
- *Properly store all material to avoid loss and/or damage. Leave all items in the original crates (when possible). Because valve parts can be deformed and some valves will interlock when stacked together, special care is needed for valve tray sections.*

- *Carefully study the customer drawings and all related information furnished by **Mapesa** before starting installation. All notes should be read, especially those pertaining to parts which require adjustment at installation, such as weir heights and downcomer clearances.*

- *Refer to the assembly drawing section (sheets 15 - 22) of this publication in assembling fasteners for trays designed by **Mapesa**. Assemblies are called out by number and marked thus ( ) on **Mapesa** drawings.*

Miscellaneous Hardware

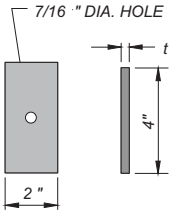
Holddown Plate



HP-1

t = 12 GA, 10 GA, 3/16 " & 1/4 "
(AVAILABLE IN SS & CS)

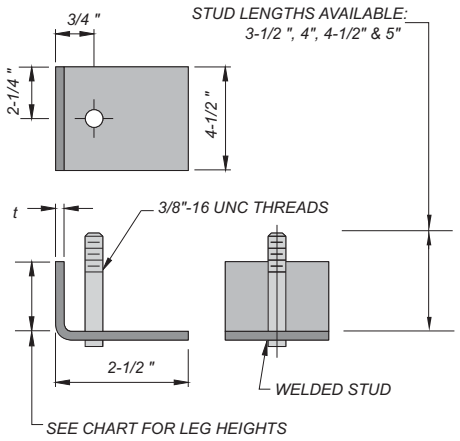
Holddown Plate



HP-2

t = 12 GA, 10 GA, 3/16 " & 1/4 "
(AVAILABLE IN SS & CS)

Grid Clamp

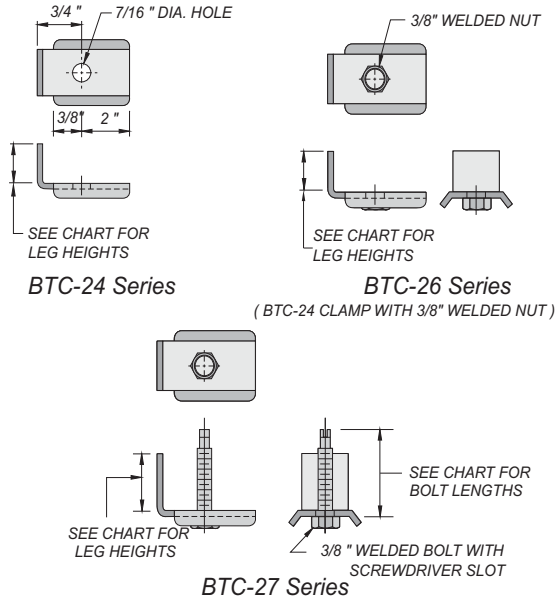


GC-2

t = 12 GA & 10 GA (AVAILABLE IN SS & CS)

CLAMP No.	LEG HT	CLAMP No.	LEG HT	CLAMP No.	LEG HT
GC-2A	3/16"	GC-2F	5/8"	GC-2L	1-1/4"
GC-2B	1/4"	GC-2G	3/4"	GC-2M	1-3/8"
GC-2C	5/16"	GC-2H	7/8"	GC-2N	1-1/2"
GC-2D	3/8"	GC-2J	1"	GC-2P	1-5/8"
GC-2E	1/2"	GC-2K	1-1/8"	GC-2Q	1-3/4"

Bottom Tray Clamps



T24 SERIES CLAMP NO.	T26 SERIES CLAMP NO.	T27 SERIES CLAMP NO.	LEG HEIGHTS	BOLT LENGTHS
BTC-24A	BTC-26A	BTC-27A	3/16"	2 "
BTC-24B	BTC-26B	BTC-27B	1/4"	2 "
BTC-24C	BTC-26C	BTC-27C	5/16"	2 "
BTC-24D	BTC-26D	BTC-27D	3/8"	2 "
BTC-24E	BTC-26E	BTC-27E	1/2"	2 "
BTC-24F	BTC-26F	BTC-27F	5/8"	2 "
BTC-24G	BTC-26G	BTC-27G	3/4"	2 "
BTC-24H	BTC-26H	BTC-27H	7/8"	2 "
BTC-24J	BTC-26J	BTC-27J	1"	2 -1/2 "
BTC-24K	BTC-26K	BTC-27K	1-1/8"	2 -1/2 "
BTC-24L	BTC-26L	BTC-27L	1-1/4"	2 -1/2 "
BTC-24M	BTC-26M	BTC-27M	1-3/8"	2 -1/2 "
BTC-24N	BTC-26N	BTC-27N	1-1/2"	2 -1/2 "
BTC-24P	BTC-26P	BTC-27P	1-5/8"	3 "
BTC-24R	BTC-26R	BTC-27R	1-3/4"	3 "

Mapesa Dislodgement Resistant Trays

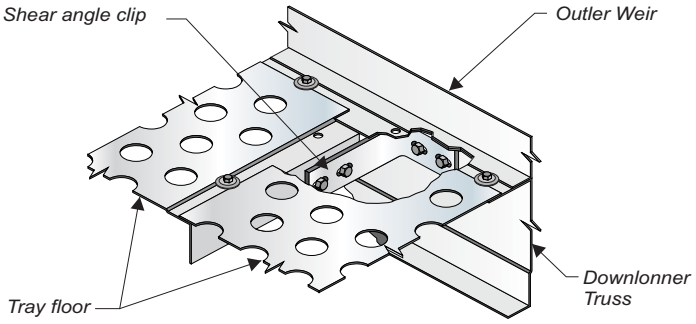


Figure c
(Tray to downcomer connection)

