1.3 IDENTIFICATION OF AGENTS AND CONTRACTORS

Holtec International is a specialty engineering company with a principal focus on spent fuel storage technologies. Holtec has carried out turnkey wet storage capacity expansions (engineering, licensing, fabrication, removal of existing racks, performance of underwater modifications, volume reduction of the old racks and hardware, installation of new racks, and commissioning of the pool for increased storage capacity) in numerous plants around the world. Over 45 plants in the U.S., Britain, Brazil, Korea, and Taiwan have utilized Holtec's wet storage technology to extend their in-pool storage capacity.

Holtec's corporate engineering consists of experts with advanced degrees (Ph.D.'s) in every discipline germane to the fuel storage technologies, namely structural mechanics, heat transfer, computational fluid dynamics, and nuclear physics. All engineering analyses for Holtec's fuel storage projects (including HI-STORM 100) are carried out in-house.

Holtec International's quality assurance program was originally developed to meet NRC requirements delineated in 10CFR50, Appendix B, and was expanded to include provisions of 10CFR71, Subpart H, and 10CFR72, Subpart G, for structures, systems, and components designated as important to safety. A description of the quality assurance program and its method of satisfying all 18 criteria in 10CFR72, Subpart G, that apply to the design, fabrication, construction, testing, operation, modification, and decommissioning of structures, systems, and components important to safety is provided in Chapter 13.

It is currently planned that the HI-STORM 100 System will be fabricated by U.S. Tool & Die, Inc. (UST&D) of Pittsburgh, Pennsylvania. UST&D is an N-Stamp holder and a highly respected fabricator of nuclear components. UST&D is on Holtec's Approved Vendors List (AVL) and has a quality assurance program meeting 10CFR50 Appendix B criteria. Extensive prototypical fabrication of the MPCs has been carried out at the UST&D shop to resolve fixturing and tolerance issues. If another fabricator is to be used for the fabrication of any part of the HI-STORM 100 System, the proposed fabricator will be evaluated and audited in accordance with Holtec International's quality assurance program described in Chapter 13.

Construction, assembly, and operations on-site may be performed by Holtec or a licensee as the prime contractor. A licensee shall be suitably qualified and experienced to perform selected activities. Typical licensees are technically qualified and experienced in commercial nuclear power plant construction and operation activities under a quality assurance program meeting 10CFR50 Appendix B criteria.

1.4 GENERIC CASK ARRAYS

The HI-STORM 100 System is stored in a vertical configuration. The required center-to-center spacing between the modules (layout pitch) is guided by operational considerations. Tables 1.4.1 and 1.4.2 provide the nominal layout pitch information.. Site-specific pitches are determined by practical operation with supporting heat transfer calculations in Chapter 4. The pitch values in Tables 1.4.1 and 1.4.2 are nominal and may be varied to suit the user's specific needs.

Table 1.4.1 provides recommended cask spacing data for array(s) of two by N casks. The pitch between adjacent rows of casks and between each adjacent column of casks are denoted by P_1 and P_2 In Table 1.4.1. There may be an unlimited number of rows. The distance between adjacent arrays of two by N casks (P3) shall be as specified in Table 1.4 1. See Figure 1.4.1 for further clarification. The pattern of required pitches and distances may be repeated for an unlimited number of columns.

For a square array of casks the pitch between adjacent casks may be in accordance with Table 1.4.2. See Figure 1.4.2 for further clarification. The data in Table 1.4.2 provide nominal values for large ISFSIs (i.e., those with hundreds of casks in a uniform layout), where access of feed air to the centrally located casks may become a matter of thermal consideration. From a thermal standpoint, regardless of the size of the ISFSI, the casks should be arrayed in such a manner that the tributary area for each cask (open ISFSI area attributable to a cask) is a minimum of 225 ft^2. Subsection 4.4.1.1.7 provides the detailed thermal evaluation of the required tributary area. For specific sites, a smaller tributary area can be utilized after appropriate thermal evaluations for the site-specific conditions are performed.

Table 1.4.1

CASK LAYOUT PITCH DATA FOR 2 BY N ARRAYS

Orientation	**Nominal Cask Pitch (ft.)**
Between adjacent rows, P1, and adjacent columns, P2	13.5
Between adjacent sets of two columns, P3	38

Table 1.4.2

CASK LAYOUT PITCH DATA FOR SQUARE ARRAYS

Orientation	Nominal Cask Pitch (ft.)
Between adjacent casks	18' - 8"

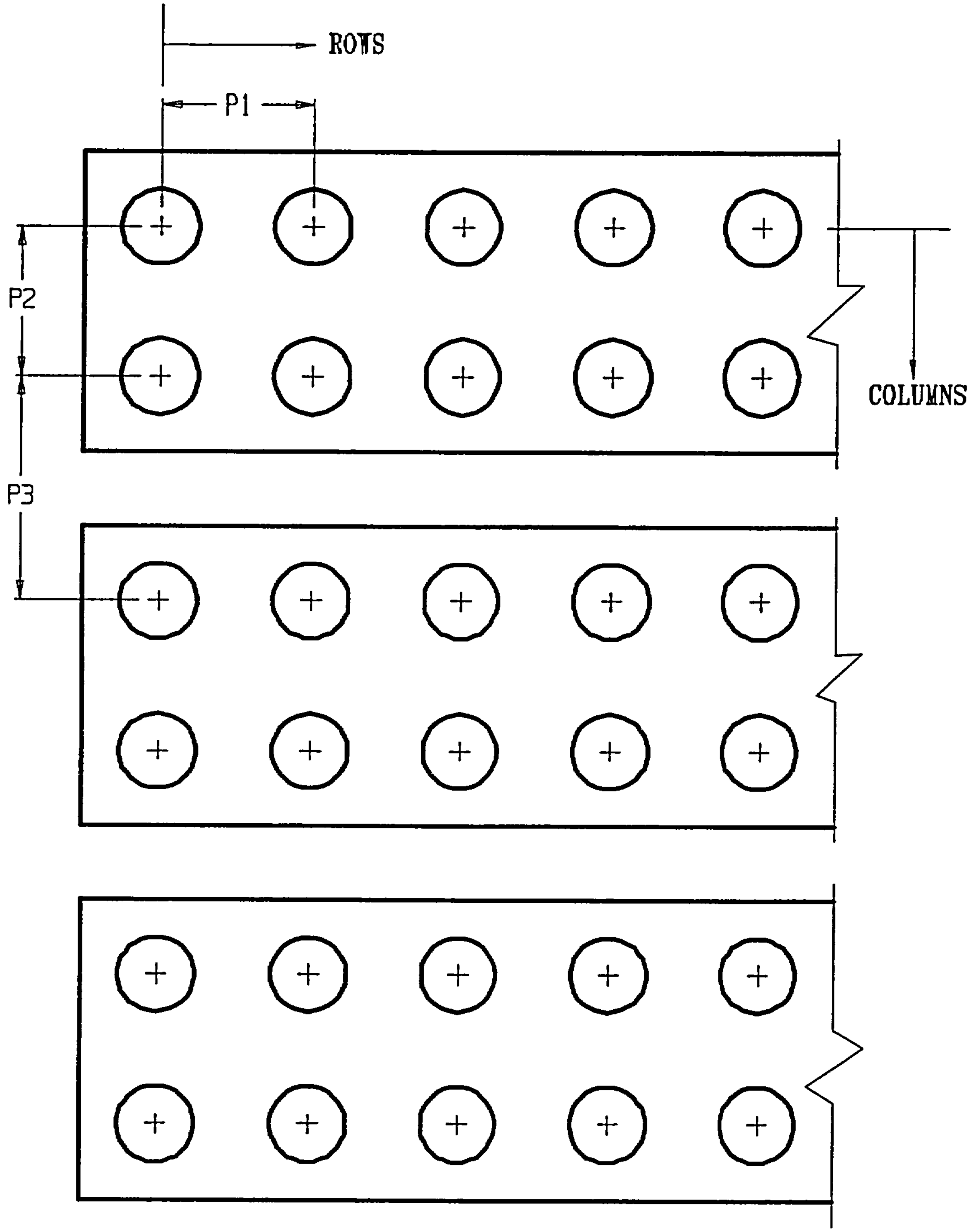


FIGURE 1.4.1; CASK LAYOUT PITCH REQUIREMENTS BASED ON 2 BY N ARRAY(S)

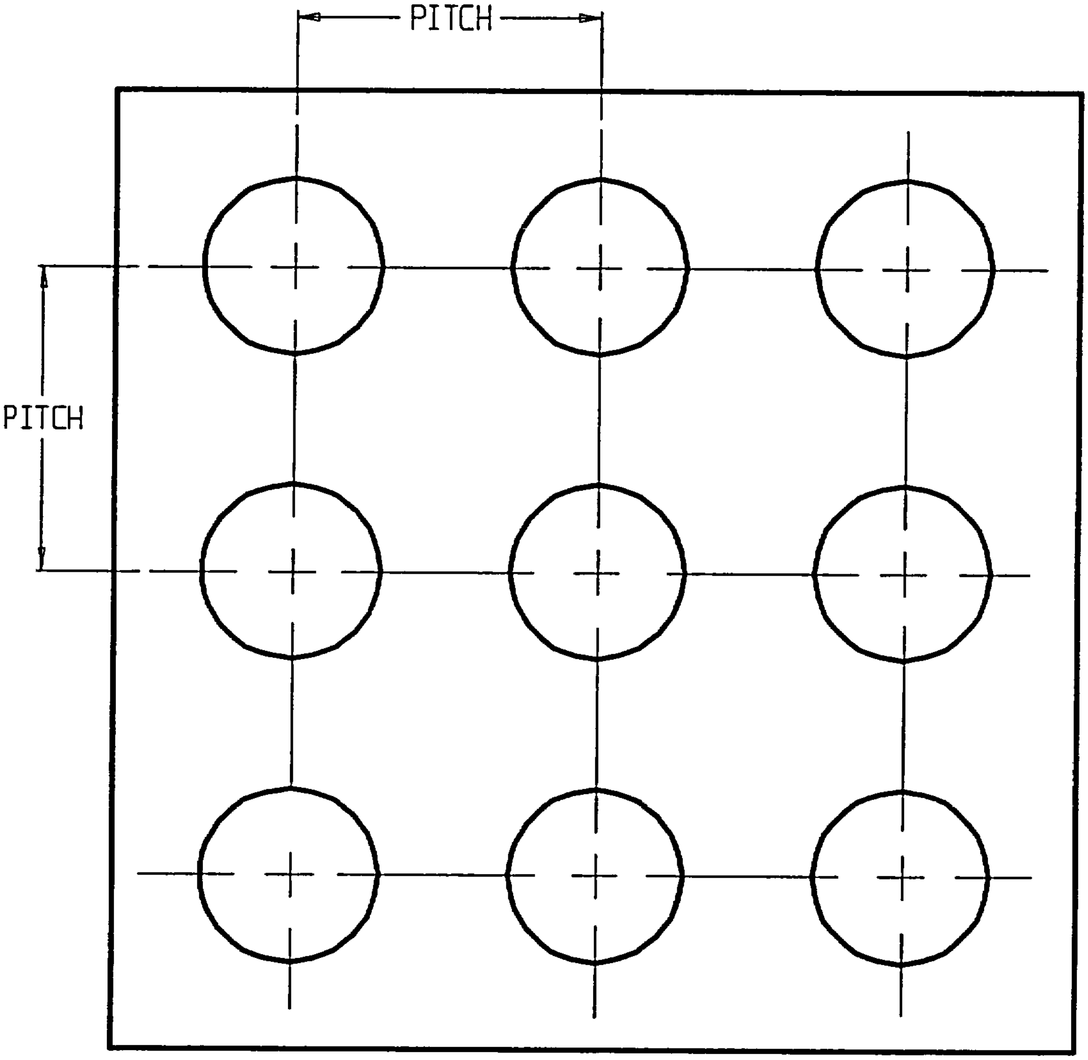


FIGURE 1.4.2; CASK LAYOUT PITCH REQUIREMENTS BASED ON A SQUARE ARRAY

1.5 GENERAL ARRANGEMENT DRAWINGS

The following HI-STORM 100 System design drawings and bills of materials are provided on subsequent pages in this subsection:

Drawing Number/Sheet	Description	Rev.
3923	MPC Enclosure Vessel	2
3925	MPC-24E/EF Fuel Basket Assembly	1
3926	MPC-24 Fuel Basket Assembly	1
3927	MPC-32 Fuel Basket Assembly	2
3928	MPC-68/68F/68FF Basket Assembly	1
1495 Sht 1/6	HI-STORM 100 Assembly	11
1495 Sht 2/6	Cross Section "Z" - "Z" View of HI-STORM	16
1495 Sht 3/6	Section "Y" - "Y" of HI-STORM	12
1495 Sht 4/6	Section "X" -"X" of HI-STORM	12
1495 Sht 5/6	Section "W" -"W" of HI-STORM	14
1561 Sht 1/6	View "A" -"A" of HI-STORM	10
1561 Sht 2/6	Detail "B" of HI-STORM	13
1561 Sht 3/6	Detail of Air Inlet of HI-STORM	11
1561 Sht 4/6	Detail of Air Outlet of HI-STORM	12
3669	HI-STORM 100S Assembly	5
1880 Sht 1/10	125 Ton HI-TRAC Outline with Pool Lid	9
1880 Sht 2/10	125 Ton HI-TRAC Body Sectioned Elevation	10
1880 Sht 3/10	125 Ton HI-TRAC Body Sectioned Elevation "B" - "B"	9
1880 Sht 4/10	125 Ton Transfer Cask Detail of Bottom Flange	10
1880 Sht 5/10	125 Ton Transfer Cask Detail of Pool Lid	10
1880 Sht 6/10	125 Ton Transfer Cask Detail of Top Flange	10
1880 Sht 7/10	125 Ton Transfer Cask Detail of Top Lid	9
1880 Sht 8/10	125 Ton Transfer Cask View "Y" - "Y"	9
1880 Sht 9/10	125 Ton Transfer Cask Lifting Trunnion and Locking Pad	7
1880 Sht 10/10	125 Ton Transfer Cask View "Z" - "Z"	9
1928 Sht 1/2	125 Ton HI-TRAC Transfer Lid Housing Detail	11
1928 Sht 2/2	125 Ton HI-TRAC Transfer Lid Door Detail	10
2145 Sht 1/10	100 Ton HI-TRAC Outline with Pool Lid	8
2145 Sht 2/10	100 Ton HI-TRAC Body Sectioned Elevation	8
2145 Sht 3/10	100 Ton HI-TRAC Body Sectioned Elevation 'B-B'	8
2145 Sht 4/10	100 Ton HI-TRAC Detail of Bottom Flange	7
2145 Sht 5/10	100 Ton HI-TRAC Detail of Pool Lid	6
2145 Sht 6/10	100 Ton HI-TRAC Detail of Top Flange	8
2145 Sht 7/10	100 Ton HI-TRAC Detail of Top Lid	8
2145 Sht 8/10	100 Ton HI-TRAC View Y-Y	8
2145 Sht 9/10	100 Ton HI-TRAC Lifting Trunnions and Locking Pad	5
2145 Sht 10/10	100 Ton HI-TRAC View Z-Z	7
2152 Sht 1/2	100 Ton HI-TRAC Transfer Lid Housing Detail	10
2152 Sht 2/2	100 Ton HI-TRAC Transfer Lid Door Detail	8
3187	Lug and Anchoring Detail for HI-STORM 100A	2

Drawing Number/Sheet	Description	Rev.
BM-1575, Sht 1/2	Bill-of-Materials HI-STORM 100 Storage Overpack	15
BM-1575, Sht 2/2	Bill-of-Materials HI-STORM 100 Storage Overpack	17
BM-1880, Sht 1/2	Bill-of-Material for 125 Ton HI-TRAC	9
BM-1880, Sht 2/2	Bill-of-Material for 125 Ton HI-TRAC	7
BM-1928, Sht 1/1	Bill-of-Material for 125 Ton HI-TRAC Transfer Lid	10
BM-2145 Sht 1/2	Bill-of-Material for 100 Ton HI-TRAC	6
BM-2145 Sht 2/2	Bill-of-Material for 100 Ton HI-TRAC	5
BM-2152 Sht 1/1	Bill-of-Material for 100 Ton HI-TRAC Transfer Lid	8
3768	125 Ton HI-TRAC 125D Assembly	1

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

2

HOLTEC
INTERNATIONAL
HOLTEC CENTER
555 LINCOLN CENTER
MARLTON NJ 08053

CLIENT: GENERAL

DESCRIPTION: MPC ENCLOSURE VESSEL

PROJECT NO: 5014

P O NO: N/A

DRAWING NO: 3923

SHEET: 1

TOTAL SHEETS: 4

FILE PATH: G:\DRAWINGS\5014\3923

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

TOLERANCES

INCHES [MILLIMETERS] ANGULAR
.X ± .2 [5.0] 2
.XX ± .1 [2.54]
.XXX ± .02 [.50]

FRACTIONAL
0 TO LESS THAN 2 IN ±1/8 IN.
2 IN TO LESS THAN 3 FT ±1/4 IN
3 FT AND GREATER ±3/8 IN

HOLTEC INTERNATIONAL
HOLTEC CENTER
555 LINCOLN CENTER
MARLTON, NJ 08053

CLIENT: GENERAL
DESCRIPTION: MPC ENCLOSURE VESSEL
PROJECT NO: 5014
N/A
COMPANION DRAWINGS:
SIZE: D
DRAWING NO: 3923
SHEET: 2
REV: 2
SCALE: NONE
FILE PATH: G:\DRAWINGS\5014\3923

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

TOLERANCES

INCHES [MILLIMETERS]		ANGULAR
.X ± .2	[5.0]	±2
.XX ± .1	[2.54]	
.XXX ± .02	[.50]	

FRACTIONAL

0 TO LESS THAN 2 IN	±1/8 IN
2 IN. TO LESS THAN 3 FT	±1/4 IN
3 FT AND GREATER	±3/8 IN

HOLTEC
INTERNATIONAL
HOLTEC CENTER
555 LINCOLN CENTER
MARLTON NJ 08053

CLIENT
GENERAL

DESCRIPTION
125 TON
HI-TRAC-125D
ASSEMBLY

PROJECT NO: 5014
N/A

COMPANION DRAWINGS

SIZE: D
DRAWING NO: 3923
SHEET: 3
REV: 2
SCALE: NONE
FILE PATH: G:\DRAWINGS\5014\3923

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

TOLERANCES

INCHES [MILLIMETERS]		ANGULAR
X ± .2	[5.0]	2
XX ± 1	[2.54]	
.XXX ± 02	[.50]	

FRACTIONAL

0 TO LESS THAN 2 IN	± 1/8 IN
2 IN. TO LESS THAN 3 FT	± 1/4 IN
3 FT AND GREATER	± 3/8 IN.

HOLTEC
INTERNATIONAL
HOLTEC CENTER
555 LINCOLN CENTER
MARLTON NJ 08053

CLIENT: GENERAL

DESCRIPTION:
MPC ENCLOSURE
VESSEL LID
DETAILS

PROJECT NO: 5014

N/A

COMPANION DRAWINGS:

SIZE: D
DRAWING NO: 3923
SHEET: 4
REV: 2

SCALE: NONE
FILE PATH: G:\DRAWINGS\5014\3923

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

HOLTEC
INTERNATIONAL
HOLTEC CENTER
555 LINCOLN CENTER
MARLTON, NJ 08053

CLIENT: GENERAL

DESCRIPTION: MPC-24E/EF
FUEL BASKET
ASSEMBLY

PROJECT NO. 1022

P O NO N/A

DRAWING NO 3925

SHEET 1

TOTAL SHEETS 3

FILE PATH G:\DRAWINGS\1022\3925

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

TOLERANCES

INCHES	[MILLIMETERS]	ANGULAR
.X ± .2	[5.0]	±2°
.XX ± .1	[2.54]	
.XXX ± .02	[.50]	

