

FIRE AND EXPLOSION INDEX

MANUFACTURING UNIT LIGHT HYDROCARBON II

PROCESS UNIT STORAGE AREA 2D-30A/B AND 2D-220 A/B/C/D

BACKGROUND INFORMATION FOR STORAGE AREA: The 2D-30's are the storage drums for product propylene. The 2D-220's are the product ethylene storage drums. The 2D-30's are 69 feet 8 inches in length and 10 feet in diameter. The 2D-220's are 69 feet 8 inches in length and 10 feet in diameter. The normal operating conditions are for two of the ethylene storage drums to be empty and for one of the propylene storage drums to be empty. The levels are run to where we have approximately 1 product drum of propylene and ethylene.

Volume for the drum is calculated below:

$$V = \pi r^2 H$$

$$V = \pi (5)^2 (69.75) = 5,478 \text{ cf}$$

$$V = 2 \text{ (ethylene drum 50 \% level)} + 2 \text{ (ethylene drum empty)}$$

$$V = 1 \text{ (propylene drum 30 \% level)} + 1 \text{ (propylene drum 60 \% level)} \text{ THIS IS NORMAL OPERATING CONDITIONS !!}$$

$$V = 2 (5,478 (.50)) + 2 (5,478 (0)) = 5478 \text{ cf (30 lb/cf)} = 164,340 \text{ Ethylene volume}$$

$$V = 1 (5,478 (.30)) + 1 (5,478 (.6)) = 4930.2 \text{ cf (30 lb/cf)} = 147,906 \text{ Propylene volume}$$

The volume of flammable product was calculated to be 164,340 lbs. of ethylene. No propylene was taken in the consideration. The drum operate with no cross ties.

Material Factor (from Appendix A of Fire & Explosion Index Hazard Classification Guide)

Compound	MF	Hc BTU/LB $\times 10^3$	N _H	N _F	N _R	Flash Point (°F)	Boiling Point (°F)
Ethylene	24	20.8	1	4	2	Gas	-155
Propylene	21	19.7	1	4	1	-162	-54

General Process Hazards: (Information)

No penalties were taken for exothermic chemical reactions, endothermic processes, enclosed or indoor process units, and access. Penalties were taken for material handling and transfer of 0.85 and 0.5 for drainage and spill control. The penalty for material handling and transfer because of the N_F. The penalty for drainage due to the poor drainage in the area and lack of solid surfacing under vessels.

7/10/95
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DO A 031286
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Special Process Hazards:(Information)

A penalty of 0.2 was taken for toxic material. The penalty was calculated by multiplying N_H by 0.2. No penalty was taken for sub-atmospheric pressure due to the pressure the drums run. No penalty was taken for operation in or near flammable range. No penalty was taken for dust explosion. The pressure penalty was 0.73993. No low temperature penalty was taken. The quantity of flammable/unstable material was calculated by multiplying the quantity of ethylene in the storage drums by its heat of combustion. The penalty was found to be. The corrosion and erosion penalty was 0.1. The leakage penalty was 0.1. No penalties were taken for use of fired equipment, hot oil heat exchange system, and rotating equipment.

Loss Control Credit Factors

Process Control Credit Factor (C_1)

Emergency Power -0.98

A credit was taken for Emergency Power due to the UPS system.

Cooling -1.0

Explosion Control-1.0

Emergency Shutdown-1.0

Computer Control- 1.0

Inert Gas-1.0

Operating Instructions/Procedure-1.0

Reactive Chemical Review-0.91

A credit was taken for reactive chemical review. Reactive chemical concerns are listed on MOC sheet and plant personnel are trained and tested on reactive chemical concerns at LHC II.

Other Process Hazard Analysis- 0.98 for Management of Change Review

Material Isolation Credit Factor (C_2)

Remote Control Valves-1

Dump/Blowdown- 1

Drainage-1

Interlock-1

Fire Protection Credit Factor (C_3)

Leak Detection -.94

LHC II is protected by Bacharach gas detectors. A project is being worked on to evaluate the gas detector system and replace with a more reliable system.