- *Plate and angle lattice trusses (see **figure d** below). This configuration often provides the necessary requirements for maximum strength and vapor equalization with minimum weight and use of material.*

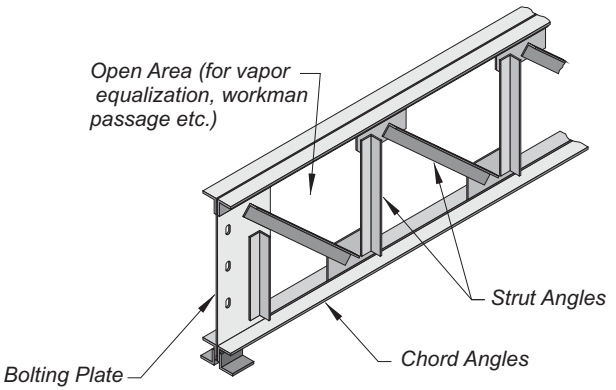


Figure d
(Lattice truss)

- *"D.R." Hardware (heavy duty, extra thick washers and clamps which greatly improve resistance to dislodgement).*

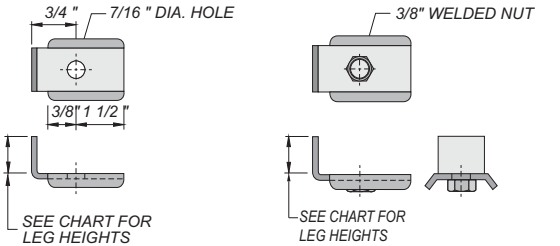
Mapesa Dislodgement Resistant Trays

Mapesa *does not recommend "D.R." trays for all applications because of minor problems such as increased installation time and effort due to the extra bolting and hardware assemblies required and additional tray purchase price.*

Under normal liquid and vapor loadings most trays will operate adequately without "D.R." features. In some cases, however, where, mechanical failure of trays in certain areas of towers is known to be a problem (particularly above and below vapor feeds), "D.R." trays can be installed and tray operating life can be considerably extended.

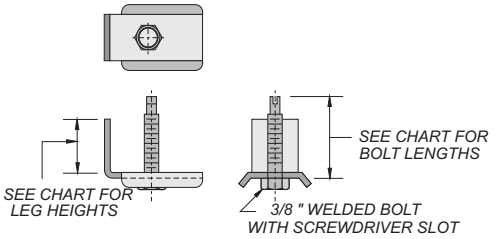
This extended tray operation can often result in extended service life and reliability in a vessel or even an entire plant, eliminating the necessity for frequent previously experienced maintenance shut downs.

Bottom Tray Clamps



BTC-20 Series

BTC-22 Series
(BTC-20 CLAMP WITH WELDED NUT)

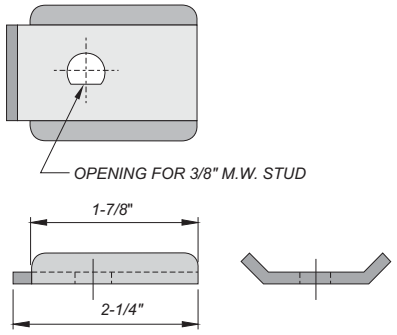


BTC-23 Series
(BTC-20 CLAMP WITH WELDED BOLT)

BTC-20 SERIES CLAMP NO.	*BTC-22 SERIES CLAMP NO.*	*BTC-23 SERIES CLAMP NO.*	*LEG HEIGHTS*	*BOLT LENGTHS*
BTC-20A	*BTC-22A*	*BTC-23A*	*3/16"*	*2 "*
BTC-20B	*BTC-22B*	*BTC-23B*	*1/4"*	*2 "*
BTC-20C	*BTC-22C*	*BTC-23C*	*5/16"*	*2 "*
BTC-20D	*BTC-22D*	*BTC-23D*	*3/8"*	*2 "*
BTC-20E	*BTC-22E*	*BTC-23E*	*1/2"*	*2 "*
BTC-20F	*BTC-22F*	*BTC-23F*	*5/8"*	*2 "*
BTC-20G	*BTC-22G*	*BTC-23G*	*3/4"*	*2 "*
BTC-20H	*BTC-22H*	*BTC-23H*	*7/8"*	*2 "*
BTC-20J	*BTC-22J*	*BTC-23J*	*1"*	*2 -1/2 "*
BTC-20K	*BTC-22K*	*BTC-23K*	*1-1/8"*	*2 -1/2 "*
BTC-20L	*BTC-22L*	*BTC-23L*	*1-1/4"*	*2 -1/2 "*
BTC-20M	*BTC-22M*	*BTC-23M*	*1-3/8"*	*2 -1/2 "*
BTC-20N	*BTC-22N*	*BTC-23N*	*1-1/2"*	*2 -1/2 "*
BTC-20P	*BTC-22P*	*BTC-23P*	*1-5/8"*	*3 "*
BTC-20R	*BTC-22R*	*BTC-23R*	*1-3/4"*	*3 "*