FRACTIONAL

0 TO LESS THAN 2 IN	±1/8 IN
2 IN TO LESS THAN 3 FT	±1/4 IN
3 FT AND GREATER	±3/8 IN

HOLTEC
INTERNATIONAL
HOLTEC CENTER
555 LINCOLN CENTER
MARLTON, NJ 08053

CLIENT
GENERAL

DESCRIPTION
MPC-24E/EF
FUEL BASKET
ARRANGEMENT

PROJECT NO 1022
N/A

COMPANION DRAWINGS
-

SIZE D
DRAWING NO 3925
SHEET 2
REV 1
SCALE NONE
FILE PATH G:\DRAWINGS\1022\3925

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

TOLERANCES

INCHES	[MILLIMETERS]	ANGULAR
.X ± 2	[5.0]	±2
.XX ± 1	[2.54]	
.XXX ± 02	[50]	

FRACTIONAL

0 TO LESS THAN 2 IN	±1/8 IN
2 IN TO LESS THAN 3 FT	±1/4 IN
3 FT AND GREATER	±3/8 IN

HOLTEC
INTERNATIONAL
HOLTEC CENTER
555 LINCOLN CENTER
MARLTON, NJ 08053

CLIENT
GENERAL

DESCRIPTION
MPC-24E/EF
FUEL BASKET
LAYOUT AND WELD DETAILS

PROJECT NO 1022
N/A

COMPANION DRAWINGS
-

SIZE D
DRAWING NO. 3925
SHEET 3
REV 1
SCALE NONE
FILE PATH G:\DRAWINGS\1022\3925

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

△1

A

HOLTEC
INTERNATIONAL
HOLTEC CENTER
555 LINCOLN CENTER
MARLTON NJ 08053

CLIENT: GENERAL

DESCRIPTION: MPC-24
FUEL BASKET
ASSEMBLY

PROJECT NO: 1022

DRAWING NO: 3926

SHEET: 1

TOTAL SHEETS: 3

P O NO: N/A

FILE PATH: G:\DRAWINGS\1022\3926

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

TOLERANCES

INCHES [MILLIMETERS]		ANGULAR
X ± .2	[5.0]	± 2°
.XX ± .1	[2.54]	
.XXX ± .02	[.50]	

FRACTIONAL

0 TO LESS THAN 2 IN	± 1/8 IN
2 IN TO LESS THAN 3 FT	± 1/4 IN
3 FT AND GREATER	± 3/8 IN

PROJECT NO 1022

N/A

HOLTEC
INTERNATIONAL
HOLTEC CENTER
555 LINCOLN CENTER
MARLTON, NJ 08053

COMPANION DRAWINGS -

CLIENT GENERAL

DESCRIPTION
MPC-24
FUEL BASKET
ARRANGEMENT

SIZE D
DRAWING NO 3926
SHEET 2
REV 1

SCALE NONE △1
FILE PATH G:\DRAWINGS\1022\3926

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

TOLERANCES

INCHES [MILLIMETERS]

X ± .2 [5.0]
.XX ± .1 [2.54]
.XXX ± .02 [.50]

ANGULAR
±2°

FRACTIONAL

0 TO LESS THAN 2 IN ±1/8 IN
2 IN TO LESS THAN 3 FT ±1/4 IN
3 FT AND GREATER +3/8 IN

HOLTEC
INTERNATIONAL

HOLTEC CENTER
555 LINCOLN CENTER
MARLTON, NJ 08053

CLIENT
GENERAL

DESCRIPTION
MPC-24
FUEL BASKET
LAYOUT AND WELD DETAILS

PROJECT NO 1022

N/A

COMPANION DRAWINGS -

SIZE D

DRAWING NO 3926

SHEET 3

REV 1

SCALE NONE 1

FILE PATH G:\DRAWINGS\1022\3926

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

HOLTEC
INTERNATIONAL
HOLTEC CENTER
555 LINCOLN CENTER
MARLTON, NJ 08053

CLIENT: GENERAL

DESCRIPTION:
MPC-32
FUEL BASKET
ASSEMBLY

PROJECT NO: 1023

P O NO: N/A

DRAWING NO: 3927

SHEET: 1

TOTAL SHEETS: 3

FILE PATH: G:\DRAWINGS\1023\3927

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

TOLERANCES

INCHES [MILLIMETERS]		ANGULAR
.X ± .2	[5.0]	±2°
.XX ± .1	[2.54]	
.XXX ± .02	[.50]	

FRACTIONAL

0 TO LESS THAN 2 IN	±1/8 IN
2 IN TO LESS THAN 3 FT	±1/4 IN
3 FT AND GREATER	±3/8 IN

HOLTEC
INTERNATIONAL
HOLTEC CENTER
555 LINCOLN CENTER
MARLTON, NJ 08053

CLIENT: GENERAL

DESCRIPTION: MPC-32
FUEL BASKET
ARRANGEMENT

PROJECT NO: 1023

N/A

COMPANION DRAWINGS:

SIZE: D

DRAWING NO.: 3927

SHEET: 2

REV: 2

SCALE: NONE

FILE PATH: G:\DRAWINGS\1023\3927

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

HOLTEC
INTERNATIONAL
HOLTEC CENTER
555 LINCOLN CENTER
MARLTON NJ 08053

CLIENT: GENERAL

DESCRIPTION: MPC-32
FUEL BASKET
ASSEMBLY

PROJECT NO: 1023

P.O. NO: N/A

DRAWING NO: 3927

SHEET: 1

TOTAL SHEETS: 3

FILE PATH: G:\DRAWINGS\1023\3927

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

HOLTEC
INTERNATIONAL

HOLTEC CENTER
555 LINCOLN CENTER
MARLTON NJ 08053

CLIENT: GENERAL

DESCRIPTION: MPC-68/68F/68FF
FUEL BASKET

PROJECT NO 1021	DRAWING NO 3928	SHEET 1	TOTAL SHEETS 3
P O NO N/A	FILE PATH G:\DRAWINGS\1021\3928		

2 1

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

TOLERANCES

INCHES	(MILLIMETERS)	ANGULAR
.X ± .2	(5.0)	±2°
.XX ± .1	(2.54)	
.XXX ± .02	(.50)	

FRACTIONAL

0 TO LESS THAN 2 IN	±1/8 IN.
2 IN TO LESS THAN 3 FT	±1/4 IN.
3 FT AND GREATER	±3/8 IN

HOLTEC
INTERNATIONAL
HOLTEC CENTER
555 LINCOLN CENTER
MARLTON, NJ 08053

CLIENT: GENERAL

DESCRIPTION: MPC-68/68F
FUEL BASKET

PROJECT NO: 1021

N/A

COMPANION DRAWINGS:

SIZE: D

DRAWING NO: 3928

SHEET: 2

REV: 1

SCALE: NONE △1

FILE PATH: G:\DRAWINGS\1021\3928

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

TOLERANCES

INCHES [MILLIMETERS]		ANGULAR
.X ± .2	[5.0]	±2
.XX ± .1	[2.54]	
.XXX ± .02	[.50]	

FRACTIONAL

0 TO LESS THAN 2 IN	±1/8 IN
2 IN TO LESS THAN 3 FT	±1/4 IN
3 FT AND GREATER	±3/8 IN

PROJECT NO 1021

N/A

HOLTEC
INTERNATIONAL
HOLTEC CENTER
555 LINCOLN CENTER
MARLTON, NJ 08053

COMPANION DRAWINGS

CLIENT
GENERAL

DESCRIPTION
MPC-68/68F/68FF
FUEL BASKET
LAYOUT AND WELD DETAILS

SIZE D
DRAWING NO. 3928
SHEET 3
REV 1
SCALE NONE 1
FILE PATH G:\DRAWINGS\1021\3928

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

TOLERANCES

INCHES [MILLIMETERS]		ANGULAR
.X ± .2	[5.0]	±2
.XX ± .1	[2.54]	
.XXX ± .02	[.50]	

FRACTIONAL

0 TO LESS THAN 2 IN	±1/8 IN
2 IN TO LESS THAN 3 FT	±1/4 IN
3 FT AND GREATER	±3/8 IN

HOLTEC
INTERNATIONAL
HOLTEC CENTER
555 LINCOLN CENTER
MARLTON, NJ 08053

CLIENT
GENERAL

DESCRIPTION
MPC-68/68F/68FF
FUEL BASKET
LAYOUT AND WELD DETAILS

PROJECT NO 1021

N/A

COMPANION DRAWINGS

SIZE	DRAWING NO.	SHEET	REV
D	3928	3	1

SCALE NONE 1

FILE PATH G:\DRAWINGS\1021\3928

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

HOLTEC
INTERNATIONAL

EQUIPMENT DESIGN
ANALYSIS
CONSULTING

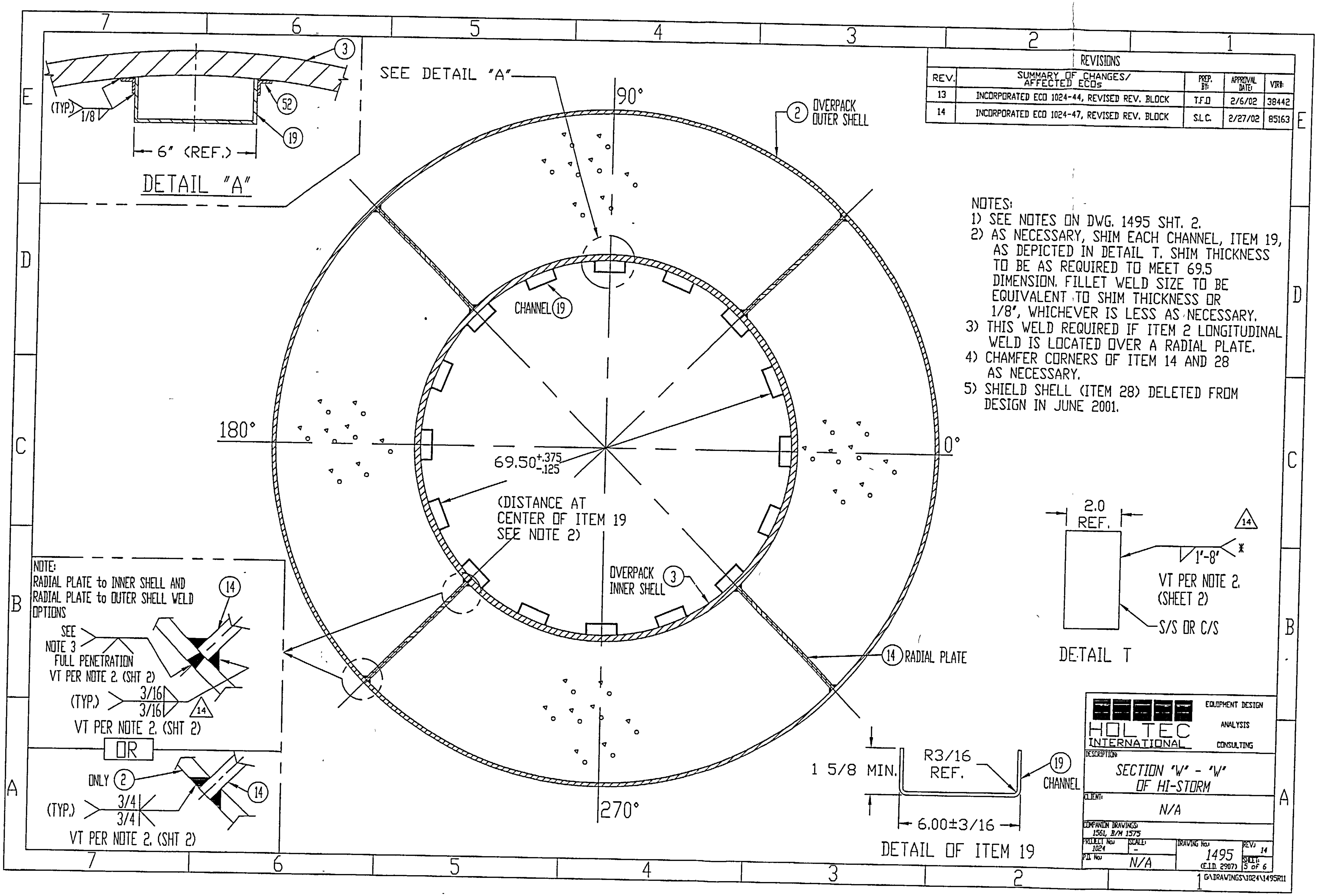
DESCRIPTION:
SECTION "X" - "X"
OF HI-STORM

CLIENT
N/A

COMPANION DRAWINGS
1561, B/M 1575

PROJECT No. 1024
SCALE -
DRAWING No. 1495 (E.I.D.2834)
REV. 12
P.O. No. N/A
SHEET: 4 of 6

A



REVISIONS

REV.	SUMMARY OF CHANGES/ AFFECTED ECOs	PREP. BY:	APPROVAL DATE:	VIR#:
13	INCORPORATED ECO 1024-44, REVISED REV. BLOCK	T.F.O	2/6/02	38442
14	INCORPORATED ECO 1024-47, REVISED REV. BLOCK	S.L.C.	2/27/02	85163

NOTES:

1) SEE NOTES ON DWG. 1495 SHT. 2.
2) AS NECESSARY, SHIM EACH CHANNEL, ITEM 19, AS DEPICTED IN DETAIL T. SHIM THICKNESS TO BE AS REQUIRED TO MEET 69.5 DIMENSION. FILLET WELD SIZE TO BE EQUIVALENT TO SHIM THICKNESS OR 1/8", WHICHEVER IS LESS AS NECESSARY.
3) THIS WELD REQUIRED IF ITEM 2 LONGITUDINAL WELD IS LOCATED OVER A RADIAL PLATE.
4) CHAMFER CORNERS OF ITEM 14 AND 28 AS NECESSARY.
5) SHIELD SHELL (ITEM 28) DELETED FROM DESIGN IN JUNE 2001.

HOLTEC INTERNATIONAL
EQUIPMENT DESIGN
ANALYSIS
CONSULTING

DESCRIPTION:
SECTION "W" - "W"
OF HI-STORM

CLIENT:
N/A

COMPANION DRAWINGS:
1561, B/M 1575

PROJECT No.: 1024
SCALE: -
P.O. No.: N/A
DRAWING No.: 1495 (E.I.D. 2907)
REV.: 14
SHEET: 5 of 6

G:\DRAWINGS\1024\1495R11

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

HOLTEC INTERNATIONAL

EQUIPMENT DESIGN
ANALYSIS
CONSULTING

DESCRIPTION:
VIEW "A" - "A"
OF HI-STORM

CLIENT
N/A

COMPANION DRAWINGS
1495, B/M 1575

PROJECT No.
1024

SCALE
0625 = 1

DRAWING No.:
1561
(E I D. 2904)

REV.
10

P.O. No.
N/A

SHEET
1 OF 6

A

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

HOLTEC
INTERNATIONAL
EQUIPMENT DESIGN
ANALYSIS
CONSULTING

DESCRIPTION:
DETAIL "B"
OF HI-STORM

CLIENT
N/A

COMPANION DRAWINGS:
1495, B/M 1575

PROJECT No.: 1024
SCALE: 25 = 1
P.O. No.: N/A
DRAWING No.: 1561 (E.I.D 2905)
REV.: 13
SHEET 2 of 6

G:\DRAWINGS\1024\1561

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

HOLTEC
INTERNATIONAL

EQUIPMENT DESIGN
ANALYSIS
CONSULTING

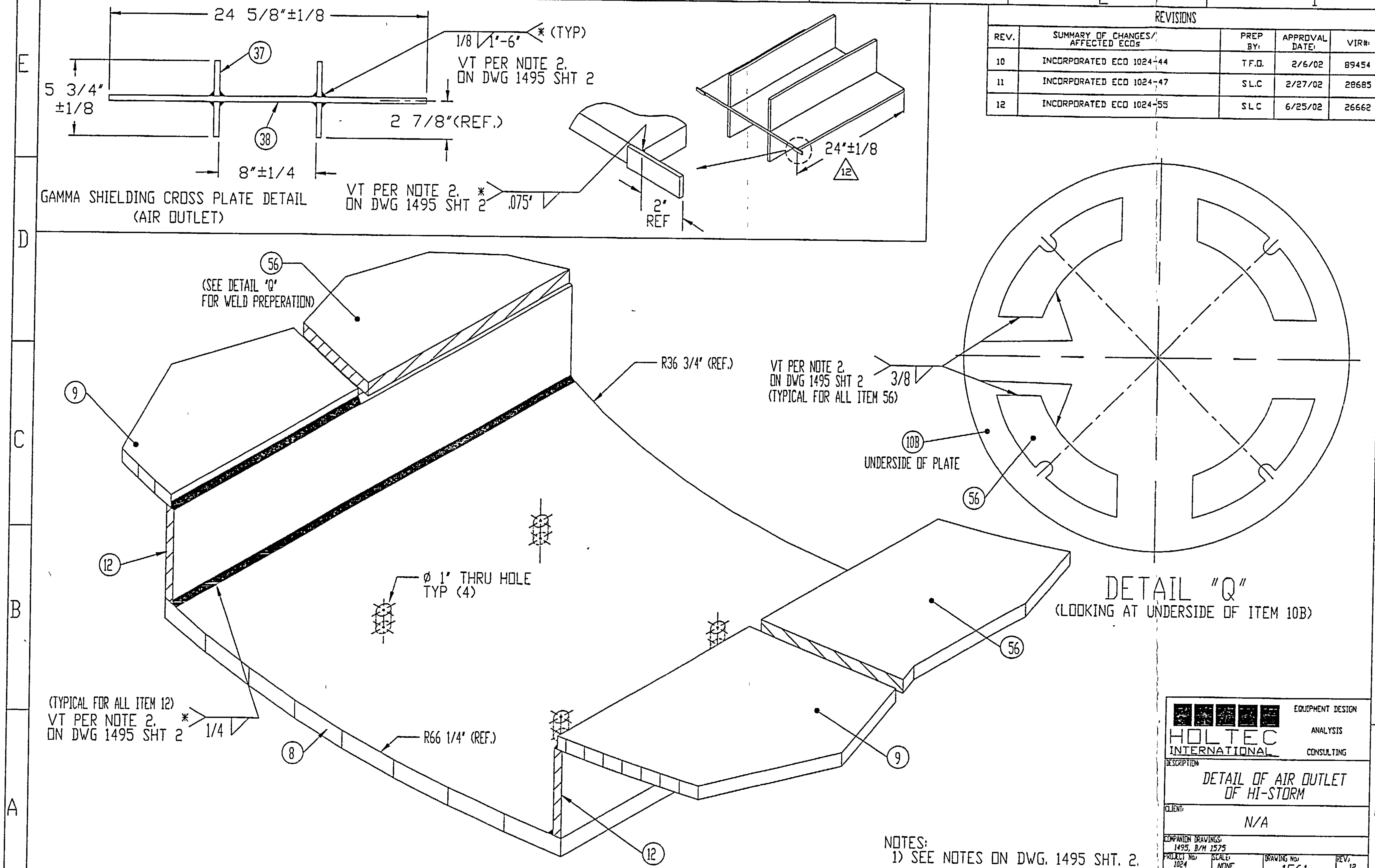
DESCRIPTION:
DETAIL OF AIR INLET
OF HI-STORM

CLIENT:
N/A

COMPANION DRAWINGS:
1495, B/M 1575

PROJECT No.: 1024	SCALE NONE	DRAWING No.: 1561 (E.I.D. 3028)	REV.: 11
P.O. No. N/A			SHEET 3 of 6

A



GAMMA SHIELDING CROSS PLATE DETAIL
(AIR OUTLET)

DETAIL "Q"
(LOOKING AT UNDERSIDE OF ITEM 10B)

REVISIONS

REV.	SUMMARY OF CHANGES/ AFFECTED ECOs	PREP BY:	APPROVAL DATE:	VIR#:
10	INCORPORATED ECO 1024-44	T F.D.	2/6/02	89454
11	INCORPORATED ECO 1024-47	S L.C	2/27/02	28685
12	INCORPORATED ECO 1024-55	S L C	6/25/02	26662

NOTES:
1) SEE NOTES ON DWG. 1495 SHT. 2.