Structural Steel- 1

Fire Water Supply- 0.94 (supply pressure will be approximately 100 psig without pump and 150 psig with pump.)

Sprinkler Systems-.97

A credit was taken for the deluge systems at LHC II.

Water Curtains- 1

No credit was taken for the furnace water curtain due to its height and that furnace 1-6 and 19-25 are unprotected are the lower level.

Foam-1

Hand Extinguishers/Monitors-.97

Cable Protection- 1 (This credit would change after completion of the Instrument Upgrade Project.)

FORM U-1A MANUFACTURERS' DATA REPORT FOR UNFIRED PRESSURE VESSELS
 Alternate Form for Single Chamber Completely Shop-Fabricated Vessels Only

1. Manufactured by AMF BEAIRD, INC., SHREVEPORT, LOUISIANA
(Name and address of Manufacturer)

2. Manufactured for THE DOW CHEMICAL COMPANY, HOUSTON, TEXAS
(Name and address of Purchaser)

3. Type Horizontal Vessel No. (161910-2) (Serial) (Date & State No.) Natl. Bd. No. Yr. Built 1969

4. SHELL: Matl. SA-516-70-FB T.S. 70,000# Nom. 1-1/8 Cor. 1/16
(Kind and Spec. No.) (Fig. or P.S. & Spec. Min. T.S.) (In. or Ft.) (In. or Ft.) (In. or Ft.)

5. SEAMS: Long Dbl. Butt H.T. No R.T. Complete Sectioned No Efficiency 100 %
(Welded, Dbl., Single, Lap, Butt) (Yes or No) (Spot or Complete) (Yes or No)

Girth Dbl. Butt H.T. No R.T. Complete Sectioned No No. of Courses 10

6. HEADS: (a) Material SA-516-70-FB T.S. 70,000# (b) Material SA-516-70-FB T.S. 70,000#
(Top, bottom, ends) Thickness Crown Radius Elliptical Ratio Conical Apex Angle Radius Diameter (Concave or Convex)

(a) Ends 1-1/8" 2:1 Concave

(b)

If removable, bolts used (Material, Spec. No., T.S., Size, Number) Other fastening (Describe or Attach Sketch)

7. Constructed for max. allowable working press. 300 psi at max. temp. 250 °F. Min. temp. (when less than -20°) °F. Hydrostatic or Pneumatic or Combination Test Press 486 psi.

8. SAFETY OR RELIEF VALVE OUTLETS: Number 1 Size 4" Location Top of tank in shell

9. NOZZLES:

Purpose (Inlet, Outlet, Drain)	Number	Diem. or Size	Type	Material	Thickness	Reinforcement Material	How Attached
	(2)	1-1/2"	300# Long Weld Neck Flgs.		SA-105-I		Welded
	(8)	2"	(1) 3" 300# Weld Neck Flgs.		SA-105-I		Welded
	(2)	4"	(2) 6" 300# Weld Neck Flgs.		SA-105-I		Welded

INSPECTION Manholes, No. 2 Size 18" Location (1) Each end of tank in heads

OPENINGS: Handholes, No. Size Location

Threaded, No. Size Location

11. SUPPORTS: Skirt (Yes or No) Legs (Number) Other (2) Saddles Attached Welded to tank shell
(Describe) (Where & How)

12. REMARKS: One 120" I.D. x 77' 3-11/16" O.A. Length 43,084 W.G. Storage Tank, per Beaird Dwg. Order 161910

(Brief description of purpose of the vessel as Air Tank, Water Tank, L.P.G., etc.—State Contents.)
 If postweld heat-treated.
 List other internal or external pressure with corresponding temperature when applicable.

