PDR - Return
396-55

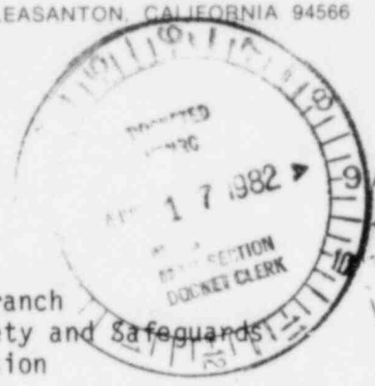
71-5942

GENERAL ELECTRIC

NUCLEAR ENERGY
ENGINEERING
DIVISION

GENERAL ELECTRIC COMPANY, P.O. BOX 460, PLEASANTON, CALIFORNIA 94566

August 10, 1982



Mr. C. E. MacDonald, Chief
Transportation Certification Branch
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Ref: 1) Certificate of Compliance No. 5942, Revision 4, Docket 71-5942, 6/18/80.
2) Certificate of Compliance No. 5942, Revision 0, Docket 71-5942, 4/9/75.
3) Amendment 71-55 to License SNM-960, Docket 70-754, 6/12/73.
4) Application for Administrative Amendment, 6/22/82.
5) Letter, C. E. MacDonald to G. E. Cunningham, 7/16/82.
6) Consolidated Application for Renewal of Certificate of Compliance No. 5942, 3/18/80.

Dear Mr. MacDonald:

This letter is in response to your request for additional information concerning the certification drawings submitted for the G.E. Model 700 shipping container (Ref. 5). You noted that the certification drawings were not in complete agreement with the drawings now referenced in Certificate of Compliance No. 5942, Rev. 4. This is because the currently referenced drawings are engineering drawings intended for fabrication while the certification drawings more truly describe the existing dimensions of the casks as they were prepared from actual measurements. However, when fabrication tolerances are applied, the agreement between the two sets of drawings is generally good. General Electric is also updating the engineering drawings to describe the existing dimensions of the Model 700.

Each of the questions contained in your letter is discussed in the following paragraphs. The item numbers parallel those in the attachment to your letter.

Item #1: The description of the Model 700 in Certificate of Compliance No. 5942 should be changed to read:

5.(a)(2) Description

A steel-encased lead-shielded shipping cask enclosed by a double-walled protective jacket of the same shape with a rectangular baseplate. The cask is a double-walled steel circular cylinder with a central cavity. The cask is equipped with a cavity drain line, pressure relief valve set at 100 psig, and a lifting device. Closure is accomplished by a silicone rubber gasketed and bolted steel lead-filled plug. The Model 700 components have the following nominal dimensions:

21110

FEE EXEMPT
addl info

Cask diameter - 37 inches
Cask height - 64.25 inches
Cavity diameter - 15 inches
Cavity height - 40 inches
Shielding lead thickness - 10.25 inches
Cask weight - 24,000 lbs
Crash/fire shield and base weight - 9,800 lbs

The cask configuration may be altered with a 14-inch high cavity extension with an additional silicone rubber gasket. The extended cask is nominally 78.5 inches high and weighs approximately 28,700 lbs.

The nominal total weight (cask, lid, spacer, crash/fire shield, base) is 34,000 lbs without the extension and 38,500 lbs with the extension (no spacer).

(3) Drawings

The packaging is constructed to be within the parameters of the following General Electric Company Drawing Nos:

129D4768, Rev. 2
129D4769, Rev. 3
129D4770, Rev. 3

The above recommended wording uses the term "nominal" to recognize the fact that a container is constructed within tolerances and that actual dimensions may vary slightly.

When Certificate of Compliance No. 5942 was first issued (Ref. 2) to replace License Amendment 71-55 (Ref. 3), the weight of the cask (23,000 lbs) was inadvertently listed in the Certificate as the weight of the "packaging". This has been corrected in the recommended wording. The nominal weight of the cask was changed to 24,000 lbs as a result of direct weight measurements. This slight increase has no safety significance as the thickness of the crash/fire shield plate material is sufficient to handle a cask several thousand pounds heavier.

There is an apparent inconsistency between the consolidated application for the Model 700 and the actual weight of the crash/fire shield and the base. We can only assume that the weight of the shield alone was listed into the application erroneously as the combined weight of the two items. However, this weight correction has no adverse safety consequences as long as the shield plate is sufficiently thick to protect the cask during the hypothetical 30-foot drop.