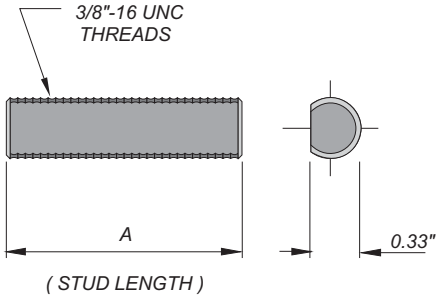
Manway Lock Devices

Manway Lock Clamp



MLC-45
THK. = 12 GA & 10 GA

Manway Lock Studs

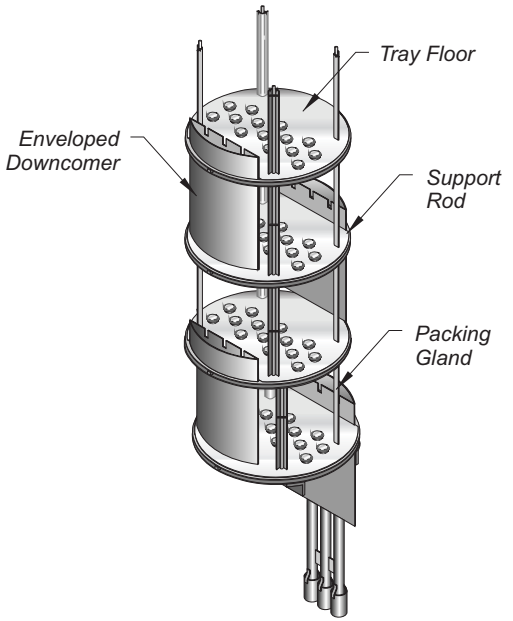


MLS-5, A = 2"
MLS-7, A = 2-1/2"

Cartridge Trays

Mapesa *designs and manufactures quality cartridge trays (which are shop pre-fabricated into bundles of 4 or 5 trays each, equipped with enveloped downcomers, peripheral packing glands and spacer rods).*

These trays offer a viable solution for the installation and removability of trays for towers which are too small for workmen passage. The bundles are designed to be pushed down from the top head of the vessel or from upper shell flanges.



Cartridge Tray Bundle

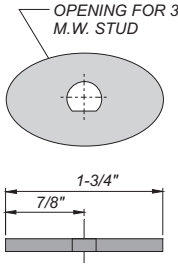
Material Symbols

(used on bolting material)

Oval	Carbon Steel
Square	Type 410 Stainless Steel
Rectangle	Type 304 Stainless Steel
L	Type 304L Stainless Steel
Cloud	Type 316 Stainless Steel
L	Type 316L Stainless Steel
Flower	Type 317 Stainless Steel
L	Type 317L Stainless Steel
Pentagon	Type 321 Stainless Steel
Hexagon	Type 347 Stainless Steel
Triangle	Type 904L Stainless Steel
X	AL-6XN
HC	Hastelloy C-276
Diamond	Monel
Lens	Inconel 600
Half-circle	Nickel
T2	Ti-Gr2
T7	Ti-Gr7

Manway Lock Devices

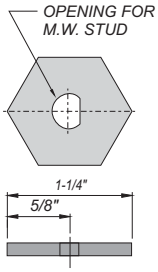
Manway Lock Clamps



MLC-2, t = 1/4 " CS
MLC-3, t = 3/16 " SS
MLC-3A, t = 10GA " SS

t = thickness

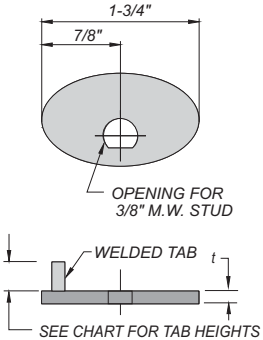
Manway Lock Clamps



MLC-20, t = 1/4 " CS
MLC-30, t = 3/16 " SS
MLC-30A, t = 10GA " SS

t = thickness

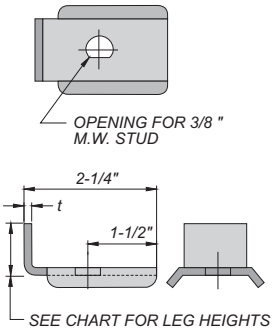
Manway Lock Clamp



MLC-2K THRU MP-2X

t = 3/16 " SS & t = 1/4 " CS

Manway Lock Clamp



MLC-40A THRU MP-40Q

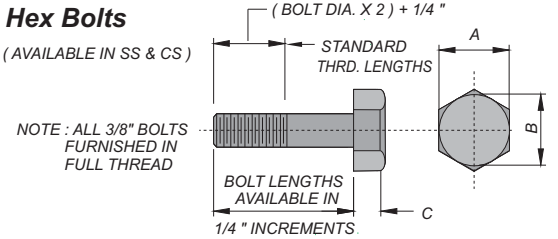
t = 12 GA & 10 GA

CLAMP NO.	TAB HT.	CLAMP NO.	TAB HT.	CLAMP NO.	TAB HT.	CLAMP NO.	LEG HT.	CLAMP NO.	LEG HT.	CLAMP NO.	LEG HT.
MLC-2K	1/16"	MLC-2P	5/16"	MLC-2T	9/16"	MLC-40A	3/16"	MLC-40F	5/8"	MLC-40L	1-1/4"
MLC-2L	1/8"	MLC-2Q	3/8"	MLC-2V	5/8"	MLC-40B	1/4"	MLC-40G	3/4"	MLC-40M	1-3/8"
MLC-2M	3/16"	MLC-2R	7/16"	MLC-2W	11/16"	MLC-40C	5/16"	MLC-40H	7/8"	MLC-40N	1-1/2"
MLC-2N	1/4"	MLC-2S	1/2"	MLC-2X	3/4"	MLC-40D	3/8"	MLC-40J	1"	MLC-40P	1-5/8"
						MLC-40E	1/2"	MLC-40K	1-1/8"	MLC-40Q	1-3/4"