We certify that the statements made in this report are correct and that all details of design, material, construction, and workmanship of this vessel conform to the ASME Code for Unfired Pressure Vessels. 1968 Edition

Date 1-10, 1969 Signed AMF BEAIRD, INC. Dr. J. R. Thomas
(Manufacturer)

Certificate of Authorization Expires December 31, 1970

CERTIFICATE OF SHOP INSPECTION

VESSEL MADE BY AMF BEAIRD, INC. at SHREVEPORT, LOUISIANA

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the State or Province N. B. and employed by THE COMMERCIAL UNION INSURANCE COMPANY of NEW YORK

have inspected the pressure vessel described in this manufacturer's data report on 1-10, 1969, and state that to the best of my knowledge and belief, the manufacturer has constructed this pressure vessel in accordance with the applicable sections of the ASME Boiler and Pressure Vessel Code.

By signing this certificate neither the inspector nor his employer makes any warranty, expressed or implied, concerning the pressure vessel described in this manufacturer's data report. Furthermore, neither the inspector nor his employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date 1-10, 1969

J. M. G. Smith
 Inspector's Signature

Commission Nat'l Board or State and No.

DO A 031288
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FORM U-1A MANUFACTURERS' DATA REPORT FOR UNFIRED PRESSURE VESSELS
 Alternate Form for Single Chamber Completely Shop-Fabricated Vessels Only

1. Manufactured by AMF BEAIRD, INC., SHREVEPORT, LOUISIANA
 (Name and address of Manufacturer)

2. Manufactured for THE DOW CHEMICAL COMPANY, HOUSTON, TEXAS
 (Name and address of Purchaser)

3. Type Horiz. Vessel No. (161908-2) () Natl. Bd. No. Yr. Built 1969
 (Horiz. or Vert.) (Mfr. Serial) (State & State No.)

4. SHELL: Matl. SA-516-70-Fbx T.S. 70,000# Nom. 1-3/4 In. Allow. 1/16 Diam. 10 Ft. 0 In. Length 69 Ft. 8 In.
 (Kind and Spec. No.) (Fig. or P.S. & Spec. Min. T.S.) heads 1/16

5. SEAMS: Long Dbl. Butt H.T. Yes R.T. Complete Sectioned No Efficiency 100 %
 (Welded, Dbl., Single, Lap, Butt) (Yes or No) (Spot or Complete) (Yes or No)

Girth Dbl. Butt H.T. Yes R.T. Complete Sectioned No No. of Courses 10

6. HEADS: (a) Material SA-516-70-Fbx T.S. 70,000# (b) Material T.S.
 Location A-300-1 (Top, bottom, ends) Thickness Crown Radius Elliptical Ratio Conical Apex Angle Non-spherical Radius Flat Diameter Size to Pressure (Convex or Concave) Concave

(a) Ends 1-3/4" 2:1

(b)

If removable, bolts used (Material, Spec. No., T.S., Size, Number) Other fastening (Describe or Attach Sketch)

7. Constructed for max. allowable working press. 475 psi at max. temp. °F. Min. temp. (when less than -20°) -50 °F. Hydrostatic Pneumatic or Combination Test Press 752 psi.

8. SAFETY OR RELIEF VALVE OUTLETS: Number 1 Size 4" Location Top of tank in shell

9. NOZZLES:

Purpose (Inlet, Outlet, Drain)	Number	Diam. or Size	Type	Material	Thickness	Reinforcement Material	How Attached
	(2)	1-1/2"	300# Long Weld Neck Flgs.		SA-350-LF1		Welded
	(8)	2" (1)	3" 300# Weld Neck Flgs.		SA-350-LF1		Welded
	(3)	4" (1)	6" (3) 8" 300# Weld Neck Flgs.		SA-350-LF1		Welded

10. INSPECTION Manholes, No. 2 Size 18" Location (1) Each end of tank in heads

OPENINGS: Handholes, No. Size Location

Threaded, No. Size Location

11. SUPPORTS: Skirt Lugs Legs Other (2) Saddles Attached Welded to tank shell
 (Yes or No) (Number) (Number) (Describe) (Where & How)

12. REMARKS: One 120" I.D. x 77' 3-11/16" O.A. Length 43.084 W.G. Storage Tank, per Beaird Dwg. Order 161908

(Brief description of purpose of the vessel as Air Tank, Water Tank, L.P.G., Etc.—State Contents.
 If postweld heat-treated.
 List other internal or external pressures with coincident temperature when applicable.