In support of the foregoing, a reanalysis was made of the factor used to scale up the Model 100 drop test data to the Model 700. In the scale-up method used in our application for renewal for the Model 700 (Ref. 6) it was necessary to calculate factors for each of the initial parameters (i.e., height, diameter, weight, and kinetic energy). The most limiting factor was then used to determine the

adequacy of the thickness of the steel plate used in the crash/fire shield. In the case of the Model 700 the limiting factor was the scale-up factor for the height, which demonstrated that the 0.625-inch plate used in the crash/fire shield was adequate to withstand the 30-foot hypothetical accident drop.

Attachment A to this letter contains a new calculation of the weight scale-up factor using the new cask assembly and crash/fire shield and base weights. This analysis demonstrates that a plate thickness for the crash/fire shield of 0.525 inches is sufficient when considering the weight factor while the more limiting height factor required the 0.625-inch plate actually used in the Model 700 shield.

Item #2: The material specification called out in Certification Drawing 129D4768 (ASTM A-449) is the correct one. ASTM A-449 bolts are used on all large General Electric shielded shipping containers. There is no problem with safety as ASTM A-449 specification bolts were used on the Model 100 shipping container when it was subject to the thirty-foot drop test (this test was the basis for the design of closures and fire/crash shields of all the large G.E. shielded shipping containers).

Item #3:

(a) The fillet weld on the base detail (Zone B-5) has been deleted from Certification Drawing 129D4769.

(b) The weld symbol (Zone B-5) which joins the ring and the gussets to the base plates has been modified on Certification Drawing 129D4769 to show the fillet weld on both sides.

(c) The location and overall dimensions of the "elongated pocket" on the jacket shell have been added to Drawing 129D4769. A tolerance for the location was also added.

Item #4:

(a) Cask Extension:

(i) The drain valve guard is the 1½-in. by 1½-in. by ¼-in. angle called out in Drawing No. 237E325. This guard was installed prior to the addition of the fire/crash shield in 1969. With the use of the shield, this valve guard is no longer necessary. However, for purposes of clarity it has been added to Drawing No. 129D4770.

(ii) A specification has been added to Certification Drawing No. 129D4770 calling for a ½-inch ball valve or equivalent on the cask extension drain line. The ball valve was chosen to permit improved flow during fill and flush operations. The type of valve used has no safety significance as the valves are physically sealed with a plug during transportation.

(iii) Drawing No. 129D4770 now calls out the drain line access tube wall thickness (1/8").

(iv) The clarifying dimensional thicknesses have been added to Drawing No. 129D4770 for items 32 and 35.

(b) Cask Body:

(i) The overall height listed on Drawing No. 129D4770 (64.25") is correct and is a directly measured value within the tolerances of engineering drawing No. 289E646.

(ii) The diameter of the cavity for the cask lid (21.38") is correct as shown on Drawing No. 129D4770. This is a measured value and is within the tolerances shown on engineering drawing 289E646.

(iii) The lifting ear dimension shown on Drawing No. 129D4770 (10.75") is correct and is a measured value.

(iv) The weld detail of the drain line coupling to the top plate is correct as shown on Drawing No. 129D4770. This coupling was changed from a ½-inch fitting to a 3/4-inch fitting and was reinforced to improve the strength of the assembly.

(v) The weld symbol joining the inner shell to the ring has been corrected on Drawing 129D4770 to indicate a single bevel.

(vi) The weld detail joining the inner shell to the inner bottom plate has been changed on Certification Drawing No. 129D4770 to be consistent with engineering drawing 289E646.

(c) Cask Lid:

(i) The 10.0-inch dimension on the cask lid on Certification Drawing No. 129D4059 is correct (measured value).

(ii) The correct valve guard material is carbon steel.

(iii) A specification for the 100 psig pressure relief valve has been added to Drawing No. 129D4770.

(iv) A specification for the gasket backup ring material (stainless steel) has been added to Drawing 129D4770.

(d) Spacer: The requested dimensional data for the spacer has been added to Drawing No. 129D4770.

Some other minor changes were made to Drawing No. 129D4770:

1. Item 18 has been clarified to note that the pipe nipple has a size reduction feature (from 3/4" to ½").

2. Item 6 has been clarified to show that the cask lid cover plate is a lamination of two pieces, not a single sheet of one-inch steel plate.