Nuts and Bolts

Hex Bolts

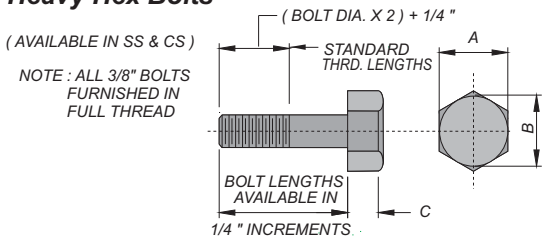
(AVAILABLE IN SS & CS)



BOLT No.	THREAD SIZE-UNC-2A	A	B	C
		(I N C H E S)		
HB-25	1/4 "-20	.43	.49	.17
HB-38	3/8 "-16	.55	.64	.25
HB-50	1/2 "-13	.74	.85	.33
HB-63	5/8 "-11	.92	1.06	.41
HB-75	3/4 "-10	1.11	1.27	.49
HB-88	7/8 "-9	1.29	1.48	.57
HB-95	1 " -8	1.48	1.69	.65
HB-96	1-1/8 "-7	1.66	1.90	.72
HB-97	1-1/4 "-7	1.84	2.12	.81

Heavy Hex Bolts

(AVAILABLE IN SS & CS)



BOLT No.	THREAD SIZE-UNC-2A	A	B	C
		(I N C H E S)		
HHB-38	3/8 "-16	.67	.78	.25
HHB-50	1/2 "-13	.86	.99	.33
HHB-63	5/8 "-11	1.05	1.29	.41
HHB-75	3/4 "-10	1.23	1.41	.46
HHB-88	7/8 "-9	1.42	1.62	.53
HHB-95	1 " -8	1.60	1.84	.59
HHB-96	1-1/8 "-7	1.78	2.05	.66
HHB-97	1-1/4 "-7	1.97	2.26	.75

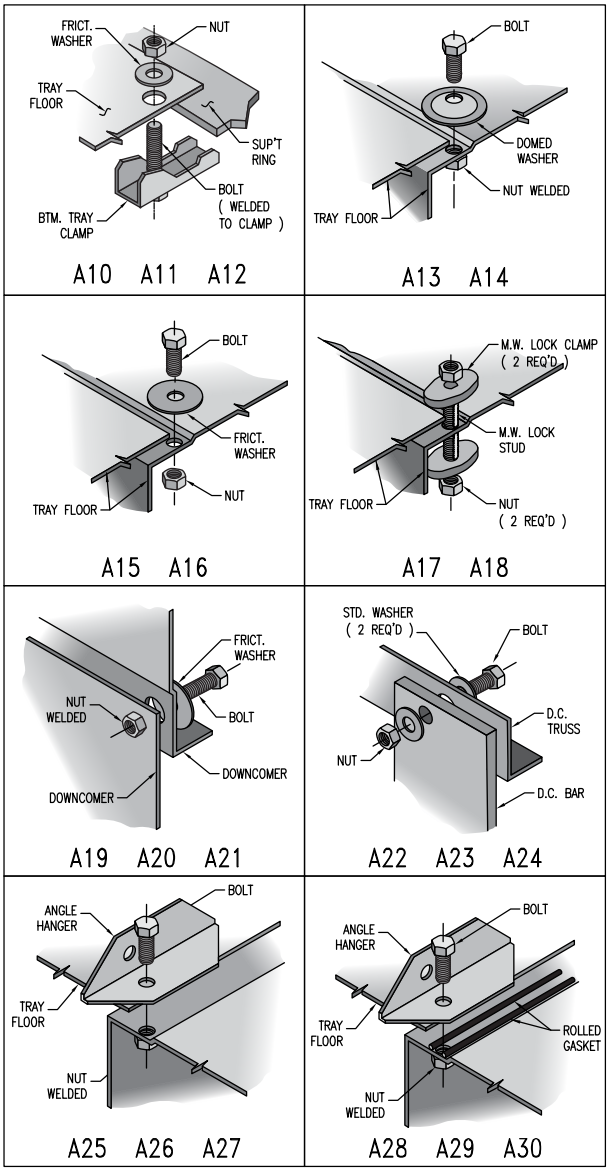
Assembly Drawings

- ***Mapesa*** *customer drawings provide fastener details which are called out by number and utilize assembly numbers marked thus ( ) to designate location of the assembly. The parts are identified only by general type, such as "Tray Clamp". More specific identifications are provided with the customer drawings.*

- *The following assemblies (listed on pages 16 - 22) provide guidance to tray installers.*

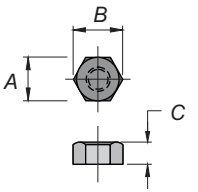
Note: *These assemblies are listed in numerical order, from A10 through A188. Fully Gasketed Assemblies begin with A110.*