HOLTEC
INTERNATIONAL
EQUIPMENT DESIGN
ANALYSIS
CONSULTING

DESCRIPTION:
DETAIL OF AIR OUTLET
OF HI-STORM

CLIENT:
N/A

COMPANION DRAWINGS:
1495, B/M 1575

PROJECT No.: 1024	SCALE: NONE	DRAWING No.: 1561 (E.I.D. 2906)	REV.: 12
PI No.	N/A		SHEET 4 of 6

G:\DRAWINGS\1024\1561R10

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

5

A

HOLTEC
INTERNATIONAL

HOLTEC CENTER
555 LINCOLN CENTER
MARLTON NJ 08053

CLIENT
GENERAL

DESCRIPTION
HI-STORM 100S
ASSEMBLY

PROJECT NO 1024

P O NO N/A

DRAWING NO 3669

SHEET 1

TOTAL SHEETS 12

FILE PATH G:\DRAWINGS\1024\3669

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

TOLERANCES

INCHES (MILLIMETERS)		ANGULAR
.X ± .2	[5.0]	±2°
.XX ± .1	[2.54]	
.XXX ± .50	[.50]	

FRACTIONAL

0 TO LESS THAN 2 IN	±1/8 IN
2 IN TO LESS THAN 3 FT	±1/4 IN
3 FT AND GREATER	3/8 IN

PROJECT NO 1024

N/A

HOLTEC
INTERNATIONAL
HOLTEC CENTER
555 LINCOLN CENTER
MARLTON, NJ 08053

COMPANION DRAWINGS -

CLIENT
GENERAL

DESCRIPTION
HI-STORM 100S
ASSEMBLY

SIZE	DRAWING NO	SHEET	REV
D	3669	2	5

SCALE NONE

FILE PATH G:\DRAWINGS\1024\3669

FIGURE WITHHELD AS SENSITIVE
UNCLASSIFIED INFORMATION

TOLERANCES
INCHES (MILLIMETERS)
ANGULAR
FRACTIONAL
0 TO LESS THAN 2 IN
2 IN TO LESS THAN 3 FT
3 FT AND GREATER

HOLTEC
INTERNATIONAL
HOLTEC CENTER
555 LINCOLN CENTER
MARLTON NJ 08053

CLIENT
GENERAL

DESCRIPTION
HI-STORM 100S
ASSEMBLY

PROJECT NO 1024
N/A
COMPANION DRAWINGS -

SIZE	DRAWING NO	SHEET	REV
D	3669	3	5

SCALE NONE
FILE PATH G:\DRAWINGS\1024\3669

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

5 5 A

TOLERANCES

INCHES (MILLIMETERS)		ANGULAR
.X ± .2	[5.0]	±2
.XX ± .1	[2.54]	
.XXX ± .02	[.50]	

FRACTIONAL

0 TO LESS THAN 2 IN	±1/8 IN
2 IN TO LESS THAN 3 FT	±1/4 IN
3 FT AND GREATER	+3/8 IN

HOLTEC
INTERNATIONAL
HOLTEC CENTER
555 LINCOLN CENTER
MARLTON NJ 08053

CLIENT
GENERAL

DESCRIPTION
HI-STORM 100S
OVERPACK BODY ASSEMBLY
SUB-COMPONENT A

PROJECT NO 1024

N/A

COMPANION DRAWINGS

SIZE D

DRAWING NO 3669

SHEET 4

REV 5

SCALE NONE 5

FILE PATH G:\DRAWINGS\1024\3669

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

TOLERANCES

INCHES (MILLIMETERS)		ANGULAR
.X ± .2	[5.0]	±2
.XX ± .1	[2.54]	
.XXX ± .02	[.50]	

FRACTIONAL

0 TO LESS THAN 2 IN	±1/8 IN
2 IN TO LESS THAN 3 FT	±1/4 IN
3 FT AND GREATER	±3/8 IN.

HOLTEC
INTERNATIONAL
HOLTEC CENTER
555 LINCOLN CENTER
MARLTON NJ 08053

CLIENT: GENERAL

DESCRIPTION:
HI-STORM 100S
OVERPACK BODY
INNER SHELL PART DETAILS

PROJECT NO: 1024

N/A

COMPANION DRAWINGS: -

SIZE	DRAWING NO	SHEET	REV
D	3669	5	5

SCALE: NONE 5

FILE PATH: G:\DRAWINGS\1024\3669

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

TOLERANCES

INCHES [MILLIMETERS]		ANGULAR
.X ± .2	[5.0]	±2
.XX ± .1	[2.54]	
.XXX ± .02	[.50]	

FRACTIONAL

0 TO LESS THAN 2 IN	±1/8 IN
2 IN. TO LESS THAN 3 FT	±1/4 IN
3 FT AND GREATER	±3/8 IN

HOLTEC INTERNATIONAL
HOLTEC CENTER
555 LINCOLN CENTER
MARLTON NJ 08053

CLIENT: GENERAL

DESCRIPTION: HI-STORM 100S
OVERPACK BODY ASSEMBLY
SUB-COMPONENT A

PROJECT NO: 1024

N/A

COMPANION DRAWINGS:

SIZE: D
DRAWING NO: 3669
SHEET: 6
REV: 5

SCALE: NONE /5\
FILE PATH: G:\DRAWINGS\1024\3669

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

TOLERANCES

INCHES [MILLIMETERS]		ANGULAR
X ± .2	[5.0]	±2°
XX ± .1	[2.54]	
XXX ± .02	[.50]	

FRACTIONAL

0 TO LESS THAN 2 IN	±1/8 IN
2 IN TO LESS THAN 3 FT	±1/4 IN
3 FT AND GREATER	±3/8 IN

HOLTEC INTERNATIONAL
HOLTEC CENTER
555 LINCOLN CENTER
MARLTON, NJ 08053

CLIENT: GENERAL

DESCRIPTION:
HI-STORM 100S
PEDESTAL ASSEMBLY
SUB-COMPONENT B

PROJECT NO: 1024

N/A

COMPANION DRAWINGS: -

SIZE: D
DRAWING NO: 3669
SHEET: 7
REV: 5

SCALE: NONE
FILE PATH: G:\DRAWINGS\1024\3669

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

TOLERANCES

INCHES (MILLIMETERS)

.X ± .2	[5.0]	
.XX ± .1	[2.54]	
.XXX ± .02	[.50]	

ANGULAR ±2°

FRACTIONAL

0 TO LESS THAN 2 IN	±1/8 IN
2 IN TO LESS THAN 3 FT	±1/4 IN
3 FT AND GREATER	±3/8 IN

HOLTEC INTERNATIONAL

HOLTEC CENTER
555 LINCOLN CENTER
MARLTON NJ 08053

CLIENT: GENERAL

DESCRIPTION: HI-STORM 100S
LID ASSEMBLY
SUB-COMPONENT C

PROJECT NO: 1024

N/A

COMPANION DRAWINGS

SIZE: D

DRAWING NO: 3669

SHEET: 8

REV: 5

SCALE: NONE /5\

FILE PATH: G:\DRAWINGS\1024\3669

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

5 5

TOLERANCES

INCHES (MILLIMETERS)		ANGULAR
.X ± .2	[5.0]	±2°
.XX ± .1	[2.54]	
.XXX ± .02	[.50]	

FRACTIONAL

0 TO LESS THAN 2 IN	± 1/8 IN
2 IN TO LESS THAN 3 FT	± 1/4 IN
3 FT AND GREATER	± 3/8 IN

HOLTEC
INTERNATIONAL
HOLTEC CENTER
555 LINCOLN CENTER
MARLTON, NJ 08053

CLIENT
GENERAL

DESCRIPTION
HI-STORM 100S
LID STUD AND NUT
SUB-COMPONENTS 5

PROJECT NO
1024

N/A

COMPANION DRAWINGS
-

SIZE	DRAWING NO.	SHEET	REV
D	3669	9	5

SCALE NONE 5 FILE PATH G:\DRAWINGS\1024\3669

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

5 5

TOLERANCES

INCHES (MILLIMETERS)
X ± .2 (5.0)
XX ± .1 (2.54)
XXX ± .02 (.50)

ANGULAR
±2

FRACTIONAL
0 TO LESS THAN 2 IN ±1/8 IN
2 IN TO LESS THAN 3 FT ±1/4 IN
3 FT AND GREATER ±3/8 IN.

HOLTEC
INTERNATIONAL
HOLTEC CENTER
555 LINCOLN CENTER
MARLTON NJ 08053

CLIENT
GENERAL

DESCRIPTION
HI-STORM 100S
VENT SCREEN ASSEMBLIES
SUB-COMPONENTS F & G

PROJECT NO
1024
N/A

COMPANION DRAWINGS
-

SIZE D
DRAWING NO 3669
SHEET 10
REV 5
SCALE NONE 5
FILE PATH G:\DRAWINGS\1024\3669

2 1

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

TOLERANCES

INCHES (MILLIMETERS) **ANGULAR**

.X ± .2 (5.0) ±2°
.XX ± .1 (2.54)
.XXX ± .02 (.50)

FRACTIONAL

0 TO LESS THAN 2 IN ±1/8 IN
2 IN TO LESS THAN 3 FT ±1/4 IN
3 FT AND GREATER ±3/8 IN

PROJECT NO 1024

N/A

HOLTEC
INTERNATIONAL
HOLTEC CENTER
555 LINCOLN CENTER
MARLTON, NJ 08053

COMPANION DRAWINGS -

CLIENT
GENERAL

DESCRIPTION
HI-STORM 100S
GAMMA SHIELDING ASSEMBLY
SUB-COMPONENTS H & I

SIZE D
DRAWING NO. 3669
SHEET 11
REV 5
SCALE NONE 5
FILE PATH G:\DRAWINGS\1024\3669

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

5 5

TOLERANCES

INCHES (MILLIMETERS)		ANGULAR
X ± .2	[5.0]	±2°
.XX ± .1	[2.54]	
.XXX ± .02	[.50]	

FRACTIONAL

0 TO LESS THAN 2 IN	±1/8 IN
2 IN TO LESS THAN 3 FT	±1/4 IN
3 FT AND GREATER	±3/8 IN

HOLTEC
INTERNATIONAL
HOLTEC CENTER
555 LINCOLN CENTER
MARLTON NJ 08053

CLIENT
GENERAL

DESCRIPTION
HI-STORM 100S
OPTIONAL GAMMA SHIELDING
SUB-COMPONENTS J & K

PROJECT NO. 1024

N/A

COMPANION DRAWINGS -

SIZE D

DRAWING NO 3669

SHEET 12

REV 5

SCALE NONE 5

FILE PATH G:\DRAWINGS\1024\3669

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

HOLTEC
INTERNATIONAL

EQUIPMENT DESIGN
ANALYSIS
CONSULTING

DESCRIPTION:
125TON HI-TRAC OUTLINE
WITH POOL LID

CLIENT:
N/A

COMPANION DRAWINGS:
B/M 1880

PROJECT No.: 1025
SCALE: 04 = 1
P.O. No.: N/A
DRAWING No.: 1880
(E.I.D. 3004)
REV.: 9
SHEET: 1 OF 10

A

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

HOLTEC INTERNATIONAL

EQUIPMENT DESIGN
ANALYSIS
CONSULTING

DESCRIPTION:
125TON HI-TRAC BODY
SECTIONED ELEVATION

CLIENT
N/A

COMPANION DRAWINGS:
B/M 1880

PROJECT No: 1025
SCALE: .10 = 1
P.O. No N/A
DRAWING No: 1880 (E.I.D. 3005)
REV. 10
SHEET: 2 of 10

A

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

HOLTEC
INTERNATIONAL

EQUIPMENT DESIGN
ANALYSIS
CONSULTING

DESCRIPTION:
125TON HI-TRAC BODY
SECTIONED ELEVATION 'B'-'B'

CLIENT:

COMPANION DRAWINGS:
B/M 1880

PROJECT NO. 1025
SCALE: 08 = 1
DRAWING No. 1880 (E.I.D. 3006)
REV. 9
P.O. No. N/A
SHEET 3 of 10

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

HOLTEC
INTERNATIONAL

EQUIPMENT DESIGN
ANALYSIS
CONSULTING

DESCRIPTION:
125TON TRANSFER CASK
DETAIL OF BOTTOM FLANGE

CLIENT:

COMPANION DRAWINGS:
B/M 1880

PROJECT No. 1025
SCALE: 08 = 1
P.O. No: N/A
DRAWING No. 1880 (E.I.D. 3007)
REV 10
SHEET 4 of 10

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

HOLTEC INTERNATIONAL
EQUIPMENT DESIGN
ANALYSIS
CONSULTING

DESCRIPTION:
125TON TRANSFER CASK
DETAIL OF POOL LID

CLIENT:

COMPANION DRAWINGS:
- B/M 1880

PROJECT No.: 1025
SCALE: 08 = 1
P.O. No.: N/A
DRAWING No.: 1880 (E.I.D. 3008)
REV.: 10
SHEET 5 of 10

A

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

HOLTEC
INTERNATIONAL

EQUIPMENT DESIGN
ANALYSIS
CONSULTING

DESCRIPTION:
125TON TRANSFER CASK
DETAIL OF TOP FLANGE

CLIENT

COMPANION DRAWINGS
B/M 1880

PROJECT No. 1025
SCALE: 10 = 1
P.O. No: N/A
DRAWING No. 1880
(E.I.D. 3009)
REV: 10
SHEET 6 of 10

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

HOLTEC
INTERNATIONAL

EQUIPMENT DESIGN
ANALYSIS
CONSULTING

DESCRIPTION:
125TON TRANSFER CASK
DETAIL OF TOP LID

CLIENT:

COMPANION DRAWINGS:
B/M 1880

PROJECT No.: 1025
SCALE: .125 = 1
P.O. No.: N/A
DRAWING No.: 1880 (E.I.D 3010)
REV.: 9
SHEET: 7 of 10

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

HOLTEC INTERNATIONAL

EQUIPMENT DESIGN

ANALYSIS

CONSULTING

DESCRIPTION:

125TONTRANSFER CASK
VIEW "Y"-"Y"

CLIENT:

COMPANION DRAWINGS:
B/M 1880

PROJECT No: 1025

SCALE: 1875 = 1

P.O. No: N/A

DRAWING No: 1880
(E.I.D. 3091)

REV: 9

SHEET: 8 of 10

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

HOLTEC INTERNATIONAL

EQUIPMENT DESIGN
ANALYSIS
CONSULTING

DESCRIPTION:
12STON TRANSFER CASK LIFTING
TRUNNION AND LOCKING PAD

CLIENT

COMPANION DRAWINGS:
B/M 1880

7

PROJECT No.: 1025
SCALE: NONE
DRAWING No.: 1880 (E.I.D. 3011)
REV.: 7
P.O. No.: N/A
SHEET 9 OF 10

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

HOLTEC
INTERNATIONAL

EQUIPMENT DESIGN
ANALYSIS
CONSULTING

DESCRIPTION:
125TON TRANSFER CASK
VIEW 'Z'-'Z'

CLIENT:

COMPANION DRAWINGS:
B/M 1880

PROJECT No.: 1025
SCALE: .20 = 1
DRAWING No. 1880 (E.I.D.3012)
REV. 9
P.O. No.
SHEET: 10 of 10

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

HOLTEC
INTERNATIONAL

EQUIPMENT DESIGN
ANALYSIS
CONSULTING

DESCRIPTION:
125TON HI-TRAC TRANSFER LID
HOUSING DETAIL

CLIENT
N/A

COMPANION DRAWINGS
B/M 1928

PROJECT No: 1025	SCALE: 0625 = 1	DRAWING No. 1928 (E.I.D. 2999)	REV: 11
P.O. No: N/A			SHEET: 1 of 2

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

HOLTEC
INTERNATIONAL

EQUIPMENT DESIGN
ANALYSIS
CONSULTING

DESCRIPTION:
125TON HI-TRAC TRANSFER LID
DOOR DETAIL

CLIENT:
N/A

COMPANION DRAWINGS:
B/M 1928

PROJECT No: 1025
SCALE: 0625 = 1
DRAWING No: 1928 (E.I.D. 3000)
REV: 10
P.O. No: N/A
SHEET: 2 of 2

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

HOLTEC
INTERNATIONAL

EQUIPMENT DESIGN
ANALYSIS
CONSULTING

DESCRIPTION:
100 TON HI-TRAC OUTLINE
WITH POOL LID

CLIENT
N/A

COMPANION DRAWINGS:
BM 2145

PROJECT No. 1026
SCALE: 04 = 1
P.O. No: N/A
DRAWING No. 2145 (E.I.D. 3051)
REV: 8
SHEET 1 of 10

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

HOLTEC
INTERNATIONAL

EQUIPMENT DESIGN
ANALYSIS
CONSULTING

DESCRIPTION:
100 TON HI-TRAC BODY
SECTIONED ELEVATION

CLIENT
N/A

COMPANION DRAWINGS:
BM 2145

PROJECT No.: 1026
SCALE: 10 = 1
P.O. No. N/A
DRAWING No. 2145 (E.I.D. 3052)
REV.: 8
SHEET 2 of 10

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

HOLTEC
INTERNATIONAL

EQUIPMENT DESIGN
ANALYSIS
CONSULTING

DESCRIPTION:
100 TON HI-TRAC BODY
SECTIONED ELEVATION 'B-B'

CLIENT:
N/A

COMPANION DRAWINGS:
BM 2145

PROJECT No: 1026
SCALE: 08 = 1
DRAWING No. 2145 (E.I.D.3053)
REV. 8
P.O. No. N/A
SHEET: 3 of 10

A

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

HOLTEC INTERNATIONAL
EQUIPMENT DESIGN
ANALYSIS
CONSULTING

DESCRIPTION:
100 TON HI-TRAC
DETAIL OF BOTTOM FLANGE

CLIENT:
N/A

COMPANION DRAWINGS:
BM 2145

PROJECT No. 1026	SCALE: 08 = 1	DRAWING No. 2145 (E.I.D. 3054)	REV. 7
P.O. No.	N/A		SHEET: 4 of 10

7

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

HOLTEC
INTERNATIONAL

EQUIPMENT DESIGN
ANALYSIS
CONSULTING

DESCRIPTION:
100 TON HI-TRAC
DETAIL OF POOL LID

CLIENT:
N/A

COMPANION DRAWINGS
BM 2145

PROJECT No. 1026
SCALE. 08 = 1
P.O. No. N/A
DRAWING No.: 2145
(E.I.D.3055)
REV. 6
SHEET: 5 of 10

A

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

HOLTEC
INTERNATIONAL

EQUIPMENT DESIGN
ANALYSIS
CONSULTING

DESCRIPTION
100 TON HI-TRAC
DETAIL OF TOP FLANGE

CLIENT: N/A

COMPANION DRAWINGS:
BM 2145

PROJECT No. 1026
SCALE 10 = 1
P.O. No.: N/A
DRAWING No.: 2145
(E.I.D. 3056)
REV. 8
SHEET: 6 of 10

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

HOLTEC
INTERNATIONAL

EQUIPMENT DESIGN
ANALYSIS
CONSULTING

DESCRIPTION:
100 TON HI-TRAC
DETAIL OF TOP LID

CLIENT:
N/A

COMPANION DRAWINGS:
BM 2145

PROJECT No.: 1026
SCALE: 125 = 1
DRAWING No.: 2145 (E.I.D. 3092)
REV.: 8
PD No. N/A
SHEET 7 of 10

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

HOLTEC INTERNATIONAL
EQUIPMENT DESIGN
ANALYSIS
CONSULTING

DESCRIPTION:
100 TON HI-TRAC
VIEW Y-Y

CLIENT
COMPANION DRAWINGS: N/A

COMPANION DRAWINGS:
BM 2145

PROJECT No.: 1026	SCALE: 1875 = 1	DRAWING No.: 2145 E.I.D. 3093	REV.: 8
P.O. No.:	N/A		SHEET: 8 of 10

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

HOLTEC INTERNATIONAL
EQUIPMENT DESIGN
ANALYSIS
CONSULTING

DESCRIPTION: 100 TON HI-TRAC LIFTING TRUNNION AND LOCKING PAD

CLIENT: N/A

COMPANION DRAWINGS: BM 2145

PROJECT No: 1026
SCALE: NONE
P.O. No: N/A
DRAWING No: 2145 (E.I.D. 3057)
REV. 5
SHEET: 9 of 10

A

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

HOLTEC
INTERNATIONAL
EQUIPMENT DESIGN
ANALYSIS
CONSULTING

DESCRIPTION:
100 TON HI-TRAC
VIEW Z-Z

CLIENT:
N/A

COMPANION DRAWINGS:
BM 2145

PROJECT No.: 1026
SCALE: .20 = 1
PI No.: N/A
DRAWING No.: 2145 (E.I.D. 3058)
REV 7
SHEET 10 of 10

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

HOLTEC
INTERNATIONAL

EQUIPMENT DESIGN
ANALYSIS
CONSULTING

DESCRIPTION:
100 TON HI-TRAC TRANSFER
LID HOUSING DETAIL

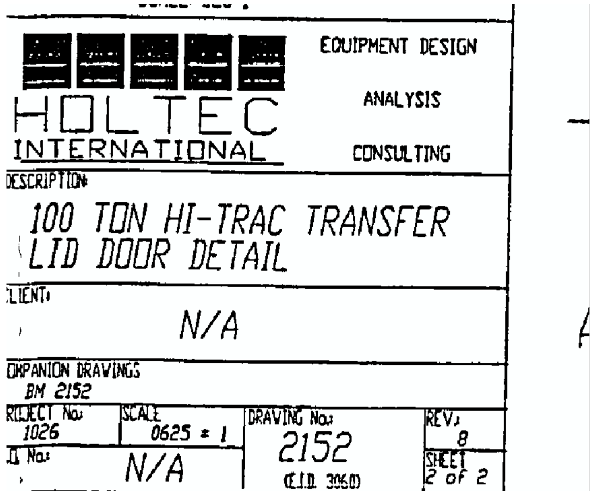
CLIENT
N/A

COMPANION DRAWINGS
BM 2152

PROJECT No 1026	SCALE: .0625 = 1	DRAWING No. 2152 (E.I.D. 3059)	REV. 10
PID No N/A			SHEET 1 of 2

A

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION



HOLTEC
INTERNATIONAL

EQUIPMENT DESIGN
ANALYSIS
CONSULTING

DESCRIPTION:
100 TON HI-TRAC TRANSFER
LID DOOR DETAIL

LIENT:
N/A

OMPANION DRAWINGS
BM 2152

ROJECT No: 1026
SCALE: 0625 = 1
DRAWING No: 2152
(C.I.D. 3060)
REV: 8
I No: N/A
SHEET 2 of 2

FIGURE WITHHELD AS SENSITIVE
UNCLASSIFIED INFORMATION

HOLTEC
INTERNATIONAL
HOLTEC CENTER
555 LINCOLN DRIVE WEST
MARLTON, NJ 08053

CLIENT GENERAL

DESCRIPTION LUG AND ANCHORING DETAIL
FOR HI-STORM 100A

PROJECT NO 1024

P O NO N/A

DRAWING NO 3187

SHEET 1

TOTAL SHEETS 2

FILE PATH C:\DRAWINGS\1024\HI-STORM\3187R0

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS ARE IN INCHES
DIMENSIONS IN [ ] ARE IN MILLIMETERS

TOLERANCES

INCHES [MILLIMETERS]		ANGULAR
X±1	[2.5]	±1
.XX±.05	[1.27]	
XXX±.010	[.25]	