3. Minor clarifications have been made to Parts 16, 19, 26 and 37.

On Drawing No. 129D4769 two optional drain holes have been added to the base plates. These holes permit the draining of any water trapped during underwater loading/unloading operations.

The weights listed on all drawings were adjusted as the result of direct weight measurements of all cask components.

Sincerely,

G. E. Cunningham
Senior Licensing Engineer

/ca

Attachment

GENERAL ELECTRIC

Attachment A

Recalculation of the Weight Scale-Up Factor for the G.E. Model 700

The weight factor used to scale up the Model 100 drop test results to the Model 700 is calculated as follows:

$$S_w = (W_p/W_m)^{1/3}$$

where: $S_w \equiv$ the weight scale-up factor
$W_p \equiv$ the weight of the prototype (Model 700)
$W_m \equiv$ the weight of the model (Model 100)

For the purposes of this calculation the following conservative values were assigned:

W_p = 41,000 lbs. (This value represents the maximum possible weight permitted by Drawing No. 129D4768 Rev. 2, i.e., the combined weight of the cask assembly, extension, crash/fire shield and base plus 2½%, plus a 1,500-lb. allowance for cask contents. The cask contents allowance is very conservative as the normal load would be expected to be less than half that amount. For example, a typical shipment of GETR-type fuel would consist of a fuel spacing basket (~250 lbs.), fuel elements, and water for a total weight of approximately 600 lbs.).

W_m = 4,450 lbs. (The total weight of the Model 100 cask assembly, crash/fire shield, and base. No allowance was made for cask contents for the Model 100. This is conservative as any increase in W_m reduces the scale-up factor.)

Therefore:

$$S_w = \left(\frac{41000}{4450}\right)^{1/3} = (9.21)^{1/3} = 2.10$$

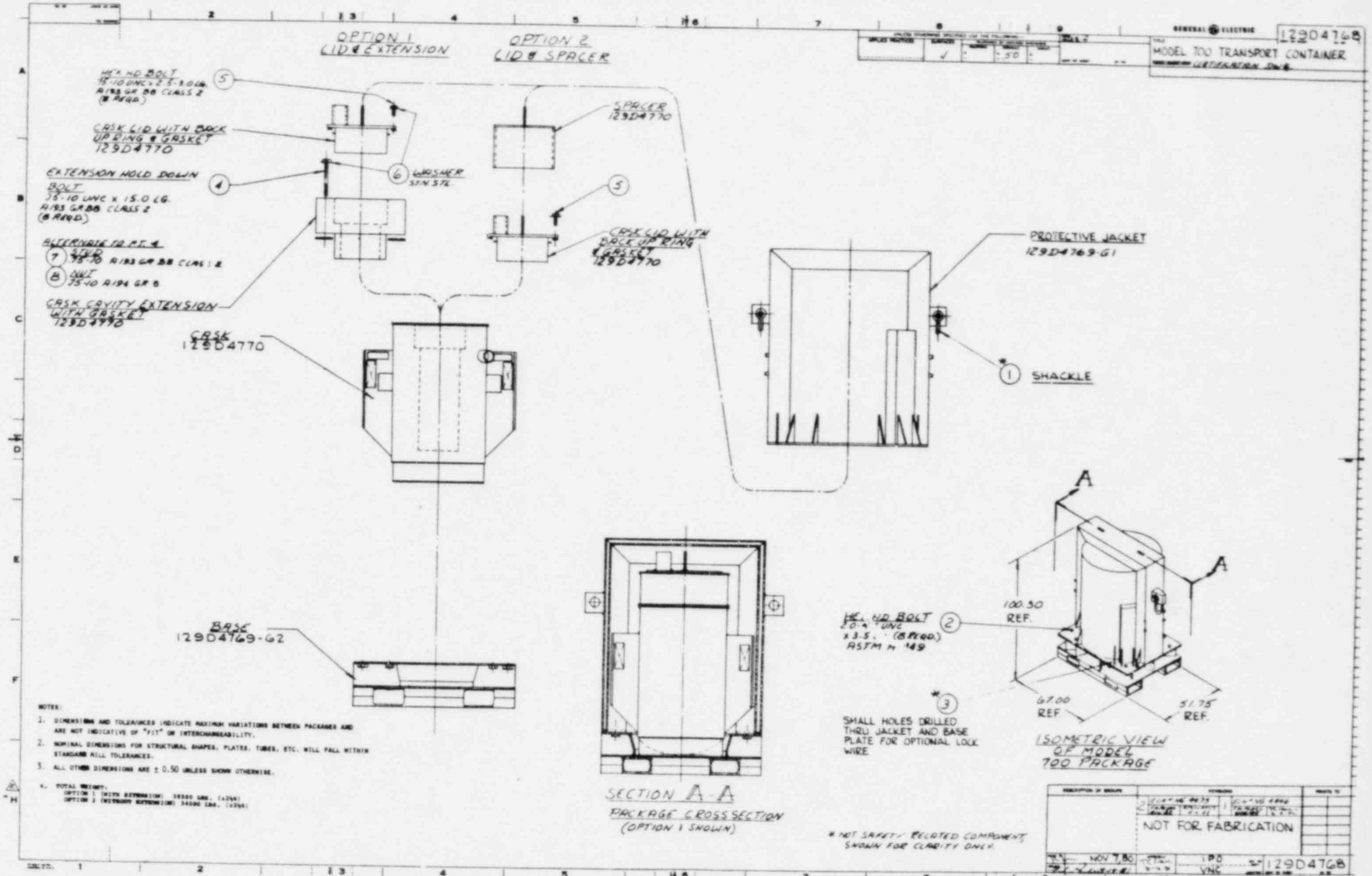
The required thickness of the Model 700 crash/fire shield plate is obtained as follows:

$$T_p = (S_w)(T_m)$$

where: $T_p \equiv$ thickness of Model 700 shield plate
$S_w \equiv$ weight scale-up factor
$T_m \equiv$ thickness of Model 100 shield plate

Therefore: $T_p = (2.10)(0.25") = 0.525"$

This is well within the 0.625-inch plate thickness actually used in the Model 700 crash/fire shield.



GENERAL ELECTRIC
129D4768
MODEL 700 TRANSPORT CONTAINER
CERTIFICATION DWG
OPTION 1
LID & EXTENSION
OPTION 2
LID & SPACER
HEX HD BOLT
.75-10 UNC x 2.5-3.0 LG.
A193 GR B8 CLASS 2
(8 REQD)
5
CASK LID WITH BACK UP RING & GASKET
129D4770
6 WASHER
STN STL
EXTENSION HOLD DOWN BOLT
.75-10 UNC x 15.0 LG.
A193 GR B8 CLASS 2
(8 REQD)
4
ALTERNATE TO PT. 4
7 STUD
.75-10 A193 GR B8 CLASS 2
8 NUT
.75-10 A194 GR 8
CASK CAVITY EXTENSION WITH GASKET
129D4770
SPACER
129D4770
CASK LID WITH BACK UP RING & GASKET
129D4770
CASK
129D4770
PROTECTIVE JACKET
129D4769-G1
1 SHACKLE
BASE
129D4769-G2
SECTION A-A
PACKAGE CROSS SECTION
(OPTION 1 SHOWN)
HEX HD BOLT
.50-4 UNC
x 3.5 (8 REQD)
ASTM A 449
2
3
SMALL HOLES DRILLED THRU JACKET AND BASE PLATE FOR OPTIONAL LOCK WIRE
100.30 REF.
67.00 REF.
51.75 REF.
ISOMETRIC VIEW OF MODEL 700 PACKAGE