Assembly Drawings



Nuts and Bolts

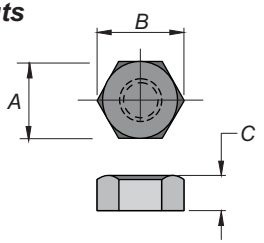
Hex Nuts



(AVAILABLE IN SS & CS)

NUT NO.	THREAD SIZE-UNC-2B	A	B	C
		(I N C H E S)		
HN-25	1/4 "-20	.43	.50	.22
HN-38	3/8 "-16	.56	.64	.33
HN-50	1/2 "-13	.74	.85	.44
HN-63	5/8 "-11	.94	1.07	.55
HN-75	3/4 "-10	1.13	1.27	.64
HN-88	7/8 "-9	1.31	1.48	.75
HN-95	1 " -8	1.50	1.69	.86
HN-96	1-1/8 "-7	1.69	1.90	.97
HN-97	1-1/4 "-7	1.88	2.12	1.06

Heavy Hex Nuts

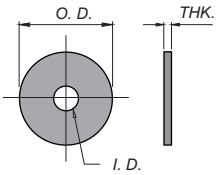


(AVAILABLE IN SS & CS)

NUT NO.	THREAD SIZE-UNC-2B	A	B	C
		(I N C H E S)		
HHN-38	3/8 "-16	.74	.78	.36
HHN-50	1/2 "-13	.86	.99	.48
HHN-63	5/8 "-11	1.05	1.20	.61
HHN-75	3/4 "-10	1.23	1.41	.734
HHN-88	7/8 "-9	1.42	1.62	.86
HHN-95	1 " -8	1.60	1.84	.98
HHN-96	1-1/8 "-7	1.78	2.05	1.11
HHN-97	1-1/4 "-7	1.97	2.26	1.22

Structural Washers

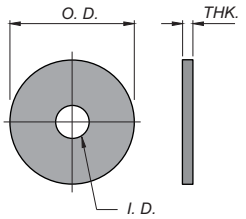
Standard Washers



AVAILABLE IN SS & CS

WASHER NO.	BOLT SIZE	I. D.	O. D.	THK.
SW-25	1/4"	5/16"	3/4"	16 GA
SW-38	3/8"	7/16"	1"	14 GA
SW-50	1/2'	9/16"	1-3/8"	12 GA
SW-63	5/8"	11/16"	1-3/4"	10 GA
SW-75	3/4"	13/16"	2"	10 GA
SW-88	7/8"	15/16"	2-1/4"	5/32"
SW-95	1"	1-1/16"	2-1/2"	5/32"
SW-96	1-1/8"	1-1/4"	2-3/4"	5/32"
SW-97	1-1/4"	1-3/8"	3"	5/32"

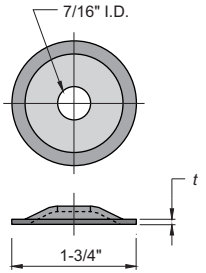
Frictional Washers



AVAILABLE IN SS & CS

WASHER NO.	BOLT SIZE	I. D.	O. D.	THK.
FW-10	3/8"	7/16"	1-1/2"	12 GA
FW-15	3/8"	7/16"	1-1/2"	10 GA
FW-20	3/8"	7/16"	1-1/2"	1/4"
FW-25	3/8"	7/16"	1-3/4"	12 GA
FW-30	3/8"	7/16"	1-3/4"	10 GA
FW-35	3/8"	7/16"	1-3/4"	1/4"
FW-40	3/8"	7/16"	2-1/4"	12 GA
FW-45	3/8"	7/16"	2-1/4"	10 GA
FW-50	1/2"	9/16"	1-1/2"	12 GA
FW-55	1/2"	9/16"	1-1/2"	10 GA
FW-60	1/2"	9/16"	1-1/2"	1/4"