FRACTIONAL	
0 TO LESS THAN 2 IN	±1/16 IN.
2 IN TO LESS THAN 3 FT	±1/8 IN
3 FT AND GREATER	±3/16 IN

REMOVE ALL BURRS AND
BREAK SHARP EDGES

- DO NOT SCALE OFF OF DRAWING -

PROJECT NO. 1024

P O NO N/A

HOLTEC
INTERNATIONAL

HOLTEC CENTER
555 LINCOLN DRIVE WEST
MARLTON NJ 08053

COMPANION DRAWINGS

CLIENT
GENERAL

DESCRIPTION
LUG AND ANCHORING DETAIL
FOR HI-STORM 100A

SIZE	DRAWING NO	SHEET	REV
D	3187	2	2

SCALE N/A

FILE PATH O:\DRAWINGS\1024\HI-STORM\3187R2

BM-1575 (E.I.D. 2839) BILL OF MATERIAL FOR HI-STORM (DWG. 1495, 1561) SHT 1 OF 2

REV.	SUMMARY OF CHANGES/ AFFECTED E.C.O.s	PREP. BY:	APPROVAL DATE:	VIR#:
13	INCORPORATED E.C.O.# 1024-44., CHANGED REVISION BLOCK TO NEW FORMAT	T.F.O.	2/6/02	34436
14	INCORPORATED E.C.O.# 1024-50	S.L.C	5/7/02	46085
15	INCORPORATED E.C.O.# 1024-54	S.L.C	6/20/02	32848

ITEM	QTY.	SPECIFICATION	NOMENCLATURE	DESCRIPTION
1	1	SA 516 GR. 70	BASEPLATE	2 THK. X 133 7/80 BASEPLATE
2	1	SA 516 GR. 70	OUTER SHELL	3/4 THK. X 224 1/2 LG. X 132 1/2 O.D. CYLINDER (MAY BE MADE IN SECTIONS, SEE DWG 1495 SHT 5)
3	1	SA 516 GR. 70	INNER SHELL	1 1/4 THK. X 224 1/2 LG. X 76 O.D. CYLINDER
4	1	CONCRETE	RADIAL SHIELD	26 3/4 THK. RADIAL SHIELD
5	1	SA 516 GR. 70	PEDESTAL SHELL	1/4 THK. X 68 3/8 O.D. X 21 5/8 LG. CYLINDER
6	1	SA 516 GR. 70	LID BOTTOM PLATE	1 1/4 THK. X 70" ø PLATE.
7	1	SA 516 GR. 70	LID SHELL	1 THK. X 10 1/2" WIDE X 69 O.D.
8	4	SA 516 GR. 70	EXIT VENT HORIZONTAL PLATE	1 1/4 THK. X 26 WIDE X 29 1/2 LG. PLATE (SEE DET. DWG. 1561 SHT. 4)
9	1	SA 516 GR. 70	TOP PLATE	3/4 THK. X 132 O.D. X 109 I.D RING (CUT IN 4 PIECES)
10A	1	SA-516-70	LID TOP PLATE	2 THK. X 124 ø PLATE (SEE NOTE 4)
10B	1	SA-516-70	LID TOP PLATE	2 THK. X 126 ø PLATE (SEE NOTE 4)
11	4	SA-516-70	INLET VENT HORIZONTAL PLATE	2 THK. X 16 1/2 WIDE X 29 1/2 LG. PLATE (SEE DET. DWG. 1561 SHT. 3)
12	8	SA 516 GR. 70 OR SA 515 GR. 70	EXIT VENT VERTICAL PLATE	1/2 THK. X 5 1/4 WIDE X 29 1/2 APPROX. LG. PLATE
13	8	SA 516 GR. 70	INLET VENT VERTICAL PLATE	3/4 THK. X 10 WIDE X 29 1/2 APPROX. LG. PLATE
14	4	SA 516 GR. 70	RADIAL PLATE	3/4 THK. X 27 1/2 WIDE X 224 1/2 LG. PLATE
15	4	SA 194 2H	TOP LID NUT	3 1/4 - 4 UNC HEAVY HEX NUT
16	4	SA-564-630 AGE HARDENED AT 1075°F OR SA193-B7	LID STUD	3 1/4- 4 UNC X 16 LG. (SEE DWG. 1561, SHT 2)
17	4	SA 350 LF3 OR SA 203 E	BOLT ANCHOR BLOCK	5 X 5 X 6 ANCHOR BLOCK W/ 3 1/4 - 4 UNC X 5 LG HOLE IN CENTER
18	--	--	DELETED	---
19	16	SA 516 GR. 70 OR SA240 TYPE 304	CHANNEL	3/16 THK. X 6 WIDE X 170 7/8 LG. CHANNEL (SEE DETAIL 1495 SH. 5) (GALVANIZE FOR C/S)
20	1	SA 516 GR. 70	SHIELD BLOCK RING	1/4 THK. X 63 1/2 I.D. X 85 1/2 O.D. (MAY BE MADE FROM MORE THAN 1 PIECE.)
21	1	CONCRETE	PEDESTAL SHIELD	17" THK. PLATFORM
22	1	CONCRETE	LID SHIELD	10 1/2 THK. TOP SHIELD
23	1	SA 516 GR. 70 OR SA 515 GR. 70	PEDESTAL PLATE	1/2 THK X 67 7/8 ø
24	1	SA 516 GR. 70	PEDESTAL PLATFORM	5 THK. X 67 7/8 ø PLATE (MAY USE MULTIPLE PLATES OF LESSER THICKNESS - NUMBER OF PLATES AND THICKNESS OF PLATES OPTIONAL)
25	1	CONCRETE	SHIELD BLOCK	8" THK.
26	1	SA 516 GR. 70 OR SA 515 GR. 70	SHIELD BLOCK SHELL	1/2 THK X 86 O.D. CYLINDER X 8" HIGH (MAY MAKE OUT OF MORE THAN 1 PIECE)
27	1	SA 516 GR. 70 OR SA 515 GR. 70	SHIELD BLOCK SHELL	1/2 THK X 64 O.D. CYLINDER X 8" HIGH (MAY MAKE OUT OF MORE THAN 1 PIECE)
28	-	--	DELETED	---
* 29	1	SA 240 304	STORAGE MARKING NAME PLATE	14 GAGE (0.0751 THK.) X 4 WIDE X 10 LG. SHEET
△15 * 30	4	C/S OR S/S	LID PLUGS	1 1/2"-6UNC X 1 1/2" DP BOLT OR 1 1/2"-6UNC X 2" LG SET SCREW

NOTE:

1) THE CONCRETE MATERIAL IS TO MEET THE REQUIREMENTS SPECIFIED IN APPENDIX 1.D OF THE HI-STORM 100 FSAR DOCKET NUMBER 72-1014 (LATEST REVISION).
2) ALL DIMENSIONS IDENTIFIED ON BM-1575 ARE APPROXIMATE DIMENSIONS EXCEPT THICKNESSES OF STEEL PLATES WHICH IN THE RAW MATERIAL FORM MUST HAVE TOLERANCES MEETING THE APPLICABLE SPECIFICATION.
3) ITEMS WITH A * CONSIDERED NOT TO BE NF CLASS 3 (NON STRUCTURAL)
4) AS AN OPTION, ITEMS 10A & 10B CAN BE COMBINED AS A SINGLE 4" THICK PLATE AT 126" ø.

BM-1575 (E.I.D. 2836) BILL OF MATERIAL FOR HI-STORM (DWG. 1495, 1561) SHT 2 OF 2

REV.	SUMMARY OF CHANGES/ AFFECTED E.C.O.s	PREP. BY:	APPROVAL DATE:	VIR #
13	INCORPORATED E.C.O.#: 1024-47	S.L.C	2/27/02	72710
14	INCORPORATED E.C.O.#: 1024-50	S.L.C	5/7/02	19678
15	INCORPORATED E.C.O.#: 1024-54	S.L.C	6/20/02	89834
16	INCORPORATED E.C.O.#: 1024-56	S.L.C	6/21/02	14060
17	INCORPORATED E.C.O.#: 1024-55	S.L.C	6/25/02	96106

ITEM	QTY.	SPECIFICATION	NOMENCLATURE	DESCRIPTION
31	--	---	DELETED	---
* 32	4	SA 240 304	EXIT VENT SCREEN SHEET	16 GAGE (0.0595 THK.) X 6 1/4 WIDE X 40 LG. SHEET
* 33	4	SA 240 304	EXIT VENT SCREEN FRAME	16 GAGE (0.0595 THK.)
* 34	1	COMMERCIAL	SCREEN	16 WIDE X 212 LG. 6 X 6 MESH 0.020 WIRE ø 0.147 WIDTH OPEN FROM McMASTER-CARR 101 PAGE# 2521 ITEM# 9220T67 CUT AS NECESSARY OR EQUIVALENT
* 35	4	SA 240 304	INLET VENT SCREEN FRAME	16 GAGE (0.0595 THK.)
* 36	2	COMMERCIAL	THERMOCOUPLE OR RTD	1/8 ø SHEATH WITH TEMPERATURE ELEMENT (BY USER).
* 37	16	SA240-304	GAMMA SHIELD CROSS PLATE	1/4 THK X 2.75 X 24
* 38	4	SA240-304	GAMMA SHIELD CROSS PLATE	1/4 THK X 24 X 24 5/8
* 39	24	SA240-304	CROSS PLATE TABS	.075 THK X 1/4 X 2 1/2
* 40	8	SA240-304	GAMMA SHIELD CROSS PLATE	1/4 THK X 14 5/8 X 24
* 41	16	SA240-304	GAMMA SHIELD CROSS PLATE	1/4 THK X 3.09 X 24
* 42	2	C/S OR S/S	DRAIN PIPE	3/4 SCH 160 PIPE X 11 1/2 LG
* 43	8	SA240-304	GAMMA SHIELD CROSS PLATE	1/4 THK X 5.09 X 17 1/4
* 44	2	316 SS	COMPRESSION FITTING	1/8" X 1/4 NPT MALE PASS THRU COMPRESSION FITTING (OPTIONAL)
* 45	2	CAST IRON	PROTECTION HEAD	1/2 NPT X 1/2 NPT (OPTIONAL)
* 46	2	304 SS	BUSHING	1/4 X 1/2 NPT (OPTIONAL)
* 47	2	304 SS	COUPLING	1/2 NPT COUPLING W/ MOUNTING STUD 1/2 DIA X 3" LG. (OPTIONAL)
* 48	2	304 SS	HEX NIPPLE	1/2 X 1/2 NPT HEX NIPPLE (OPTIONAL)
* 49	2	304 SS	CONNECTION	1/2 NPT CONDUIT CONNECTION (OPTIONAL)
* 50	28	S/S	SCREW	ø1/4" X LENGTH AS REQUIRED
△17 51	4	S/S	WASHER	1/2" MIN. THK. X 3 1/2" I.D X 8" MIN. O.D.
52	96	A36	CHANNEL MOUNTS	3/16" X 1" X 1" X 24" LONG
53	4	C/S	SHIMS	2" THK X 3" LONG X 2" HIGH
54	4	S/S	BAR INLET SCREEN BASE	1/2" X 1" X 24 3/32" LG. BAR
55	8	S/S	BAR INLET SCREEN BASE	1/2" X 1" X 15" LG. BAR.
56	1	SA516 GR. 70	SHEAR RING	3/4" THK. X 73 1/2" I.D. X 108" O.D. PLATE (CUT IN FOUR PIECES)
57	2	SA516 GR. 70 OR SA515 GR. 70	GROUNDING BLOCK	1/2" THK. X 2" WIDE X 4" LONG
58	16	SA516 GR. 70	EXITVENT FRAME LEG	3/8" THK. X 1" WIDE X 6 1/2" LG. (CUT AS REQUIRED)
59	8	SA516 GR. 70	EXITVENT FRAME TOP	3/8" THK. X 1" WIDE X 28 1/4" LG. (CUT AS REQUIRED)
60	16	SA516 GR. 70	INLETVENT FRAME LEG	3/8" THK. X 1" WIDE X 12" LG. (CUT AS REQUIRED)
61	8	SA516 GR. 70	INLETVENT FRAME TOP	3/8" THK. X 1" WIDE X 18 3/4" LG. (CUT AS REQUIRED)
62	4	S/S	EXIT SCREEN BASE	3/8" THK. X 1/2" WIDE X 32 5/16" LG.
63	8	S/S	EXIT SCREEN BASE	3/8" THK. X 1/2" WIDE X 10" LG.

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BM-1880 (E.I.D. 3002) BILL OF MATERIAL FOR 125 TON HI-TRAC (DWG. 1880) SHT. 1 OF 2

REV. NO.	SUMMARY OF CHANGES/ AFFECTED ECOs	PREP. BY	APPROVAL DATE:	VIR#:
9	INCORPORATED ECO 1025-35, 15, 12, 8, 6 & 5.	T.F.O.	11/30/01	70889

ITEM	QTY.	SPECIFICATION	NOMENCLATURE	DESCRIPTION
1	1	ASTM B 29	RADIAL LEAD SHIELD	113 CU. FT. COMMON LEAD APPROX.
2	1	SA 516 GR. 70	OUTER SHELL	1 THK. X 81.25 O.D. X 184.75 LG. CYLINDER
3	1	SA 516 GR. 70	INNER SHELL	0.75 THK. X 68.75 I.D. X 184.75 LG. CYLINDER
△9 4	-	-	DELETED	-
△9 4A	-	-	DELETED	-
△9 4B	-	-	DELETED	-
△9 5	-	-	DELETED	-
△9 5A	-	-	DELETED	-
6A	2	SA 516 GR. 70	WATER JACKET END PLATE	1 THK. X 94.625 O.D. X 81.25 I.D. X 141° (APP) (MAY BE MADE FROM MORE THAN 1 PIECE)
6B	1	SA 516 GR. 70	WATER JACKET END PLATE	1 THK. X 94.625 O.D. X 81.25 I.D. RING (MAY BE MADE FROM MORE THAN 1 PIECE)
7	1	SA 350 LF3	TOP FLANGE	4.5 THK. X 81.25 O.D. X 68.75 I.D. RING
8	1	SA 516 GR. 70	LOWER WATER JACKET SHELL	0.5 THK. X 86.25 O.D. X 6 LG. CYLINDER
9	1	SA 516 GR. 70 OR SA 350 LF3	BOTTOM FLANGE	2 THK. X 93 O.D. X 68.75 I.D.
△9 10	1	SA 516 GR. 70 OR SA 203-E OR SA 350 LF3	POOL LID OUTER RING	3.5 THK. X 93.75 O.D. X 75 I.D. RING
11	1	SA 516 GR. 70	POOL LID TOP PLATE	2 THK. X 93 ø PLATE
12	1	ASTM B 29	POOL LID LEAD SHIELD	6.39 CU. FT. COMMON LEAD APPROX.
△9 13	1	SA 516 GR. 70	TOP LID OUTER RING	0.5 THK. X 71.875 O.D. X 3.25 LG. CYLINDER
△9 14	1	SA 516 GR. 70	TOP LID INNER RING	0.5 THK. X 29 O.D. X 3.25 LG. CYLINDER
△9 15	1	SA 516 GR. 70	TOP LID TOP PLATE	0.5 THK. X 71.375 O.D. X 28.5 I.D. RING
16	1	SA 516 GR. 70	TOP LID BOTTOM PLATE	1.0 THK. X 81.25 O.D. X 27 I.D. RING
17	1	HOLTITE	TOP LID SHIELDING	5.41 CU. FT. APPROX.
△9 18	8	SA 516 GR. 70	FILL PORT PLUGS	3 1/4"LG. X 2 7/8" ø CYLINDER (MAYBE MADE OF MULTIPLE, UNATTACHED PIECES)
19	24	SA 193 B7	TOP LID STUD	1-8 UNC X 4 3/8 LG. STUDS (4 3/8 FULL LENGTH THREAD WITH WRENCH FLAT AT ONE END)
20	24	SA 194 2H	TOP LID NUT	1-8 UNC HEAVY HEX WITH WASHER
△9 21	1	ELASTOMER	POOL LID GASKET	0.5 THK. X 87.25 O.D. X 85.75 I.D. COMMERCIAL
22	36	SA 193 B7	POOL LID BOLT	1 - 8 UNC X 3.125 LG. HEX. BOLTS X 1.25 MIN THREAD LENGTH W/WASHER

NOTE: 1) ALL SA-350-LF3 MATERIAL MAY BE REPLACED BY SA-203-E.
2) ALL DIMENSIONS ARE FOR REFERENCE ONLY.
△9 3) FOR ITEM 18, SA 516 GR.70 MAY BE REPLACED WITH SA-203-E OR SA-350-LF 3 OR EQUIVALENT.