* NOT SAFETY RELATED COMPONENT, SHOWN FOR CLARITY ONLY.
NOTES:
1. DIMENSIONS AND TOLERANCES INDICATE MAXIMUM VARIATIONS BETWEEN PACKAGES AND ARE NOT INDICATIVE OF "FIT" OR INTERCHANGEABILITY.
2. NOMINAL DIMENSIONS FOR STRUCTURAL SHAPES, PLATES, TUBES, ETC. WILL FALL WITHIN STANDARD MILL TOLERANCES.
3. ALL OTHER DIMENSIONS ARE ± 0.50 UNLESS SHOWN OTHERWISE.
4. TOTAL WEIGHT:
OPTION 1 (WITH EXTENSION) 38500 LBS. (±2%)
OPTION 2 (WITHOUT EXTENSION) 34000 LBS. (±2%)
NOT FOR FABRICATION
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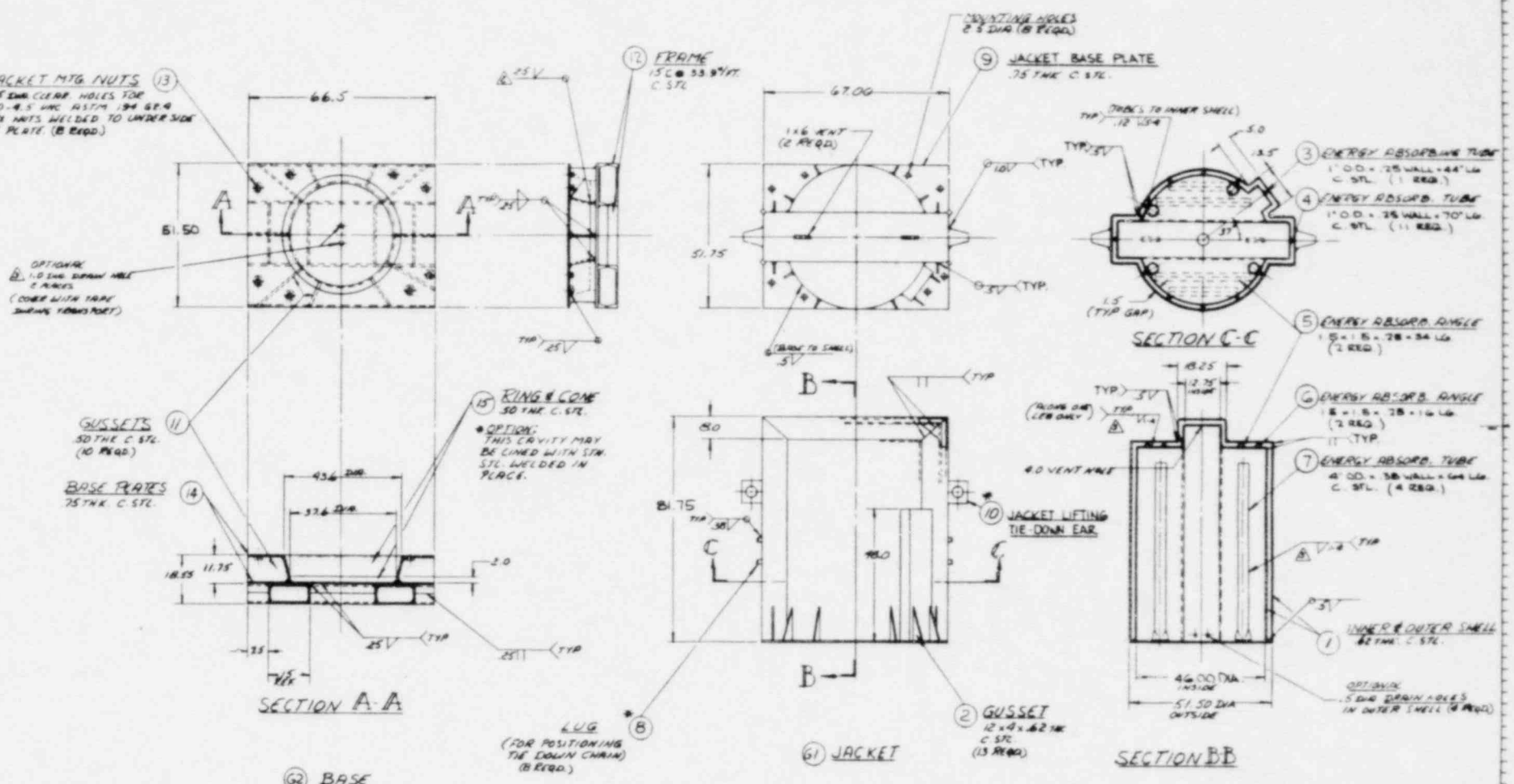
129D4768

GENERAL ELECTRIC 1290D4769

MODEL 700 PROTECTIVE JACKET

NEXT ASSEM 1290D4768



NOTES:

1. DIMENSIONS AND TOLERANCES INDICATE MAXIMUM VARIATIONS BETWEEN PACKAGES AND ARE NOT INDICATIVE OF "FIT" OR INTERCHANGEABILITY.
2. NOMINAL DIMENSIONS FOR STRUCTURAL SHAPES, PLATES, TUBES, ETC. WILL FALL WITHIN STANDARD MILL TOLERANCES.
3. ALL OTHER DIMENSIONS ARE ± 0.50 UNLESS SHOWN OTHERWISE.
4. BASE WT. = 2,550 LBS (± 2.0%)
5. JACKET WT. = 7,822 LBS (± 2.0%)

* NOT SAFETY RELATED COMPONENT. SHOWN FOR CLARITY ONLY.