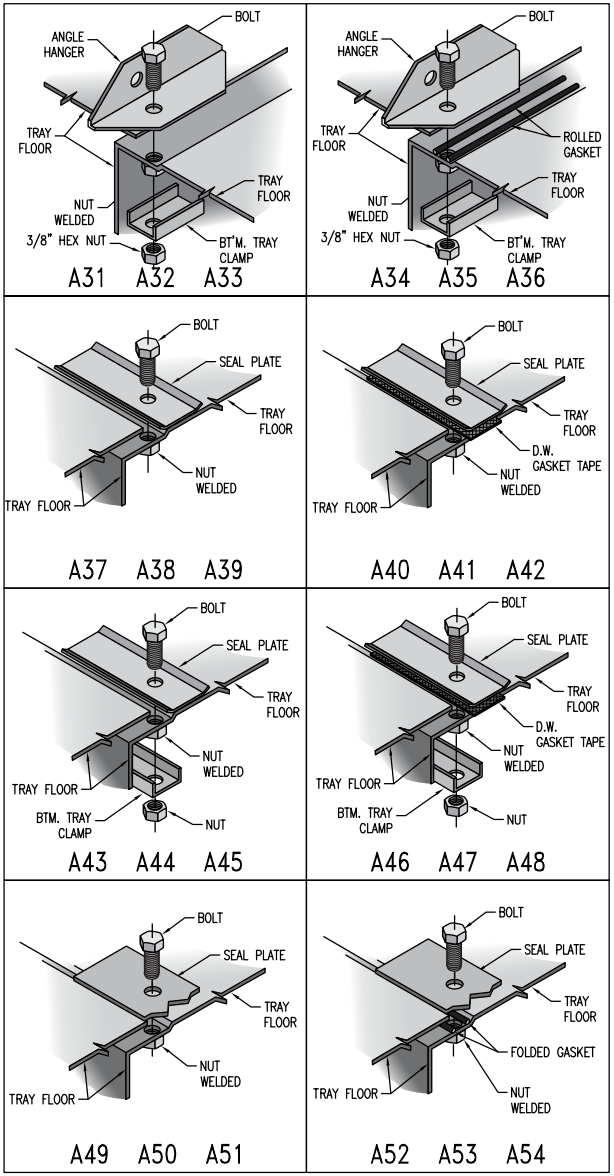
Domed Washer



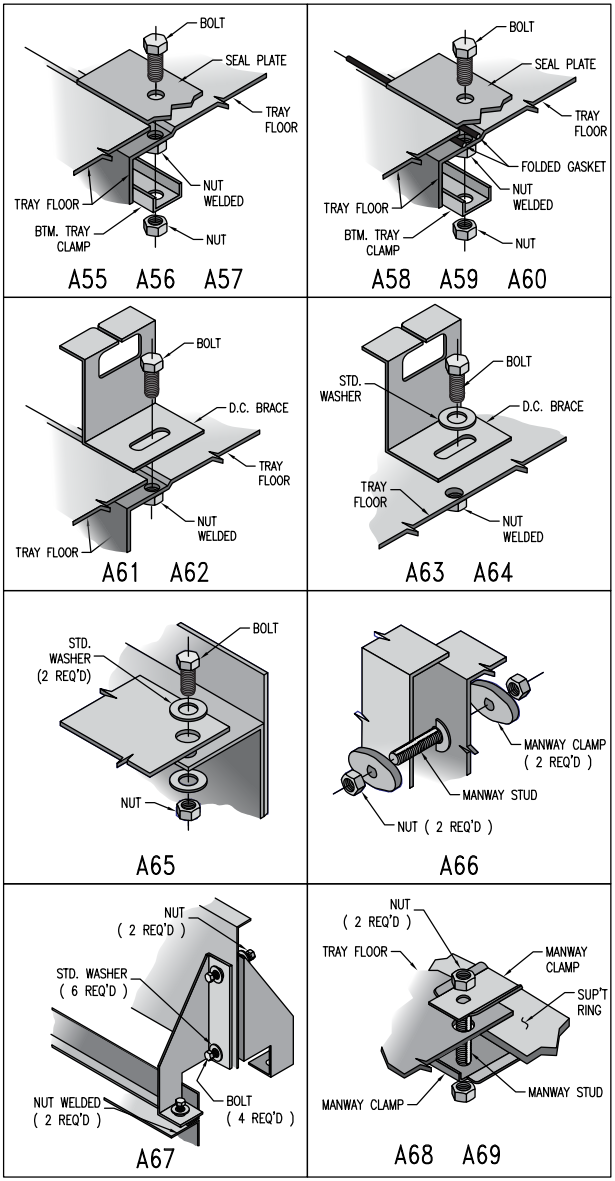
DW-14, t = 14 GA (SS)

DW-25, t = 10 GA (CS)

Assembly Drawings



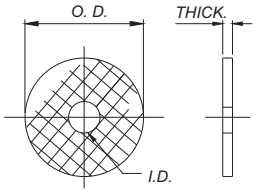
Assembly Drawings



Gasketing

Washer Gasket

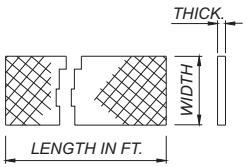
FOR 3/8" BOLTS



WASHERS ARE AVAILABLE IN THE FOLLOWING MATERIALS & THICKNESS :

D - 8080	1/16" & 1/8"
TN - 9000	1/16"
BLUEGUARD	1/16" & 1/8"
GREENGUARD	1/16" & 1/8"
TEFLON	1/16" & 1/8"
NEOPRENE	1/16" & 1/8"
GRAFOIL	1/16" & 1/8"

Gasket Tape



GASKET TAPE IS AVAILABLE IN THE FOLLOWING WIDTHS, STYLES, MATERIALS & THICKNESS :

STYLES AVAILABLE
DW = DROP WARP
NDW = NON-DROP WARP

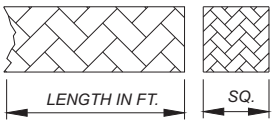
MATERIALS AVAILABLE

FIBERGLASS	1/16" & 1/8"
TEFLON	1/16" & 1/8"
NEOPRENE	1/16" & 1/8"

WASHER GASK. NO.	I. D.	O. D.	THICK.
WG-10	3/8"	1"	1/16"
WG-15	3/8"	1"	1/8"
WG-20	3/8"	1-1/2"	1/16"
WG-25	3/8"	1-1/2"	1/8"
WG-30	3/8"	1-3/4"	1/16"
WG-35	3/8"	1-3/4"	1/8"
WG-40	3/8"	2-1/4"	1/16"
WG-45	3/8"	2-1/4"	1/8"

GASKET TAPE NO.	THICK.	WIDTH	STYLE
GT-10	1/16"	1"	NDW
GT-15	1/8"	1"	NDW
GT-16	1/16"	1-1/2"	DW
GT-17	1/8"	1-1/2"	DW
GT-20	1/16"	2"	NDW & DW
GT-25	1/8"	2"	NDW & DW
GT-30	1/16"	2-1/2"	NDW & DW
GT-35	1/8"	2-1/2"	NDW & DW