△9 G:\DRAWINGS\1025\TRNSFER\BM1880-1.R9

BM-1880 (E.I.D 3003) BILL OF MATERIAL FOR 125 TON HI-TRAC (DWG. 1880) SHT. 2 OF 2

REV. NO.	SUMMARY OF CHANGES/ AFFECTED ECOs	PREP BY:	APPROVAL DATE:	VIR#:
7	INCORPORATED ECO 1025-35, 20, 13, 8 & 5.	T.F.O.	11/30/01	22562

	ITEM	QTY.	SPECIFICATION	NOMENCLATURE	DESCRIPTION
△7	23	12	SA 516 GR.70	ENCLOSURE SHELL PANEL	0.5 THK. X 93.00 O.D. X 168.75 LG. 30DEG. SHELL SEGMENTS
	24	2	SA 350 LF3	LIFTING TRUNNION BLOCK	7.625 (APPROX) X 10 X 10
	25	--	---	DELETED	---
	26	2	SB 637 N07718	LIFTING TRUNNION	6.25 ø X 9.25 LG. BAR
	27	2	SA 516 GR. 70	LIFTING TRUNNION END CAP	0.5 THK. X 6.25 ø PLATE
	28	4	SA 193 B7	END CAP BOLTS	0.5 - 13 UNC X 1 LG. WITH 5/8 LG THREAD
	29	2	SA 350 LF3	POCKET TRUNNION	12.375 X 13 X 12.5 BLOCK
	30	1	SA 106	DRAIN PIPE	1 SHC. 80 X 7 (APPROX.) LG. PIPE
△7	31	12	SA 516 GR.70	RADIAL RIB	1.25 THK. X 5.361 W X 168.75 LG.
	32	1	SA 193 B7	DRAIN BOLT	1 - 8UNC X 1.75 LG. SOCKET SET SCREW
	33	--	---	DELETED	---
	34	2	SA 516 GR. 70	WATER JACKET END PLATE	1 THK. X 94.625 O.D. X 81.25 I.D. X 39° (APP)
	35	--	---	DELETED	---
	36	1	SA 516 GR. 70	POOL LID BOTTOM PLATE	1 THK. X 77 ø PLATE
	37	1	COMMERCIAL	VENT COUPLING	1 1/2-3000 lb. SCREWED HALF COUPLING (OR SIMILAR)
	38	1	COMMERCIAL	VENT PLUG	1 1/2-3000 lb. SCREWED HEXAGON HEAD PLUG (OR SIMILAR)
△7	39	2	COMMERCIAL	PRESSURE RELIEF COUPLING	2-3000 lb. SCREWED HALF COUPLING (OR SIMILAR)
△7	40	2	COMMERCIAL	PRESSURE RELIEF VALVE	MEDIUM PRESSURE POP VALVE (OR SIMILAR)
	41	1	SA 106	JACKET DRAIN PIPE	1 1/2 SCH. 40 X 5 LG. PIPE
△7	42	1	COMMERCIAL	JACKET DRAIN VALVE	1 1/2 NONRISING STEM GATE VALVE (OR SIMILAR)
	43	4	C/S OR S/S	HOLE PLUGS	N/A
	44	4	SA 516 GR. 70	TOP LID LIFTING BLOCK	1.5 SQ. X 3.25 LG. BLOCK
△7	45	--	--	DELETED	--
	46	--	---	DELETED	---
△7	47	4	SA 516 GR.70	SHORT RIB	0.5 THK. X 6.688" W X 4.125 LG.

△7 G:\DRAWINGS\1025\TRNSFER\BM1880-2.R7

BM-1928 (E.I.D. 3001) BILL OF MATERIAL FOR 125 TON HI-TRAC TRANSFER LID (DWG. 1928)

REV. NO.	SUMMARY OF CHANGES/AFFECTED ECOs	PREP BY:	APPROVAL DATE:	VIR#:
10	INCORPORATED ECO 1025-35, 10, 8, 6, & 4.	T.F.O.	11/30/01	87422

	ITEM	QTY.	SPECIFICATION	NOMENCLATURE	DESCRIPTION
△10	1	1	SA 516 GR. 70	LID TOP PLATE	1.5 THK. X 93.5 WIDE X 128 LG. PLATE
△10	2	1	SA 516 GR. 70	LID BOTTOM PLATE	2 THK. X 93.5 WIDE X 128 LG. PLATE
△10	3	2	SA 516 GR. 70	LID INTERMEDIATE PLATE	1.5 THK. X 8.625 WIDE X 132 LG. PLATE
△10	4	2	SA 516 GR. 70	LEAD COVER PLATE	1 THK. X 8.625 WIDE X 78 LG. PLATE
△10	5	8	SA 516 GR. 70	LEAD COVER SIDE PLATE	1 THK. X 4.5 WIDE X 8.625 LG. PLATE
	6	1	ASTM B 29	SIDE LEAD SHIELD	2.65 (APPROX.) CU. FT.
△10	7	2	SA 36	WHEEL TRACK	0.25 THK. X 1 X 1 X 128 LG. ANGLE
	8	2	SA 516 GR. 70	DOOR TOP PLATE	2 1/4 THK. X 47 WIDE X 80 LG. PLATE (CUT AS NECESSARY)
	9	2	ASTM B 29	DOOR LEAD SHIELD	2.9 (APPROX.) CU. FT.
	10	2	SA 516 GR. 70	DOOR MIDDLE PLATE	1/2 THK. X 47 WIDE X 65 LG. PLATE (CUT AS NECESSARY)
	11	2	HOLTITE	DOOR SHIELDING	3.65 (APPROX.) CU. FT.
	12	2	SA 516 GR. 70	DOOR BOTTOM PLATE	3/4 THK. X 47 WIDE X 65 LG. PLATE (CUT AS NECESSARY)
	13	4	SA 516-70	DOOR WHEEL HOUSING	1 7/8 THK. X 6 WIDE X 25 LG. PLATE
	14	2	SA 516 GR. 70	DOOR INTERFACE PLATE	1 THK. X 3 7/8 WIDE X 80 LG. PLATE
	15	2	SA 516 GR. 70	DOOR SIDE PLATE	1 THK. X 5.75 WIDE X 65 LG. PLATE
	15A	4	SA 516 GR. 70	DOOR SIDE PLATE	1 THK. X 5.75 WIDE X 65 LG. PLATE
	16	4	SA 516 GR. 70	DOOR SIDE PLATE	1 THK. X 5.75 WIDE X 32.625 APPROX. LG. PLATE
	17	2	C/S OR S/S	DOOR HANDLE	3/4-10UNC EYE BOLT
	18	12	COMMERCIAL	DOOR WHEEL	6 X 3 V-GROOVE WHEEL.
	19	12	SA 193-B7	WHEEL SHAFT	1.25-7UNC (1.25' THREAD LENGTH) X 6.625 LG. BAR WITH SCREWDRIVER SLOT FOR INSTALLATION AT UNTHREADED END.
	20	---	---	DELETED	---
△10	21	2	SA 516 GR. 70	LID HOUSING STIFFENER	1 THK. X 3.5 WIDE X 8.625 LG. PLATE
△10	22	4	SA 193 B7	DOOR LOCK BOLT	3 - 4 UNC X 11.25' LG. HEX. BOLTS W/ 1.5 LG. THREADED AT END
	23	4	SA 516 GR. 70	DOOR STOP BLOCK	2 THK. X 2 WIDE X 8 LG. BLOCK
	24	8	SA 193 B7	DOOR STOP BLOCK BOLT	1 - 8 UNC X 3 LG. BOLT W/ 2.5 LG. THREADED AT END
	25	2	SA 516 GR. 70	DOOR END PLATE	1 THK. X 5.75 WIDE X 19 LG. PLATE
	26	4	SA 516 GR. 70	LIFTING LUG	0.75 THK. X 3 WIDE X 3.5 LG. PLATE
	27	4	SA 516 GR. 70	LIFTING LUG PAD	0.5 THK. X 5 SQ. PLATE

NOTE:
1) ALL DIMENSIONS ARE APPROXIMATE.

△10 G:\DRAWINGS\1025\TRNSFER\BM-1928R10

BM-2145 (E.I.D. 3049) BILL OF MATERIAL FOR 100 TON HI-TRAC (DWG. 2145) SHT. 1 OF 2

REV. NO.	SUMMARY OF CHANGES/AFFECTED ECOs	PREP BY:	APPROVAL DATE:	VIR#:
6	INCORPORATED ECO-1026-28, 18, 8, 7 & 5	T.F.O.	11/30/01	70563

	ITEM	QTY.	SPECIFICATION	NOMENCLATURE	DESCRIPTION
	1	1	ASTM B 29	RADIAL LEAD SHIELD	71.15 CU. FT. COMMON LEAD APPROX.
	2	1	SA 516 GR. 70	OUTER SHELL	1 THK. X 78 O.D. X 184.75 LG. CYLINDER
	3	1	SA 516 GR. 70	INNER SHELL	0.75 THK. X 68.75 I.D. X 184.75 LG. CYLINDER
△6	4	-	-	DELETED	-
△6	4A	-	-	DELETED	-
△6	4B	-	-	DELETED	-
△6	5	-	-	DELETED	-
△6	5A	-	-	DELETED	-
	6A	2	SA 516 GR. 70	WATER JACKET END PLATE	1 THK. X 91 O.D. X 78 I.D. RING X 132° REF (MAY BE MADE FROM MORE THAN 1 PIECE)
	6B	1	SA 516 GR. 70	WATER JACKET END PLATE	1 THK. X 91 O.D. X 78 I.D. RING (MAY BE MADE FROM MORE THAN 1 PIECE)
	7	1	SA 350 LF3	TOP FLANGE	4.5 THK. X 78.00 O.D. X 68.75 I.D. RING
	8	1	SA 516 GR. 70	LOWER WATER JACKET SHELL	1.25 THK. X 83.00 O.D. X 6 LG. CYLINDER
	9	1	SA 350 LF3, OR SA 516 GR. 70	BOTTOM FLANGE	2 THK. X 89 O.D. X 68.75 I.D.
	10	1	SA516 GR 70 OR SA 203-E OR SA350 LF3	POOL LID OUTER RING	2.0 THK X 89-3/4 O.D. X 75 I.D.
	11	1	SA 516 GR. 70	POOL LID TOP PLATE	2 THK. X 89 ø
	12	1	ASTM B 29	POOL LID LEAD SHIELD	3.84 CU FT APPROX. COMMON LEAD
	13	--	---	DELETED	---
	14	--	---	DELETED	---
	15	--	---	DELETED	---
	16	1	SA 516 GR. 70	TOP LID BOTTOM PLATE	1.0 THK. X 78.00 O.D. X 27 I.D. RING
	17	1	SA 516 GR 70	POOL LID BOTTOM PLATE	.5 THK X 76.5 ø
△6	18	8	SA 516 GR. 70	FILL PORT PLUGS	3 1/4 LG. X ø2 3/8 CYLINDER (MAYBE MADE OF MULTIPLE UNATTACHED PIECES)
△6	19	24	SA 193 B7	TOP LID STUD	1-8 UNC X 5 LG. STUD (FULL LENGTH THREAD WITH WRENCH FLAT AT ONE END)
△6	20	24	SA 194 2H	TOP LID NUT	1-8 UNC HEAVY HEX WITH WASHER (3/16" MAX; OPTIONAL)
△6	21	1	ELASTOMER	POOL LID GASKET	0.5" THK. X 83.625 O.D. X 82.125 I.D. COMMERCIAL
△6	22	36	SA 193 B7	POOL LID BOLT	1-8UNC X 3.125 LG. HEX BOLTS WITH 1.25" MIN THRD LENGTH W/WASHER (3/16" MAX; OPTIONAL)
	23	--	---	DELETED	---
	24	2	SA 350 LF3	LIFTING TRUNNION BLOCK	7.25 (APP) X 10 X 10
	25	--	---	DELETED	---

NOTES: 1. ALL SA-350-LF3 MATERIAL MAY BE REPLACED BY SA-203-E.
2. ALL DIMENSIONS ARE FOR REFERENCE ONLY.

BM-2145 (E.I.D. 3050) BILL OF MATERIAL FOR 100 TON HI-TRAC (DWG. 2145) SHT. 2 OF 2

REV. NO.	SUMMARY OF CHANGES/AFFECTED ECOs	PREP BY:	APPROVAL DATE:	VIR#:
5	INCORPORATED ECO-1026-10, 7 & 5.	T.F.O.	11/30/01	66474

ITEM	QTY.	SPECIFICATION	NOMENCLATURE	DESCRIPTION
26	2	SB 637 N07718	LIFTING TRUNNION	6.25 ø X 9.25 LG. BAR
27	2	SA 516 GR. 70	LIFTING TRUNNION END CAP	0.5 THK. X 6.25 ø PLATE
28	4	SA 193 B7	END CAP BOLTS	0.5 - 13 UNC X 1 LG. WITH 5/8 MIN THREAD.
29	2	SA 350 LF3	REMOVABLE POCKET TRUNNION	3.9375 X 13 X 12.375 BLOCK
30	6	SA564-630 (H1100)	DOWEL PINS	1 3/8" ø BAR
31	1	SA 106	DRAIN PIPE	1 SCH 80 X 6 LG APPROX (CUT TO SUIT)
△5 32	1	SA 193 B7	DRAIN BOLT	1 - 8UNC X 1.75 LG. SET SCREW
33	--	---	DELETED	---
34	2	SA 516 GR. 70	WATER JACKET END PLATE	1 THK. X 91 O.D. X 78 I.D. X 48° APP
35	--	---	DELETED	---
△5 36	10	SA 516 GR. 70	ENCLOSURE SHELL PANEL	0.375 THK. X 88.75 O.D. X 168.75 LG. 36 DEG. SHELL SEGMENT
37	1	COMMERCIAL	VENT COUPLING	1 1/2-3000 lb. SCREWED HALF COUPLING (OR SIMILAR)
38	1	COMMERCIAL	VENT PLUG	1 1/2-3000 lb. SCREWED HEXAGON HEAD PLUG (OR SIMILAR)
△5 39	2	COMMERCIAL	PRESSURE RELIEF COUPLING	2"-3000 lb. SCREWED HALF COUPLING (OR SIMILAR)
△5 40	2	COMMERCIAL	PRESSURE RELIEF VALVE	MEDIUM PRESSURE POP VALVE (OR SIMILAR)
41	1	SA 106	JACKET DRAIN PIPE	1 1/2 SCH. 40 X 5 LG. PIPE
△5 42	1	COMMERCIAL	JACKET DRAIN VALVE	1 1/2 NONRISING STEM GATE VALVE (OR SIMILAR)
43	4	C/S OR S/S	HOLE PLUGS	N/A
△5 44	10	SA 516 GR. 70	RADIAL RIB	1.25 THK. X 168.75 LG. X 5 WIDE
△5 45	4	SA 516 GR. 70	SHORT RIB	0.5 THK. X 4.125 LG. X 5.375 WIDE
46	--	---	DELETED	---
47	2	SA 350 LF3	POCKET TRUNNION BASE	8.03 X 13 X 12.375
48	4	SA564-630 (H1100)	POCKET TRUNNION BOLTS	1-8 UNC X 6.25 WITH 2.3125" MIN LG THREAD
△5 49	--	---	DELETED	---

△5 G:\DRAWINGS\1026\HI-TRAC\BM2145-2R5

BM-2152 BILL OF MATERIAL FOR 100 TON HI-TRAC TRANSFER LID (DWG. 2152)

REV. NO.	SUMMARY OF CHANGES/ AFFECTED ECOs	PREP BY:	APPROVAL DATE:	VIR#:
8	INCORPORATED ECO-1026-28, 19, 15, 14, 10, 8 & 4.	T.F.O.	11/30/01	71621

	ITEM	QTY.	SPECIFICATION	NOMENCLATURE	DESCRIPTION
△8	1	1	SA 516 GR. 70	LID TOP PLATE	1.5 THK. X 89.5 WIDE X 128 LG. PLATE
△8	2	1	SA 516 GR. 70	LID BOTTOM PLATE	1 1/2 THK. X 89.5 WIDE X 128 LG. PLATE
△8	3	2	SA 516 GR. 70	LID INTERMEDIATE PLATE	1.5 THK. X 8.625 WIDE X 132 LG. PLATE
△8	4	2	SA 516 GR. 70	LEAD COVER PLATE	1 THK. X 8.625 WIDE X 78 LG. PLATE
△8	5	8	SA 516 GR. 70	LEAD COVER SIDE PLATE	1 THK. X 2.5 WIDE X 8.625 LG. PLATE
	6	1	ASTM B 29	SIDE LEAD SHIELD	1.136 APPROX. CU. FT.
△8	7	2	SA 36	WHEEL TRACK	0.25 THK. X 1.0 X 1.0 X 128 LG. ANGLE
	8	2	SA 516 GR. 70	DOOR TOP PLATE	2.25 THK. X 47 WIDE X 80 LG. (CUT AS NECESSARY)
	9	2	ASTM B 29	DOOR LEAD SHIELD	2.04 APPROX CU. FT.
	10	--	DELETED	- - -	- - -
	11	--	DELETED	- - -	- - -
	12	2	SA 516 GR. 70	DOOR BOTTOM PLATE	1/2 THK. X 44.5 WIDE X 65 LG. PLATE (CUT AS NECESSARY)
	13	4	SA 516 GR 70,	DOOR WHEEL HOUSING	1 7/8 THK. X 6 WIDE X 25 LG.
△8	14	2	SA 516 GR. 70	DOOR INTERFACE PLATE	1 THK. X 3 3/4 WIDE X 80 LG. PLATE
△8	15	2	SA 516 GR. 70	DOOR SIDE PLATE	1 THK. X 5.75 WIDE X 65 LG. PLATE
△8	15A	4	SA 516 GR. 70	DOOR SIDE PLATE	1 THK. X 5.75 WIDE X 65 LG. PLATE
	16	4	SA 516 GR. 70	DOOR SIDE PLATE	1 THK. X 2 WIDE X 29 APPROX. LG. PLATE
	17	2	C/SOR S/S	DOOR HANDLE	3/4-10UNC EYE BOLT
	18	12	COMMERCIAL	DOOR WHEEL	6 X 3 V-GROOVE WHEEL
	19	12	SA 193 B7	WHEEL SHAFT	1.25-7UNC (1.25 THREAD LENGTH) X 6.625 LG. BAR WITH SCREWDRIVER SLOT FOR INSTALLATION AT UNTHREADED END.
	20	--	DELETED	- - -	- - -
△8	21	2	SA 516 GR. 70	LID HOUSING STIFFENER	1 THK. X 1.5 WIDE X 8.625 LG. PLATE
△8	22	4	SA 193 B7	DOOR LOCK BOLT	3 - 4 UNC X 11.25 LG. HEX. BOLTS W/ 1.5 LG. THREADED AT END
	23	4	SA 516 GR. 70	DOOR STOP BLOCK	2 THK. X 2 WIDE X 8 LG. BLOCK
	24	8	SA 193 B7	DOOR STOP BLOCK BOLT	1 - 8 UNC X 3 LG. BOLT W/ 2.5 LG. THREADED AT END
	25	2	SA 516 GR. 70	DOOR END PLATE	1 THK. X 2 WIDE X 24 LG. PLATE
	26	4	SA 516 GR. 70	LIFTING LUG	0.75 THK. X 3 WIDE X 3.5 LG. PLATE
	27	4	SA 516 GR. 70	LIFTING LUG PAD	0.5 THK. X 5 SQ. PLATE
△8	28	1	CARBON STEEL	TOP PLATE EXTENSION	1 1/2" THK. X 5.75" WIDE X 89 LG. PLATE
△8	29	2	CARBON STEEL	AIR HOSE GUIDE	2" X 2" SQ. TUBE W/ 1/4" THK. WALL

NOTES:
1) ALL DIMENSIONS ARE APPROXIMATE.