NOT FOR FABRICATION

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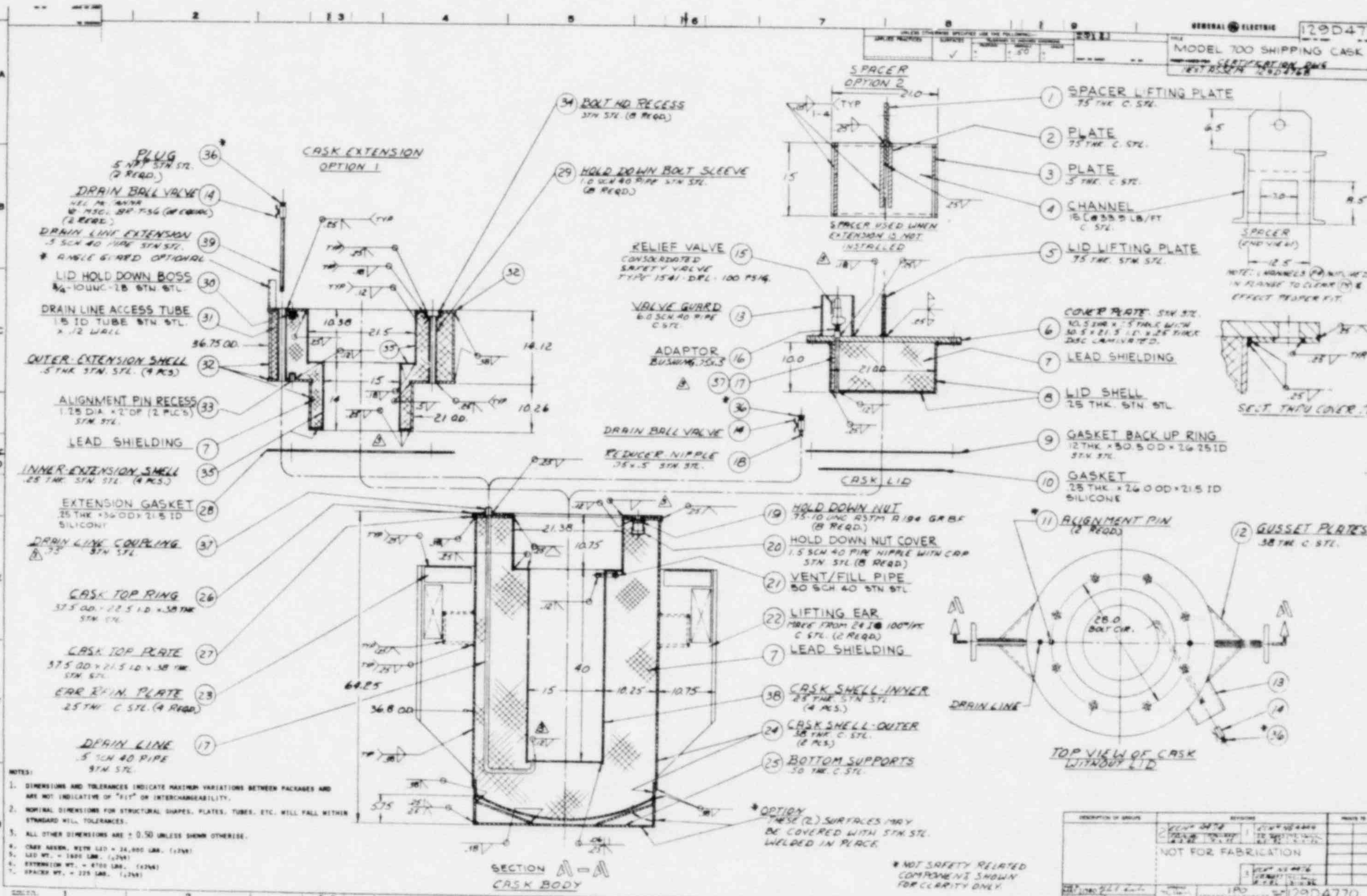