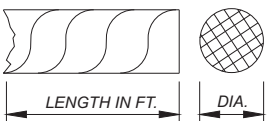
Square Gasket Rope



AVAILABLE IN FIBERGLASS, TEFLON & NEOPRENE

GASKET ROPE NO.	SIZE	GASKET ROPE NO.	SIZE
SGR-25	1/4" SQ	SGR-63	5/8" SQ
SGR-38	3/8" SQ	SGR-75	3/4" SQ
SGR-50	1/2" SQ	SGR-95	1" SQ

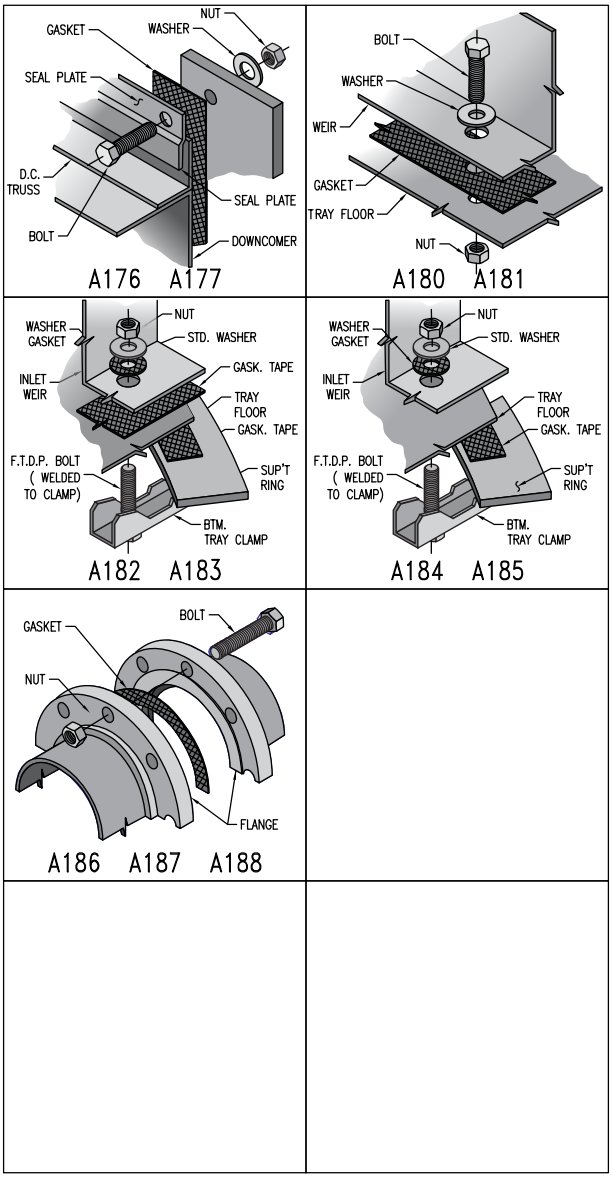
Round Gasket Rope



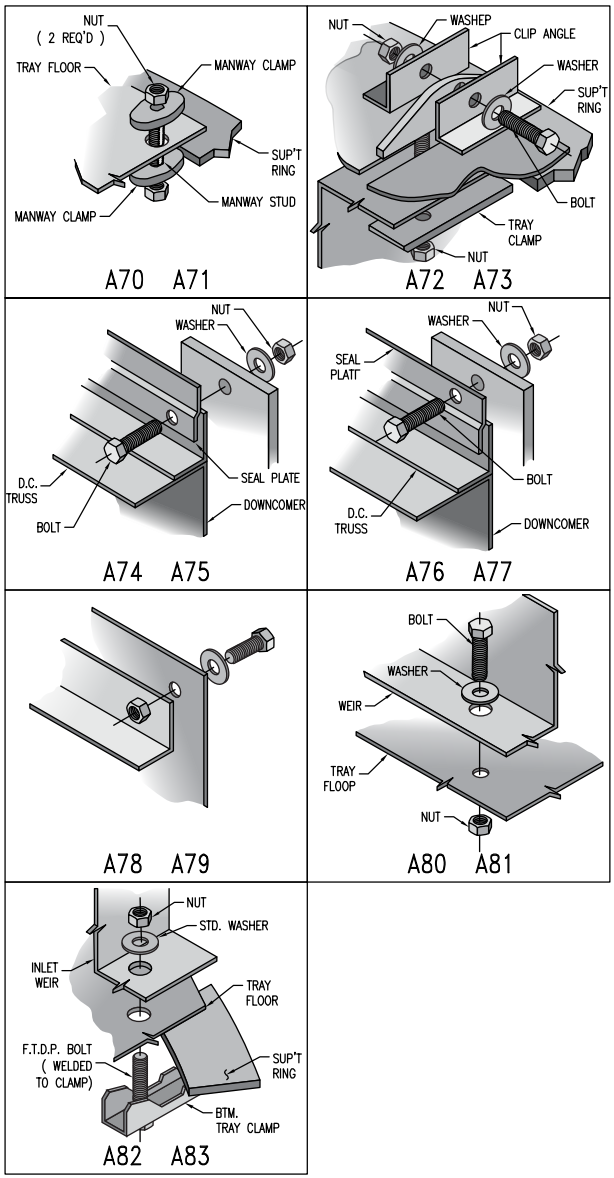
AVAILABLE IN FIBERGLASS, TEFLON & NEOPRENE