△8 @\DRAWIINGS\1026\HI-TRAC\BM2152R8

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

HOLTEC
INTERNATIONAL
HOLTEC CENTER
555 LINCOLN CENTER
MARLTON, NJ 08053

CLIENT: GENERAL

DESCRIPTION: 125 TON
HI-TRAC-125D
ASSEMBLY

PROJECT NO: 1025

P O NO: N/A

DRAWING NO: 3768

SHEET: 1

TOTAL SHEETS: 11

FILE PATH: G:\DRAWINGS\1025\3768

2 1

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

TOLERANCES

INCHES [MILLIMETERS]		ANGULAR
X ± .2	[5.0]	±2
XX ± .1	[2.54]	
XXX ± .02	[.50]	

FRACTIONAL

0 TO LESS THAN 2 IN	± 1/8 IN
2 IN TO LESS THAN 3 FT	± 1/4 IN
3 FT AND GREATER	± 3/8 IN

HOLTEC
INTERNATIONAL
HOLTEC CENTER
555 LINCOLN CENTER
MARLTON NJ 08053

CLIENT
GENERAL

DESCRIPTION
125 TON
HI-TRAC-125D
ASSEMBLY

PROJECT NO 1025

N/A

COMPANION DRAWINGS

SIZE D

DRAWING NO 3768

SHEET 2

REV 1

SCALE 1 16

FILE PATH G:\DRAWINGS\1025\3768

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

A

TOLERANCES

INCHES	[MILLIMETERS]	ANGULAR
X ± .2	[5.0]	±2
.XX ± .1	[2.54]	
.XXX ± .02	[.50]	

FRACTIONAL

0 TO LESS THAN 2 IN	± 1/8 IN
2 IN TO LESS THAN 3 FT	± 1/4 IN
3 FT AND GREATER	± 3/8 IN

HOLTEC
INTERNATIONAL
HOLTEC CENTER
555 LINCOLN CENTER
MARLTON NJ 08053

CLIENT
GENERAL

DESCRIPTION
125 TON
HI-TRAC-125D
ASSEMBLY

PROJECT NO 1025
N/A
COMPANION DRAWINGS

SIZE D
DRAWING NO 3768
SHEET 3
REV 1
SCALE 1 8
FILE PATH G:\DRAWINGS\1025\3768

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

TOLERANCES
INCHES (MILLIMETERS) ANGULAR
X ± .2 [5.0] ±2
XX .1 [2.54]
XXX .02 [.50]
FRACTIONAL
0 TO LESS THAN 2 IN ±1/8 IN
2 IN TO LESS THAN 3 FT ±1/4 IN
3 FT AND GREATER ±3/8 IN

PROJECT NO 1025
N/A

HOLTEC INTERNATIONAL
HOLTEC CENTER
555 LINCOLN CENTER
MARLTON NJ 08053

COMPANION DRAWINGS

CLIENT
GENERAL

DESCRIPTION
125 TON
HI-TRAC-125D
POOL LID ASSEMBLY

SIZE D
DRAWING NO 3768
SHEET 4
REV 1
SCALE 1 16
FILE PATH G:\DRAWINGS\1025\3768

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

TOLERANCES

INCHES	MILLIMETERS	ANGULAR
.X ± .2	[5.0]	2
.XX ± .1	[2.54]	
.XXX ± .02	[.50]	

FRACTIONAL

0 TO LESS THAN 2 IN	±1/8 IN
2 IN TO LESS THAN 3 FT	±1/4 IN
3 FT AND GREATER	±3/8 IN

PROJECT NO 1025

N/A

HOLTEC
INTERNATIONAL
HOLTEC CENTER
555 LINCOLN CENTER
MARLTON NJ 08053

COMPANION DRAWINGS

CLIENT
GENERAL

DESCRIPTION
125 TON
HI-TRAC-125D
BASE PLATE ASSEMBLY

SIZE D

DRAWING NO 3768

SHEET 5

REV 1

SCALE 1:1

FILE PATH G:\DRAWINGS\1025\3768

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

TOLERANCES

INCHES (MILLIMETERS)		ANGULAR
.X ± .2	[5.0]	±2
.XX ± .1	[2.54]	
.XXX ± .02	[.50]	

FRACTIONAL

0 TO LESS THAN 2 IN	1/8 IN
2 IN TO LESS THAN 3 FT	± 1/4 IN
3 FT AND GREATER	3/8 IN

HOLTEC
INTERNATIONAL
HOLTEC CENTER
555 LINCOLN CENTER
MARLTON NJ 08053

CLIENT
GENERAL

DESCRIPTION
125 TON
HI-TRAC-125D
OUTER SHELL ASSEMBLY

PROJECT NO 1025

N/A

COMPANION DRAWINGS

SIZE D
DRAWING NO 3768
SHEET 6
REV 1

SCALE 1:16
FILE PATH G:\DRAWINGS\1025\3768

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

TOLERANCES

INCHES [MILLIMETERS]		ANGULAR
X ± .2	[5.0]	±2
.XX ± .1	[2.54]	
.XXX ± .02	[.50]	

FRACTIONAL

0 TO LESS THAN 2 IN	± 1/8 IN
2 IN TO LESS THAN 3 FT	± 1/4 IN.
3 FT AND GREATER	± 3/8 IN

PROJECT NO 1025

N/A

HOLTEC
INTERNATIONAL
HOLTEC CENTER
555 LINCOLN CENTER
MARLTON NJ 08053

COMPANION DRAWINGS -

CLIENT
GENERAL

DESCRIPTION
125 TON
HI-TRAC-125D
TOP FLANGE ASSEMBLY

SIZE D
DRAWING NO 3768
SHEET 7
REV 1
SCALE 1 1
FILE PATH G:\DRAWINGS\1025\3768

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

TOLERANCES

INCHES [MILLIMETERS]

X ± .2 [5.0]
XX ± .1 [2.54]
XXX ± .02 [.50]

ANGULAR
±2°

FRACTIONAL

0 TO LESS THAN 2 IN ±1/8 IN.
2 IN TO LESS THAN 3 FT ±1/4 IN
3 FT AND GREATER 3/8 IN

HOLTEC
INTERNATIONAL

HOLTEC CENTER
555 LINCOLN CENTER
MARLTON NJ 08053

CLIENT
GENERAL

DESCRIPTION
125 TON
HI-TRAC-125D
TRUNNION & SHELL ASSEMBLY

PROJECT NO 1025

N/A

COMPANION DRAWINGS

SIZE D

DRAWING NO 3768

SHEET 8

REV 1

SCALE 1 2

FILE PATH G:\DRAWINGS\1025\3768

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

TOLERANCES

INCHES	[MILLIMETERS]	ANGULAR
X ± .2	[5.0]	.2
.XX ± .1	[2.54]	
.XXX ± .02	[.50]	

FRACTIONAL

0 TO LESS THAN 2 IN	± 1/6 IN
2 IN TO LESS THAN 3 FT	± 1/4 IN
3 FT AND GREATER	± 3/8 IN

HOLTEC
INTERNATIONAL
HOLTEC CENTER
555 LINCOLN CENTER
MARLTON NJ 08053

CLIENT
GENERAL

DESCRIPTION
125 TON
HI-TRAC-125D
ASSEMBLY

PROJECT NO
1025
N/A

COMPANION DRAWINGS

SIZE D
DRAWING NO 3768
SHEET 9
REV 1

SCALE

FILE PATH

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

TOLERANCES

INCHES [MILLIMETERS] ANGULAR

X ± .2 [5.0] ±2

.XX ± .1 [2.54]

.XXX ± .02 [.50]

FRACTIONAL

0 TO LESS THAN 2 IN ±1/8 IN

2 IN TO LESS THAN 3 FT ±1/4 IN

3 FT AND GREATER ±3/8 IN

HOLTEC
INTERNATIONAL

HOLTEC CENTER
555 LINCOLN CENTER
MARLTON NJ 08053

CLIENT: GENERAL

DESCRIPTION:
125 TON
HI-TRAC-125D
TOP LID ASSEMBLY

PROJECT NO 1025	COMPANION DRAWINGS	SIZE D	DRAWING NO 3768		SHEET 10	REV 1
N/A		SCALE 1 16	FILE PATH G:\DRAWINGS\1025\3768			

FIGURE WITHHELD AS SENSITIVE UNCLASSIFIED INFORMATION

A

TOLERANCES

INCHES [MILLIMETERS] ANGULAR
X ± .2 [5.0] ±2
XX ± .1 [2.54]
.XXX ± .02 [.50]

FRACTIONAL
0 TO LESS THAN 2 IN ±1/8 IN
2 IN TO LESS THAN 3 FT ±1/4 IN
3 FT AND GREATER 3/8 IN

HOLTEC
INTERNATIONAL
HOLTEC CENTER
555 LINCOLN CENTER
MARLTON, NJ 08053

CLIENT
GENERAL

DESCRIPTION
HI-TRAC-125D △1
OPTIONAL RADIAL
RIB DESIGN

PROJECT NO
1025

N/A

COMPANION DRAWINGS

SIZE
D

DRAWING NO
3768

SHEET
11

REV
1

SCALE
1 16

FILE PATH
G:\DRAWINGS\1025\3768

1.6 REFERENCES

[1.0.1] 10CFR Part 72, "Licensing Requirements for the Storage of Spent Fuel in an Independent Spent Fuel Storage Installation", Title 10 of the Code of Federal Regulations, 1998 Edition, Office of the Federal Register, Washington, D.C.

[1.0.2] Regulatory Guide 3.61 (Task CE306-4) "Standard Format for a Topical Safety Analysis Report for a Spent Fuel Storage Cask", USNRC, February 1989.

[1.0.3] NUREG-1536, "Standard Review Plan for Dry Cask Storage Systems", U.S. Nuclear Regulatory Commission, January 1997.

[1.0.4] American Concrete Institute, "Code Requirements for Nuclear Safety Related Concrete Structures", ACI 349-85, ACI, Detroit, Michigan[†]

[1.0.5] American Concrete Institute, "Building Code Requirements for Structural Concrete", ACI 318-95, ACI, Detroit, Michigan.

[1.1.1] ASME Boiler & Pressure Vessel Code, Section III, Subsection NB, American Society of Mechanical Engineers, 1995 with Addenda through 1997.

[1.1.2] USNRC Docket No. 72-1008, Final Safety Analysis Report for the (Holtec International Storage, Transport, and Repository) HI-STAR System, latest revision.

[1.1.3] USNRC Docket No. 71-9261, Safety Analysis Report for Packaging for the (Holtec International Storage, Transport, and Repository) HI-STAR System, latest revision.

[1.1.4] 10CFR Part 50, "Domestic Licensing of Production and Utilization Facilities", Title 10 of the Code of Federal Regulations, 1998 Edition, Office of the Federal Register, Washington, D.C.

[1.1.5] Deleted.

[1.2.1] U.S. NRC Information Notice 96-34, "Hydrogen Gas Ignition During Closure Welding of a VSC-24 Multi-Assembly Sealed Basket".

[1.2.2] Directory of Nuclear Reactors, Vol. II, Research, Test & Experimental Reactors, International Atomic Energy Agency, Vienna, 1959.

[1.2.3] V.L. McKinney and T. Rockwell III, "Boral: A New Thermal-Neutron Shield", USAEC Report AECD-3625, August 29, 1949.

[†] The 1997 edition of ACI-349 is specified for ISFSI pad and embedment design for deployment of the anchored HI-STORM 100A and HI-STORM 100SA

[1.2.4] Reactor Shielding Design Manual, USAEC Report TID-7004, March 1956.

[1.2.5] "Safety Analysis Report for the NAC Storable Transport Cask", Revision 8, September 1994, Nuclear Assurance Corporation (USNRC Docket No. 71-9235).

[1.2.6] Deleted.

[1.2.7] Materials Handbook, 13th Edition, Brady, G.S. and H.R. Clauser, McGraw-Hill, 1991, Page 310.

[1.2.8] Deleted.

[1.2.9] ANSI N14.6-1993, "American National Standard for Special Lifting Devices for Shipping Containers Weighing 10,000 Pounds (4500 kg) or More for Nuclear Materials," American National Standards Institute, June, 1993.

[1.2.10] Deleted.

APPENDIX 1.A: ALLOY X DESCRIPTION

1.A ALLOY X DESCRIPTION

1.A.1 Alloy X Introduction

Alloy X is used within this licensing application to designate a group of stainless steel alloys. Alloy X can be any one of the following alloys:

- Type 316
- Type 316LN
- Type 304
- Type 304LN

Qualification of structures made of Alloy X is accomplished by using the least favorable mechanical and thermal properties of the entire group for all MPC mechanical, structural, neutronic, radiological, and thermal conditions. The Alloy X approach is conservative because no matter which material is ultimately utilized, the Alloy X approach guarantees that the performance of the MPC will meet or exceed the analytical predictions.

This appendix defines the least favorable material properties of Alloy X.

1.A.2 Alloy X Common Material Properties

Several material properties do not vary significantly from one Alloy X constituent to the next. These common material properties are as follows:

- density
- specific heat
- Young's Modulus (Modulus of Elasticity)
- Poisson's Ratio

The values utilized for this licensing application are provided in their appropriate chapters.

1.A.3 Alloy X Least Favorable Material Properties

The following material properties vary between the Alloy X constituents

- Design Stress Intensity (S_m)
- Tensile (Ultimate) Strength (S_u)
- Yield Strength (S_y)
- Coefficient of Thermal Expansion (á)

- Coefficient of Thermal Conductivity (k)

Each of these material properties are provided in the ASME Code Section II [1.A.1]. Tables 1.A.1 through 1.A.5 provide the ASME Code values for each constituent of Alloy X along with the least favorable value utilized in this licensing application. The ASME Code only provides values to -20°F. The design temperature of the MPC is -40°F to 725°F as stated in Table 1.2.3. Most of the above-mentioned properties become increasingly favorable as the temperature drops. Conservatively, the values at the lowest design temperature for the HI-STAR 100 System have been assumed to be equal to the lowest value stated in the ASME Code. The lone exception is the thermal conductivity. The thermal conductivity decreases with the decreasing temperature. The thermal conductivity value for -40°F is linearly extrapolated from the 70°F value using the difference from 70°F to 100°F.

The Alloy X material properties are the minimum values of the group for the design stress intensity, tensile strength, yield strength, and coefficient of thermal conductivity. Using minimum values of design stress intensity is conservative because lower design stress intensities lead to lower allowables that are based on design stress intensity. Similarly, using minimum values of tensile strength and yield strength is conservative because lower values of tensile strength and yield strength lead to lower allowables that are based on tensile strength and yield strength. When compared to calculated values, these lower allowables result in factors of safety that are conservative for any of the constituent materials of Alloy X. Further discussion of the justification for using the minimum values of coefficient of thermal conductivity is given in Chapter 3. The maximum and minimum values are used for the coefficient of thermal expansion of Alloy X. The maximum and minimum coefficients of thermal expansion are used as appropriate in this submittal. Figures 1.A.1-1.A.5 provide a graphical representation of the varying material properties with temperature for the Alloy X materials.

1.A.4 References

[1.A.1] ASME Boiler & Pressure Vessel Code Section II, 1995 ed. with Addenda through 1997.

Table 1.A.1

ALLOY X AND CONSTITUENT DESIGN STRESS INTENSITY (S_m) vs. TEMPERATURE

Temp. (°F)	Type 304	Type 304LN	Type 316	Type 316LN	Alloy X (minimum of constituent values)
-40	20.0	20.0	20.0	20.0	20.0
100	20.0	20.0	20.0	20.0	20.0
200	20.0	20.0	20.0	20.0	20.0
300	20.0	20.0	20.0	20.0	20.0
400	18.7	18.7	19.3	18.9	18.7
500	17.5	17.5	18.0	17.5	17.5
600	16.4	16.4	17.0	16.5	16.4
650	16.2	16.2	16.7	16.0	16.0
700	16.0	16.0	16.3	15.6	15.6
750	15.6	15.6	16.1	15.2	15.2
800	15.2	15.2	15.9	14.9	14.9

Notes:

1. Source: Table 2A on pages 314, 318, 326, and 330 of [1.A.1].
2. Units of design stress intensity values are ksi.

Table 1.A.2

ALLOY X AND CONSTITUENT TENSILE STRENGTH (S_u) vs. TEMPERATURE

Temp. (°F)	Type 304	Type 304LN	Type 316	Type 316LN	Alloy X (minimum of constituent values)
-40	75.0	75.0	75.0	75.0	75.0
100	75.0	75.0	75.0	75.0	75.0
200	71.0	71.0	75.0	75.0	71.0
300	66.0	66.0	73.4	70.9	66.0
400	64.4	64.4	71.8	67.1	64.4
500	63.5	63.5	71.8	64.6	63.5
600	63.5	63.5	71.8	63.1	63.1
650	63.5	63.5	71.8	62.8	62.8
700	63.5	63.5	71.8	62.5	62.5
750	63.1	63.1	71.4	62.2	62.2
800	62.7	62.7	70.9	61.7	61.7

Notes:

1. Source: Table U on pages 437, 439, 441, and 443 of [1.A.1].
2. Units of tensile strength are ksi.

Table 1.A.3

ALLOY X AND CONSTITUENT YIELD STRESSES (S_y) vs. TEMPERATURE

Temp. (°F)	Type 304	Type 304LN	Type 316	Type 316LN	Alloy X (minimum of constituent values)
-40	30.0	30.0	30.0	30.0	30.0
100	30.0	30.0	30.0	30.0	30.0
200	25.0	25.0	25.8	25.5	25.0
300	22.5	22.5	23.3	22.9	22.5
400	20.7	20.7	21.4	21.0	20.7
500	19.4	19.4	19.9	19.4	19.4
600	18.2	18.2	18.8	18.3	18.2
650	17.9	17.9	18.5	17.8	17.8
700	17.7	17.7	18.1	17.3	17.3
750	17.3	17.3	17.8	16.9	16.9
800	16.8	16.8	17.6	16.6	16.6

Notes:

1. Source: Table Y-1 on pages 518, 519, 522, 523, 530, 531, 534, and 535 of [1.A.1].

2. Units of yield stress are ksi.

Table 1.A.4

ALLOY X AND CONSTITUENT COEFFICIENT OF THERMAL EXPANSION vs. TEMPERATURE

Temp. (°F)	Type 304 and Type 304LN	Type 316 and Type 316LN	Alloy X Maximum	Alloy X Minimum
-40	8.55	8.54	8.55	8.54
100	8.55	8.54	8.55	8.54
150	8.67	8.64	8.67	8.64
200	8.79	8.76	8.79	8.76
250	8.90	8.88	8.90	8.88
300	9.00	8.97	9.00	8.97
350	9.10	9.11	9.11	9.10
400	9.19	9.21	9.21	9.19
450	9.28	9.32	9.32	9.28
500	9.37	9.42	9.42	9.37
550	9.45	9.50	9.50	9.45
600	9.53	9.60	9.60	9.53
650	9.61	9.69	9.69	9.61
700	9.69	9.76	9.76	9.69
750	9.76	9.81	9.81	9.76
800	9.82	9.90	9.90	9.82

Notes:

1. Source: Table TE-1 on pages 590 and 591 of [1.A.1].

2. Units of coefficient of thermal expansion are in./in.-°F x 10^{-6}.

Table 1.A.5

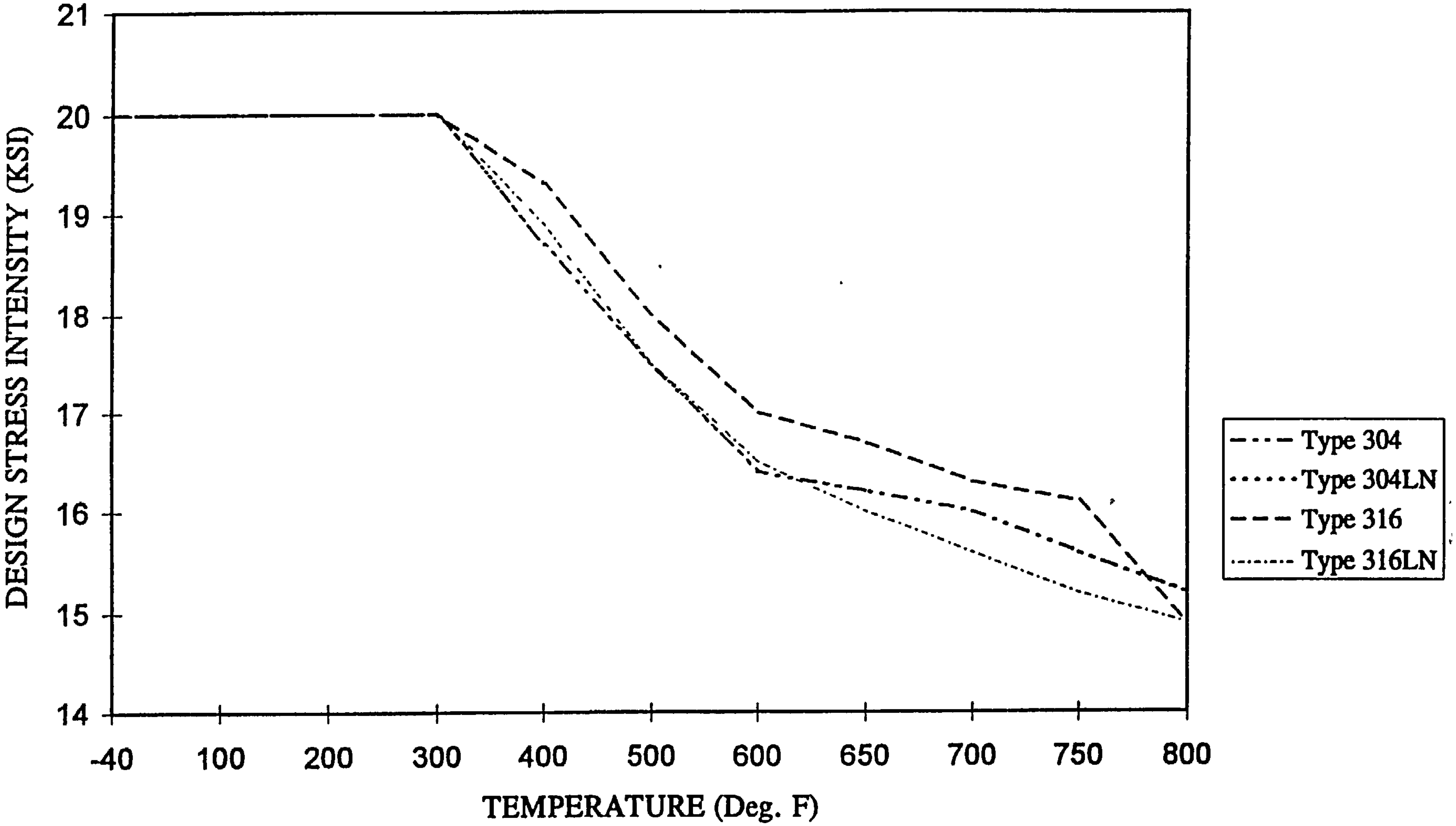
ALLOY X AND CONSTITUENT THERMAL CONDUCTIVITY vs. TEMPERATURE

Temp. (°F)	Type 304 and Type 304LN	Type 316 and Type 316LN	Alloy X (minimum of constituent values)
-40	8.23	6.96	6.96
70	8.6	7.7	7.7
100	8.7	7.9	7.9
150	9.0	8.2	8.2
200	9.3	8.4	8.4
250	9.6	8.7	8.7
300	9.8	9.0	9.0
350	10.1	9.2	9.2
400	10.4	9.5	9.5
450	10.6	9.8	9.8
500	10.9	10.0	10.0
550	11.1	10.3	10.3
600	11.3	10.5	10.5
650	11.6	10.7	10.7
700	11.8	11.0	11.0
750	12.0	11.2	11.2
800	12.2	11.5	11.5

Notes:

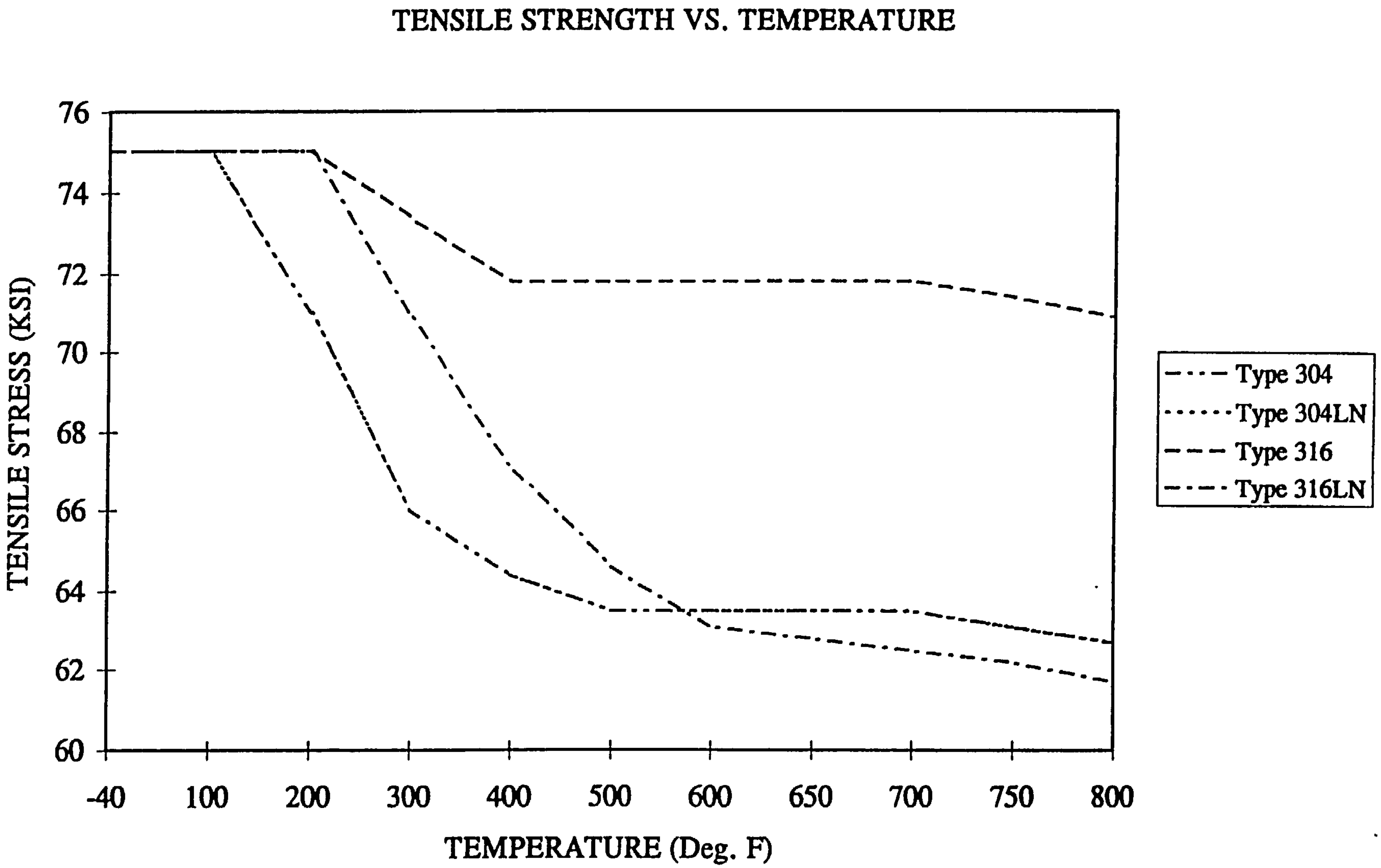
1. Source: Table TCD on page 606 of [1.A.1].
2. Units of thermal conductivity are Btu/hr-ft-°F.

DESIGN STRESS INTENSITY VS. TEMPERATURE



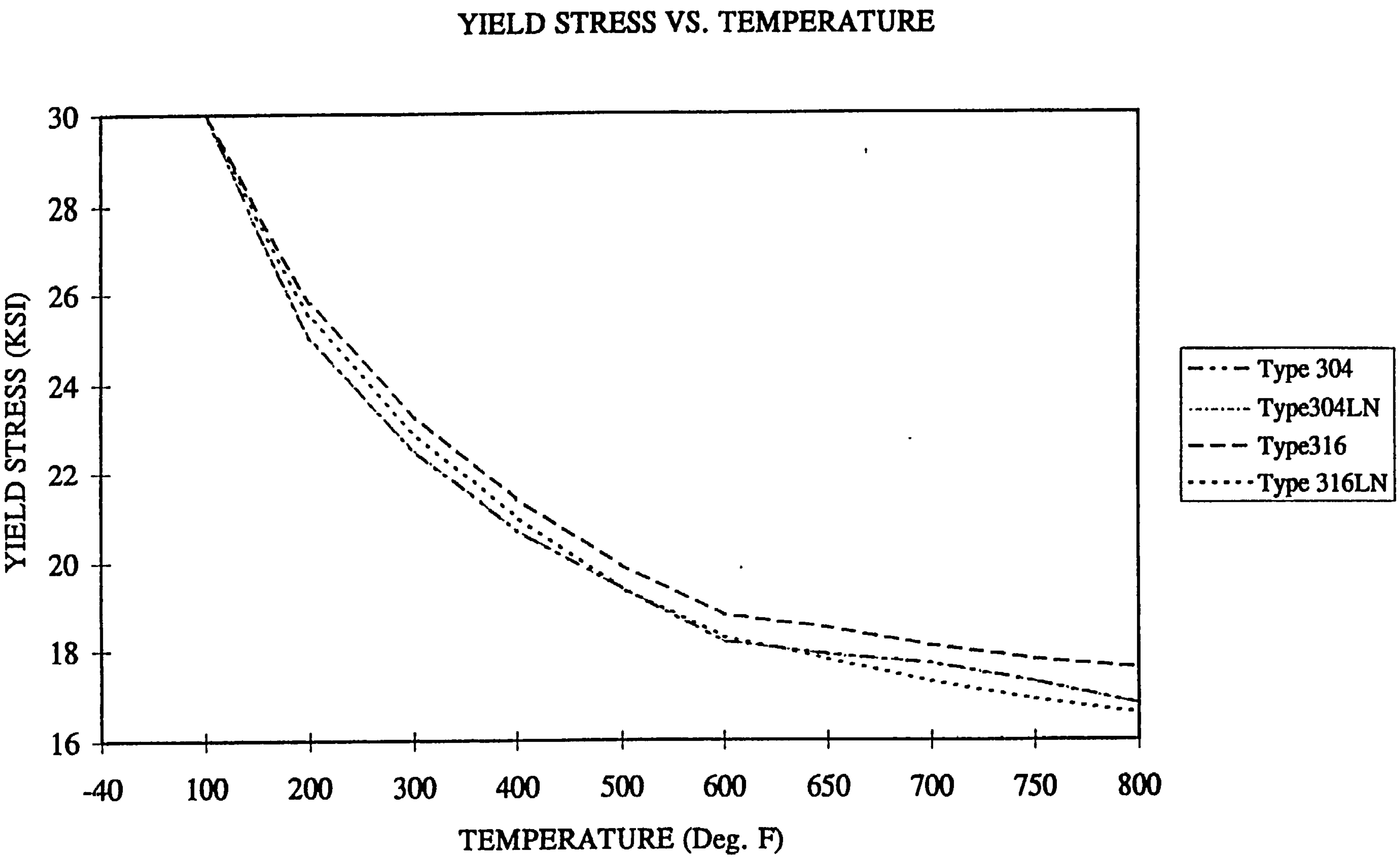
SOURCE: TABLE 1.A.1

FIGURE 1.A.1; DESIGN STRESS INTENSITY VS. TEMPERATURE



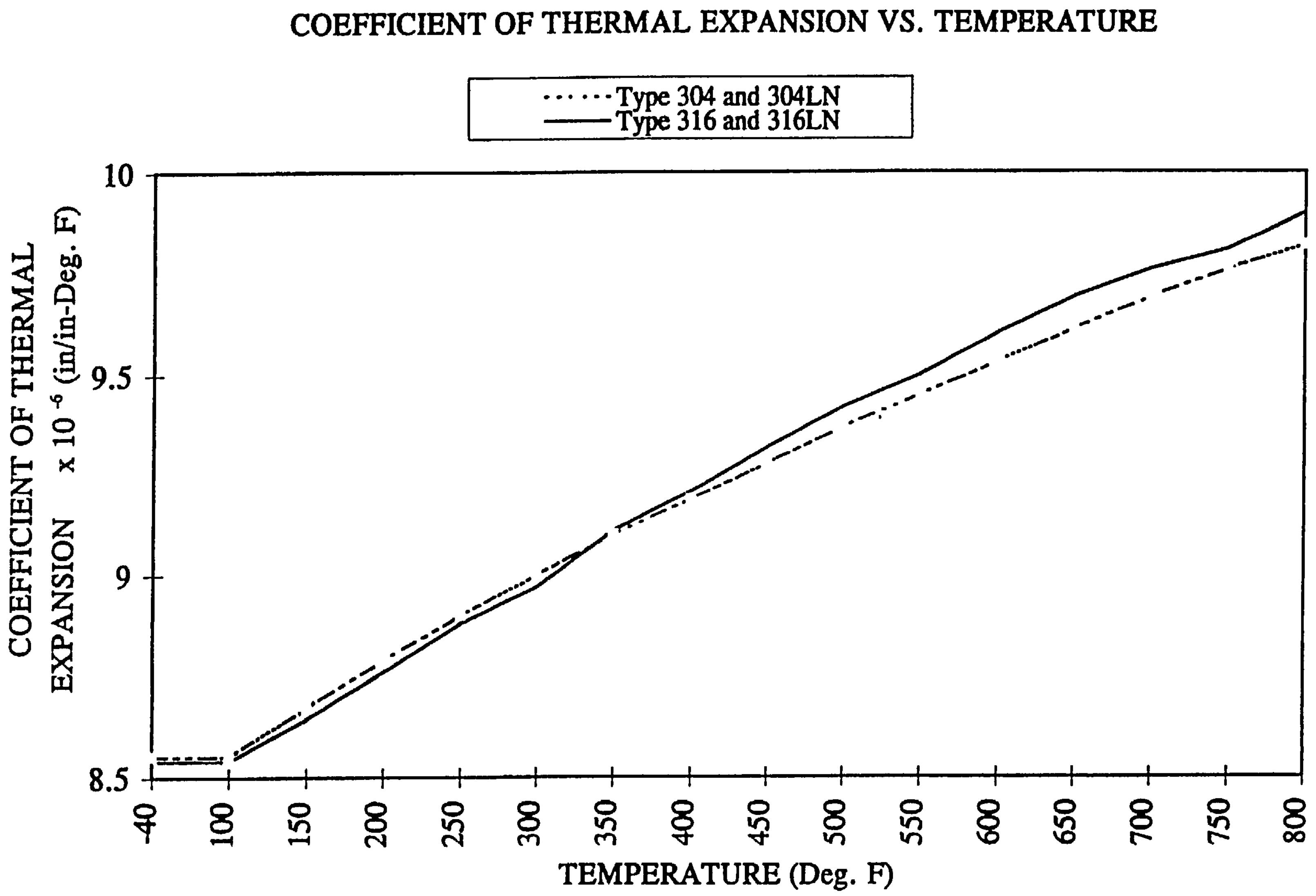
SOURCE: TABLE 1.A.2

FIGURE 1.A.2; TENSILE STRENGTH VS. TEMPERATURE

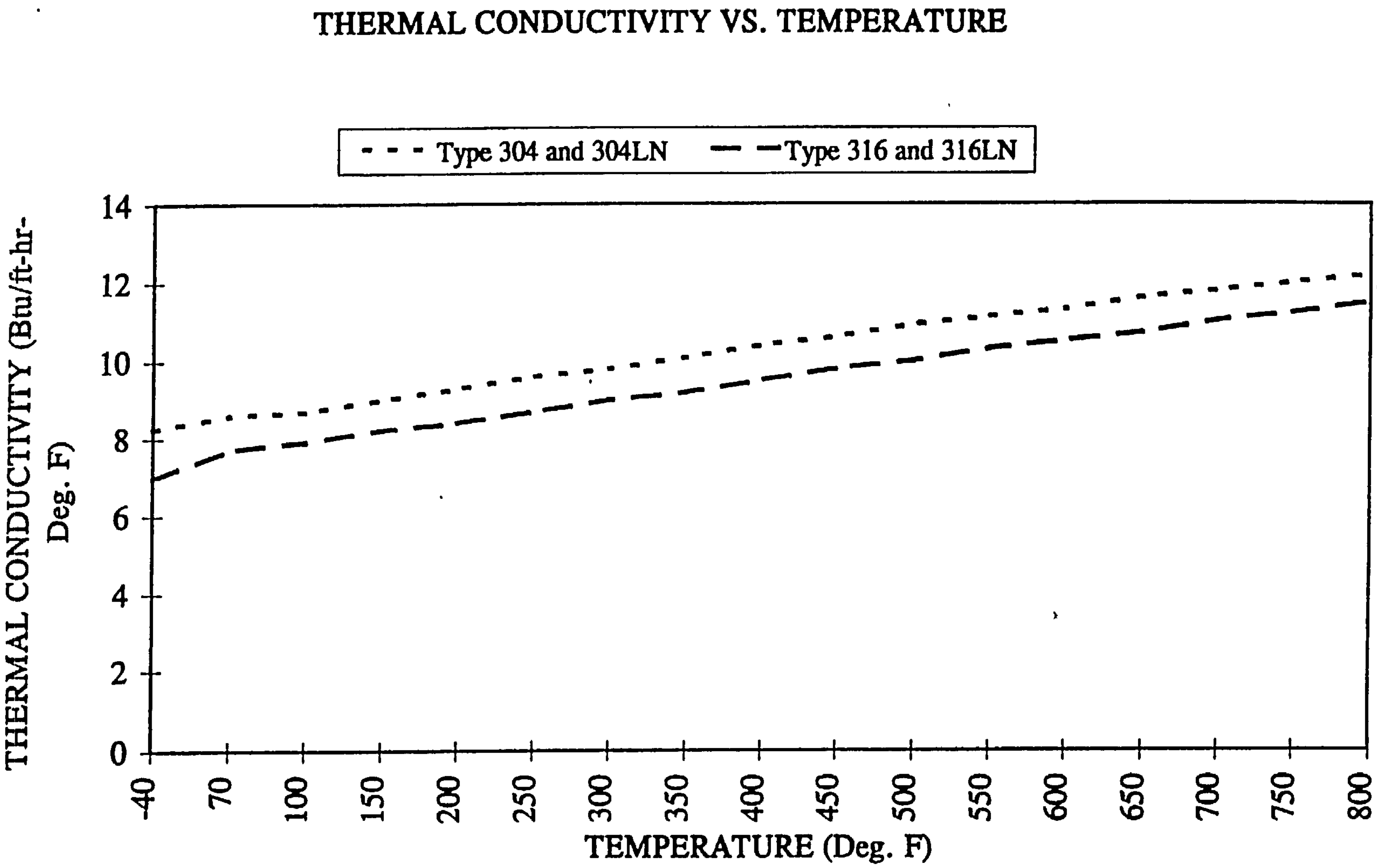


SOURCE: TABLE 1.A.3

FIGURE 1.A.3; YIELD STRESS VS. TEMPERATURE



SOURCE: TABLE 1.A.4 FIGURE 1.A.4; COEFFICIENT OF THERMAL EXPANSION VS. TEMPERATURE



SOURCE: TABLE 1.A.5

FIGURE 1.A.5; THERMAL CONDUCTIVITY VS. TEMPERATURE

APPENDIX 1.B: HOLTITE ™ MATERIAL DATA

The information provided in this appendix describes the neutron absorber material, Holtite-A for the purpose of confirming its suitability for use as a neutron shield material in spent fuel storage casks. Holtite-A is one of the family of Holtite neutron shield materials denoted by the generic name Holtite^{TM}. It is currently the only neutron shield material approved for installation in the HI-STAR 100 cask. It is chemically identical to NS-4-FR which was originally developed by Bisco Inc. and used for many years as a shield material with B_4C or Pb added.

Holtite-A contains aluminum hydroxide ($Al(OH)_3$) in an epoxy resin binder. Aluminum hydroxide is also known by the industrial trade name of aluminum tri-hydrate or ATH. ATH is often used commercially as a fire-retardant. Holtite-A contains approximately 62% ATH supported in a typical 2-part epoxy resin as a binder. Holtite-A contains 1% (nominal) by weight B_4C, a chemically inert material added to enhance the neutron absorption property. Pertinent properties of Holtite-A are listed in Table 1.B.1.

The essential properties of Holtite-A are:

1. the hydrogen density (needed to thermalize neutrons),
2. thermal stability of the hydrogen density, and
3. the uniformity in distribution of B_4C needed to absorb the thermalized neutrons.