GENERAL ELECTRIC
129D4770
MODEL 700 SHIPPING CASK
CERTIFICATION DWG
SPACER
OPTION 2
SPACER USED WHEN EXTENSION IS NOT INSTALLED
1 SPACER LIFTING PLATE .75 THK. C. STL.
2 PLATE .75 THK. C. STL.
3 PLATE .5 THK. C. STL.
4 CHANNEL 15 [@ 33.9 LB/FT C. STL.
5 LID LIFTING PLATE .75 THK. STN. STL.
SPACER (END VIEW)
NOTE: CHANNELS (4) NOTCHED IN FLANGE TO CLEAR (1) & EFFECT PROPER FIT.
SECT. THRU COVER
CASK EXTENSION
OPTION 1
36 PLUG .5 NPT STN. STL. (2 REQD.)
14 DRAIN BALL VALVE
39 DRAIN LINE EXTENSION .5 SCH. 40 PIPE STN. STL.
* ANGLE GUARD OPTIONAL
30 LID HOLD DOWN BOSS 3/4-10UNC-2B STN. STL.
31 DRAIN LINE ACCESS TUBE 1.5 ID TUBE STN. STL. x .12 WALL
32 OUTER-EXTENSION SHELL .5 THK. STN. STL. (4 PCS.)
33 ALIGNMENT PIN RECESS 1.25 DIA. x 2" DP (2 PLC'S) STN. STL.
7 LEAD SHIELDING
35 INNER-EXTENSION SHELL .25 THK. STN. STL. (4 PCS.)
28 EXTENSION GASKET .25 THK. x 36.0 OD x 21.5 ID SILICONE
37 DRAIN LINE COUPLING STN. STL.
26 CASK TOP RING 37.5 OD. x 22.5 I.D. x .38 THK. STN. STL.
27 CASK TOP PLATE 37.5 OD. x 21.5 I.D. x .38 THK. STN. STL.
23 EAR REIN. PLATE .25 THK. C. STL. (4 REQD.)
17 DRAIN LINE .5 SCH 40 PIPE STN. STL.
34 BOLT HD RECESS STN. STL. (8 REQD.)
29 HOLD DOWN BOLT SLEEVE 1.0 SCH 40 PIPE STN. STL. (8 REQD.)
15 RELIEF VALVE CONSOLIDATED SAFETY VALVE TYPE 1541-DFL-100 PSIG
13 VALVE GUARD 6.0 SCH 40 PIPE C. STL.
16 ADAPTOR BUSHING .75x.5
6 COVER PLATE STN. STL.
7 LEAD SHIELDING
8 LID SHELL .25 THK. STN. STL.
9 GASKET BACK UP RING .12 THK. x 30.5 OD x 26.25 ID STN. STL.
10 GASKET .25 THK. x 26.0 OD x 21.5 ID SILICONE
14 DRAIN BALL VALVE
18 REDUCER NIPPLE .75 x .5 STN. STL.
CASK LID
19 HOLD DOWN NUT .75-10 UNC ASTM A 194 GR 8F (8 REQD.)
20 HOLD DOWN NUT COVER 1.5 SCH 40 PIPE NIPPLE WITH CAP STN. STL. (8 REQD.)
21 VENT/FILL PIPE .50 SCH 40 STN. STL.
22 LIFTING EAR MADE FROM 24 I @ 100#/FT C. STL. (2 REQD.)
7 LEAD SHIELDING
38 CASK SHELL-INNER .25 THK. STN. STL. (4 PCS.)
24 CASK SHELL-OUTER .38 THK. C. STL. (2 PCS.)
25 BOTTOM SUPPORTS .50 THK. C. STL.
* OPTION THESE (2) SURFACES MAY BE COVERED WITH STN. STL. WELDED IN PLACE.
SECTION A-A
CASK BODY
11 ALIGNMENT PIN (2 REQD.)
12 GUSSET PLATES .38 THK. C. STL.
28.0 BOLT CIR.
DRAIN LINE
TOP VIEW OF CASK WITHOUT LID
* NOT SAFETY RELATED COMPONENT SHOWN FOR CLARITY ONLY.
NOT FOR FABRICATION
NOTES:
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3. ALL OTHER DIMENSIONS ARE ± 0.50 UNLESS SHOWN OTHERWISE.
4. CASK ASSEM. WITH LID = 24,000 LBS.
5. LID WT. = 1600 LBS.
6. EXTENSION WT. = 4700 LBS.
7. SPACER WT. = 225 LBS.