GASKET ROPE NO.	DIA.	GASKET ROPE NO.	DIA.
RGR-25	1/4"	RGR-63	5/8"
RGR-38	3/8"	RGR-75	3/4"
RGR-50	1/2"	RGR-95	1"

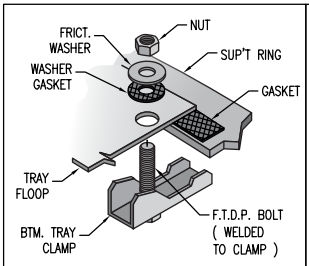
Assembly Drawings



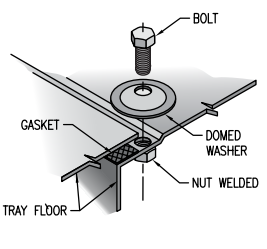
Assembly Drawings



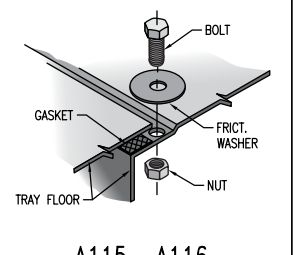
Assembly Drawings



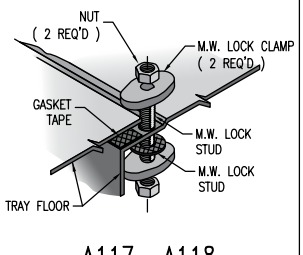
A110 A111 A112



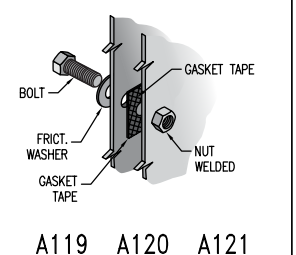
A113 A114



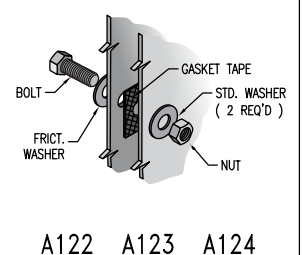
A115 A116



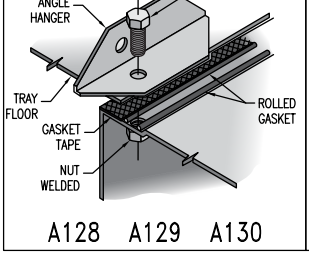
A117 A118



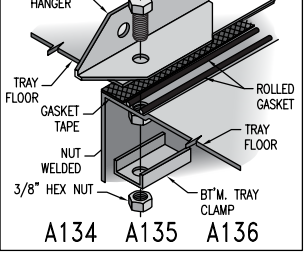
A119 A120 A121



A122 A123 A124



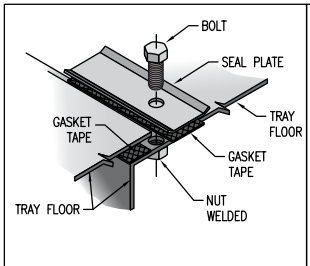
A128 A129 A130



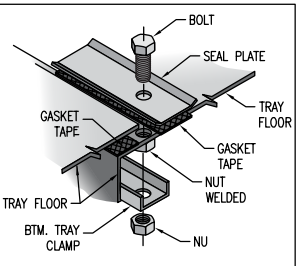
A134 A135 A136

MAPESA
MANUFACTURAS PETROLERAS, S.A. DE C.V.

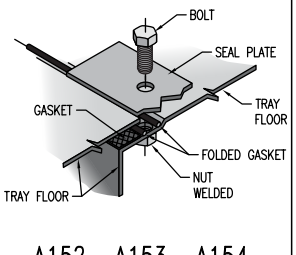
Assembly Drawings



A140 A141 A142



A146 A147 A148



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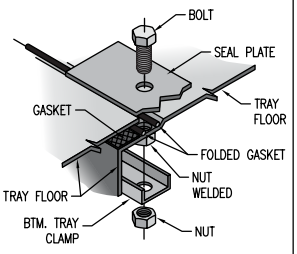

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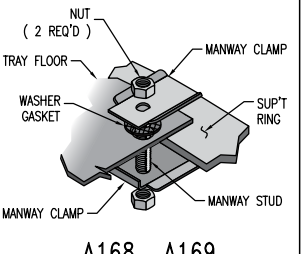

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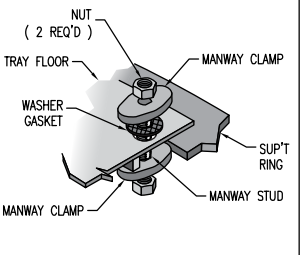

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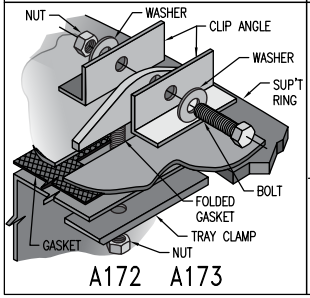

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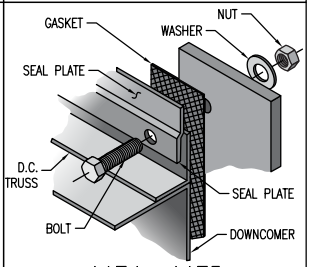

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