ATH and the resin binder contain nearly the same hydrogen density so that the hydrogen density of the mixture is not sensitive to the proportion of ATH and resin in the Holtite-A mixture. B_4C is added as a finely divided powder and does not settle out during the resin curing process. Once the resin is cured (polymerized), the ATH and B_4C are physically retained in the hardened resin. Qualification testing for B_4C throughout a column of Holtite-A has confirmed that the B_4C is uniformly distributed with no evidence of settling or non-uniformity. Furthermore, an excess of B_4C is specified in the Holtite-A mixing and pouring procedure as a precaution to assure that the B_4C concentration is always adequate throughout the mixture.

The specific gravity specified in Table 1.B.1 does not include an allowance for weight loss. The specific gravity assumed in the shielding analysis includes a 4% reduction to conservatively account for potential weight loss at the design temperature of 300°F or an inability to reach theoretical density. Tests on the stability of Holtite-A were ~~also~~ performed by Holtec International. The results of the tests are summarized in Holtec Reports HI-2002396, "Holtite-A Development History and Thermal Performance Data" and HI-2002420, "Results of Pre- and Post-Irradiation Test Measurements." The information provided in these reports demonstrates that Holtite-A^{TM} possesses the necessary thermal and radiation stability characteristics to function as a reliable shielding material in the HI-STAR 100 overpack.

The Holtite-A is encapsulated in the HI-STAR 100 overpack and, therefore, should experience a very small weight reduction during the design life of the HI-STAR 100 System. The data and test results confirm that

Holtite-A remains stable under design thermal and radiation conditions, the material properties meet or exceed that assumed in the shielding analysis, and the B_4C remains uniformly distributed with no evidence of settling or non-uniformity.

Based on the information described above, Holtite-A meets all of the requirements for an acceptable neutron shield material.

Table 1.B.1

REFERENCE PROPERTIES OF HOLTITE-A NEUTRON SHIELD MATERIAL

PHYSICAL PROPERTIES	
% ATH	62 nominal
Specific Gravity	1.68 g/cc nominal
Max. Continuous Operating Temperature	300°F
Hydrogen Density	0.096 g/cc minimum
Radiation Resistance	Excellent
CHEMICAL PROPERTIES (Nominal)	
wt% Aluminum	21.5
wt% Hydrogen	6.0
wt% Carbon	27.7
wt% Oxygen	42.8
wt% Nitrogen	2.0
wt% B_4C	~~up to 6.5 (Holtite-A uses 1% B_4C)~~ 1.0

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APPENDIX 1.C: MISCELLANEOUS MATERIAL DATA

(Total of 6 Pages Including This Page)

The information provided in this appendix specifies the paint properties and demonstrates their suitability for use in spent nuclear fuel storage casks. The following is a listing of the information provided.

- Thermaline 450, Carboline, Product Data Sheet and Application Instructions

Thermaline 450 or equivalent is specified to coat the overpack to the maximum extent practical and the inner cavity of the HI-TRAC transfer cask. Carboline 890 or equivalent is specified to coat external surfaces of the HI-TRAC transfer cask. As can be seen from the product data sheets, the paints are suitable for the design temperatures (see Table 2.2.3) and the environment.

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carboline

product data sheet

THERMALINE 450

VOC

0928

SELECTION DATA

GENERIC TYPE: A glass flake filled, phenolic modified, amine cured epoxy novalac.

GENERAL PROPERTIES: A dense cross-linked polymer which exhibits outstanding barrier protection against a variety of chemical exposures. Excellent resistance to wet/dry cycling conditions at elevated temperatures. Designed to coat the exterior of insulated piping. It is also suitable for coating non-insulated piping and equipment exposed to chemical attack. The glass flakes help provide excellent abrasion resistance, permeation resistance and internal reinforcement.

- Temperature resistance to 450°F
- Excellent abrasion resistance
- Excellent overall chemical resistance
- Excellent thermal shock resistance

RECOMMENDED USES: Typically used as a one coat system to coat pipes and tanks that will be insulated. May also be used to coat non-insulated pipe, structural steel, equipment or concrete that may be subjected to severe chemical attack, abrasion or other abuse typical of a chemical plant environment.

TYPICAL CHEMICAL RESISTANCE:

Exposure	Splash & Spillage	Fumes
Acids	Excellent	Excellent
Alkalies	Excellent	Excellent
Solvents	Excellent	Excellent
Salt	Excellent	Excellent
Water	Excellent	Excellent

TEMPERATURE RESISTANCE (Under insulation):

Continuous:	425°F (218°C)
Excursions to:	450°F (232°C)

At 200°F (93°C) coating discoloration may be observed without loss of film integrity.

SUBSTRATES: Apply over properly prepared steel.

COMPATIBLE COATINGS: Normally applied directly to substrate. May be applied over epoxies and phenolics as recommended. May be topcoated with epoxies, polyurethanes or other finish coats as recommended.

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SPECIFICATION DATA

THEORETICAL SOLIDS CONTENT OF MIXED MATERIAL:

	By Volume
THERMALINE 450	70 ± 2%

VOLATILE ORGANIC CONTENT (VOC):
The following are nominal values:
As supplied: 2.13 lbs./gal. (255 gm./liter).

Thinner	Fluid Ounces/Gal.	Pounds/ Gallon	Grams/ Liter
213	13	2.56	307

RECOMMENDED DRY FILM THICKNESS:
8-10 mils (200-250 microns) to be achieved in 1 or 2 coats.

THEORETICAL COVERAGE PER MIXED GALLON:*
1,117 mil sq. ft. (27.9 sq.m/l at 25 microns)
139 sq. ft at 8 mils (3.5 sq. m/l at 200 microns)
111 sq. ft at 10 mils (2.8 sq.m/l at 250 microns)

*Mixing and application losses will vary and must be taken into consideration when estimating job requirements.

STORAGE CONDITIONS: Store indoors
Temperature: 40-110°F (4-43°C) Humidity: 0-90%

SHELF LIFE: 24 months when stored indoors at 75°F (24°C)

COLOR: Red (0500) and Gray (5742)

GLOSS: Low (Epoxies lose gloss, discolor and eventually chalk in sunlight exposure.)

ORDERING INFORMATION

Prices may be obtained from your Carboline Sales Representative or Carboline Customer Service Department.

APPROXIMATE SHIPPING WEIGHT:

	1's	5's
THERMALINE 450	12 lbs. (5.5 kg)	58 lbs. (26.3 kg)
Thinner 213	8.4 lbs. (3.8 kg)	41 lbs. (18.6 kg)

FLASH POINT: (Setaflash)

THERMALINE 450 Part A:	53°F	(12°C)
THERMALINE 450 Part B:	>200°F	(>93°C)
Thinner 213	22°F	(-6°C)

APPLICATION INSTRUCTIONS

THERMALINE 450

These instructions are not intended to show product recommendations for specific service. They are issued as an aid in determining correct surface preparation, mixing instructions and application procedure. It is assumed that the proper product recommendations have been made. These instructions should be followed closely to obtain the maximum service from the materials.

0928

SURFACE PREPARATION: Remove all oil or grease from surface to be coated with Thinner 2 or Surface Cleaner 3 (refer to Surface Cleaner 3 instructions) in accordance with SSPC-SP 1.

STEEL:

Not Insulated: Abrasive blast to a Commercial Finish in accordance with SSPC-SP 6 and obtain a 2-3 mil (50-75 micron) blast profile.

Under Insulation: Abrasive blast to a Near White Finish in accordance with SSPC-SP 10 and obtain a 2-3 (50-75 micron) blast profile.

MIXING: Power mix each component separately, then combine and power mix in the following proportions.

Allow 30 minutes induction time at 75°F (24°C) prior to use.

	1 Gal. Kit	5 Gal. Kit
THERMALINE 450 Part A:	0.8 gals.	4.0 gals.
THERMALINE 450 Part B:	0.2 gals.	1.0 gals.

THINNING: May be thinned up to 13 oz/gal with Thinner 213.

Use of thinners other than those supplied or approved by Carboline may adversely affect product performance and void product warranty, whether express or implied.

POT LIFE: Three hours at 75°F (24°C) and less at higher temperatures. Pot life ends when coating loses body and begins to sag.

APPLICATION CONDITIONS:

	Material	Surfaces	Ambient	Humidity
Normal	65-85°F (18-29°C)	65-85°F (18-29°C)	65-85°F (18-29°C)	30-60%
Minimum	55°F (13°C)	50°F (10°C)	50°F (10°C)	0%
Maximum	90°F (32°C)	110°F (43°C)	100°F (38°C)	85%

Do not apply when the surface temperature is less than 5°F or 3°C above the dew point.

Special thinning and application techniques may be required above or below normal conditions.

SPRAY: The following spray equipment has been found suitable and is available from manufacturers such as Binks, DeVilbiss and Graco.

Conventional: Pressure pot equipped with dual regulators, 1/2" I.D. minimum material hose, .110" I.D. fluid tip and appropriate air cap.

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Airless:

Pump Ratio:	30:1 (min)*
GPM Output:	3.0 (min)
Material Hose:	1/2" I.D. (min)
Tip Size:	.035"-.041"
Output psi:	2200-2500

*Teflon packings are recommended and are available from the pump manufacturer.

BRUSH: For striping of welds, touch-up of small areas only. Use a natural bristle brush, applying full strokes Avoid rebrushing.

ROLLER: Not recommended.

DRYING TIMES: These times are based on a dry film thickness of 10 mils (250 microns). Higher film thickness, insufficient ventilation or cooler temperatures will require longer cure times and could result in solvent entrapment and premature failure.

Surface Temperature	Dry To Handle	Dry to Topcoat	Final Cure
50°F (10°C)	18 hours	48 hours	21 days
60°F (16°C)	12 hours	32 hours	14 days
75°F (24°C)	6 hours	16 hours	7 days
90°F (32°C)	3 hours	8 hours	4 days

If the final cure time has been exceeded, the surface must be abraded by sweep blasting prior to the application of any additional coats.

EXCESSIVE HUMIDITY OR CONDENSATION ON THE SURFACE DURING CURING MAY RESULT IN A SURFACE HAZE OR BLUSH; ANY HAZE OR BLUSH MUST BE REMOVED BY WATER WASHING BEFORE RECOATING.

VENTILATION & SAFETY: WARNING: VAPORS MAY CAUSE EXPLOSION. When used in enclosed areas, thorough air circulation must be used during and after application until the coating is cured. The ventilation system should be capable of preventing the solvent vapor concentration from reaching the lower explosion limit for the solvents used. In addition to insuring proper ventilation, fresh air respirators or fresh air hoods must be used by all application personnel Where flammable solvents exist, explosion-proof lighting must be used. Hypersensitive persons should wear clean, protective clothing, gloves and/or protective cream on face, hands and all exposed areas

CLEANUP: Use Thinner 2.

CAUTION: READ AND FOLLOW ALL CAUTION STATEMENTS ON THIS PRODUCT DATA SHEET AND ON THE MATERIAL SAFETY DATA SHEET FOR THIS PRODUCT.

CAUTION CONTAINS FLAMMABLE SOLVENTS. KEEP AWAY FROM SPARKS AND OPEN FLAMES. WORKMEN IN CONFINED AREAS MUST WEAR FRESH AIRLINE RESPIRATORS HYPERSENSITIVE PERSONS SHOULD WEAR GLOVES OR USE PROTECTIVE CREAM. ALL ELECTRICAL EQUIPMENT AND INSTALLATIONS SHOULD BE MADE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE. IN AREAS WHERE EXPLOSION HAZARDS EXIST, WORKMEN SHOULD BE REQUIRED TO USE NONFERROUS TOOLS AND TO WEAR CONDUCTIVE AND NONSPARKING SHOES

carboline
350 Hanley Industrial Ct • St Louis MO 63144 1599

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APPENDIX 1.D: Requirements on HI-STORM 100 Shielding Concrete

1.D.1 Introduction

The HI-STORM 100 overpack utilizes plain concrete for neutron and gamma shielding. While most of the shielding concrete used in the HI-STORM 100 overpack is installed in the annulus between the concentric structural shells, smaller quantities of concrete are also present in the pedestal shield and the overpack lid. Because plain concrete has little ability to withstand tensile stresses, but is competent in withstanding compressive and bearing loads, the design of the HI-STORM 100 overpack places no reliance on the tension-competence of the shielding concrete. ACI 318-95 provides formulas for permissible compressive and bearing stresses in plain concrete which incorporate a penalty over the corresponding permissible values in reinforced concrete. The formulas for permissible compressive and bearing stresses set forth in ACI 318-95 are used in calculations supporting this TSAR in load cases involving compression or bearing loads on the overpack concrete. However, since ACI 318-95 is intended for commercial applications and the overpack concrete is designated as an ITS Category B material, it is necessary to invoke provisions of ACI 349 (85) (which is sanctioned by NUREG-1536) for all requirements except for the allowable stress formulas (which do not exist in ACI 349) and load combinations. This appendix provides a complete set of criteria applicable to the plain concrete in the HI-STORM 100 overpack.

1.D.2 Design Requirements

The primary function of the plain concrete is to provide neutron and gamma shielding. As plain concrete is a competent structural member in compression, the plain concrete's effect on the performance of the HI-STORM overpack is included. The formulas for permissible compressive and bearing stresses set forth in ACI 318-95 are used. However, as plain concrete has very limited capabilities in tension, no tensile strength is allotted to the concrete.

The steel structure of the HI-STORM overpack provides the strength to meet all load combinations specified in Chapters 2 and 3. Credit for the structural strength of the plain concrete is limited to the compressive load carrying capability of the concrete in calculations appropriate to handling and transfer operations, and to demonstrate that the HI-STORM 100 System continues to provide functional performance in a post-accident environment. Therefore, the load combinations provided in ACI 349 and NUREG-1536, Table 3-1 are not applied to the plain concrete.

The shielding performance of the plain concrete is maintained by ensuring that the allowable concrete temperature limits are not exceeded. The thermal analyses for normal and off-normal conditions demonstrate that the plain concrete does not exceed the allowable long term temperature limit provided in Table 1.D.1. Under accident conditions, the bulk of the plain concrete in the HI-STORM overpack does not exceed the allowable short term temperature limit provided in Table 1.D.1. Any portion of the plain concrete which exceeds the short term temperature limit under accident conditions is neglected in the post-accident shielding analysis and in any post-accident structural analysis.

1.D.3 Material Requirements

Table 1.D.1 provides the material limitations and requirements applicable to the overpack plain concrete. These requirements are drawn from ACI 349 (85) supplemented by the provisions of NUREG 1536 (page 3-21) and standard good practice. Two different minimum concrete densities are specified for the overpack concrete, based on the presence or absence of the steel shield shell.

1.D.4 Construction Requirements

The HI-STORM 100 overpack is composed of a steel structure that houses plain concrete. The steel structure acts as the framework for the pouring of the concrete. The steel structure defines the dimensions of the concrete which ensures that the required thickness of concrete is provided. The fabrication sequence for the HI-STORM 100 overpack as it pertains to the concrete is provided below. All item numbers are taken from the design drawings in Section 1.5. All nomenclature is taken from bills-of-material in Section 1.5.

The steel structure of the HI-STORM 100 overpack body is assembled at a qualified steel fabrication facility. However, access remains to the annulus formed by the overpack inner and outer shells (Items 3 and 2, respectively); likewise, the pedestal shell (Item 5) is welded to the baseplate (Item 1) and the pedestal platform (Item 24) to form the pedestal cavity, but penetrations exist in the baseplate to allow placement of concrete. The steel structure of the overpack body is transported to the reactor site or a nearby concrete facility.

Once the steel structure of the body is received, the body will be inspected to ensure the steel structure meets the requirements of Sections 5.1 and 6.1 of ACI 349. The concrete shall be mixed, conveyed, and deposited in accordance with Sections 5.2 through 5.4 of ACI 349. Sufficient rigidity in the steel structure overpack body is provided such that all the concrete may be placed in a single pour into each of the four segments formed by the inner shell (Item 3), outer shell (Item 2), and radial plates (Item 14). If more than one pour is performed, the requirements of Section 6.4 of ACI 349 must be met for construction joints. The pedestal shell may require bracing and support in accordance with Section 6.1 of ACI 349 to maintain the proper position and shape.

Mixing and placing of the concrete shall follow the guidance of Sections 5.6 and 5.7 for cold and hot weather conditions, respectively. Consolidation of the plain concrete shall be performed in accordance with ACI 309-87. As no reinforcement is placed in the concrete, the possibility of voids is greatly diminished. Curing of the concrete shall be in accordance with Section 5.5 of ACI 349. Water curing or accelerated curing using sealing materials methods may be used as described in ACI 308-92, Standard Practice for Curing Concrete. This would include the use of either a plastic film or a curing compound.

Non-shrink grout shall be applied as necessary to account for any deviation of the concrete elevation To fabricate the overpack lid an identical process is followed.

Table 1.D.1 provides the construction limitations and requirements applicable to the overpack plain concrete. These requirements are drawn from ACI 349 (85).

1.D.5 Testing Requirements

Table 1.D.2 provides the testing requirements applicable to the overpack plain concrete. These requirements are drawn from ACI 349 (85).

Table 1.D.1: Requirements for Plain Concrete

ITEM	APPLICABLE LIMIT OR REFERENCE
Density in overpack body (Minimum)	146 lb/ft^3 (HI-STORM 100 up to Serial Number (S/N) 7), 155 lb/ft^3 (HI-STORM 100 S/N 8 and higher, and HI-STORM 100S)
Density in lid and pedestal (Minimum)	146 lb/ft^3
Specified Compressive Strength	3,300 psi (min.)
Compressive and Bearing Stress Limit	Per ACI 318-95
Cement Type and Mill Test Report	Type II; Section 3.2 (ASTM C 150 or ASTM C595)
Aggregate Type	Section 3 3 (including ASTM C33(Note 2))
Nominal Maximum Aggregate Size	1 (inch)
Water Quality	Per Section 3.4
Material Testing	Per Section 3 1
Admixtures	Per Section 3 6
Maximum Water to Cement Ratio	0.5 (Table 4.5 2)
Maximum Water Soluble Chloride Ion Cl in Concrete	1 00 percent by weight of cement (Table 4 5.4)
Concrete Quality	Per Chapter 4 of ACI 349
Mixing and Placing	Per Chapter 5 of ACI 349
Consolidation	Per ACI 309-87
Quality Assurance	Per Holtec Quality Assurance Manual, 10 CFR Part 72, Appendix G commitments
Maximum Local Temperature Limit Under Long Term Conditions	200°F (See Note 3)
Maximum Section Average Temperature Limit Under Short Term Conditions	350°F (Appendix A, Subsection A 4 2)
Aggregate Maximum Value[2] of Coefficient of Thermal Expansion (tangent in the range of 70°F to 100°F)	6E-06 inch/inch/°F (NUREG-1536, 3 V 2 b i (2)(c)2 b)

Notes:

1. All section and table references are to ACI 349 (85)
2. The coarse aggregate shall meet the requirements of ASTM C33 for class designation 1S from Table 3. However, if the requirements of ASTM C33 cannot be met, concrete that has been shown by special tests or actual service to produce concrete of adequate strength and durability meeting the requirements of Tables 1.D 1 and 1.D.2 is acceptable in accordance with ACI 349 Section 3.3.2.
3. The 200 °F long term temperature limit is specified in accordance with Paragraph A 4.3 of ACI 349 for normal conditions. The 200 °F long term temperature limit is based on (1) the use of Type II cement, specified aggregate criteria, and the specified compressive stress in Table 1 D 1, (2) the relatively small increase in long term temperature limit over the 150°F specified in Paragraph A 4.1, and (3) the very low maximum stresses calculated for normal and off-normal conditions in Section 3.4 of this FSAR.

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[1]

[2] The following aggregate types are a priori acceptable limestone, dolomite, marble, basalt, granite, gabbro, or rhyolite. The thermal expansion coefficient limit does not apply when these aggregates are used. Careful consideration shall be given to the potential of long-term degradation of concrete due to chemical reactions between the aggregate and cement selected for HI-STORM 100 overpack concrete

Table 1.D.2: Testing Requirements for Plain Concrete

TEST	SPECIFICATION
Compression Test	ASTM C31, ASTM C39, ASTM C192
Unit Weight (Density)	ASTM C138
Maximum Water Soluble Chloride Ion Concentration	Federal Highway Administration Report FHWA-RD-77-85, "Sampling and Testing for Chloride Ion in Concrete"