We certify that the statements made in this report are correct and that all details of design, material, construction, and workmanship of this vessel conform to the ASME Code for Unfired Pressure Vessels. 1968 Edition

Date 2-14 19 69 Signed AMF BEAIRD, INC. By
 (Manufacturer)

Certificate of Authorization Expires December 31, 1970

CERTIFICATE OF SHOP INSPECTION

VESSEL MADE BY AMF BEAIRD, INC. at SHREVEPORT, LOUISIANA

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the State or Province N. B. and employed by COMMERCIAL UNION INSURANCE COMPANY of AMERICA

have inspected the pressure vessel described in this manufacturer's data report on 2-14 19 69 and state that to the best of my knowledge and belief, the manufacturer has constructed this pressure vessel in accordance with the applicable sections of the ASME Boiler and Pressure Vessel Code.

By signing this certificate neither the Inspector nor his employer makes any warranty, expressed or implied, concerning the pressure vessel described in this manufacturer's data report. Furthermore, neither the Inspector nor his employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date 2-14 19 69

 Inspector's Signature

Commission

Natl. Board or State and No.

DO A 031289
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FORM U-1A MANUFACTURERS' DATA REPORT FOR UNFIRED PRESSURE VESSELS

Alternate Form For Single Chamber Completely Shop Fabricated Vessels Only

As required by the Provisions of the ASME Code Rules and the National Board

1. Manufactured by Wilson Engineering & Mfg. Co., Division of Wilson Supply, Houston, Texas
(Name and address of Manufacturer)

2. Manufactured for The Dow Chemical Company, Freeport, Texas
(Name and address of Purchaser)

3. Type Horiz Vessel No. (15215 A) (Mrs. Serial) (State & Std. No.) Nat'l Bd. No. Yr. Built 1967
(Horiz. or Vert.) (SA-212-BFB)

4. SHELL: Mat'l A-300-CLT S. 70,000 T.S. 1-3/4 In. Allow. 1/16 Diam. 10ft. 0 O.D. in. Length 69ft. 8 SM to SM
(Kind and Spec. No.) (Fig. or F. B. & Spec. Min. T.S.)

5. SEAMS: Long DEF HT Yes XR Full Sectioned No Efficiency 100 %
(Welded, Dbl., Single, Lap, Butt) (Yes or No) (Spot or Complete) (Yes or No)

Girth DEF HT Yes XR Full Sectioned No No. of Courses 8

6. HEADS: (a) Material SA-300-CLT T.S. 70,000 (b) Material Same T.S. 70,000

Location (Top, bottom, ends)	Thickness	Crown Radius	Knuckle Radius	Elliptical Ratio	Conical Apex angle	Hemispherical Radius	Flat Diameter	Side to Pressure
(a) End	<u>1.70" Min</u>			<u>2:1</u>				<u>Concave</u>
(b)								

If removable, bolts used _____ Other fastening _____
(Material, Spec. No., T.S., Size, Number) (Describe or Attach Sketch)

If riveted or brazed describe seams fully under remarks.

7. Constructed for max. allowable working press. 475 psi. at max. temp. _____ °F Min. temp. (when less than -20°) -50 °F. Test Press. 741 psi.
Hydrostatic Test Pressure

8. SAFETY OR RELIEF VALVE OUTLETS: Number 1 Size 4" 300# Location Shell

9. NOZZLES:

Purpose (Inlet, Outlet, Drain)	Number	Diam. or Size	Type	Material	Thickness	Reinforcement	How Attached
	<u>1</u>	<u>6" 300#</u>	<u>W.N. FLG</u>	<u>SA-350-CLT</u>	<u>Sch. 80</u>	<u>SA-300-CLT</u>	<u>Welded</u>
	<u>1</u>	<u>3" 300#</u>	<u>W.N. FLG</u>	<u>"</u>	<u>Sch. 80</u>	<u>"</u>	<u>Welded</u>
	<u>3</u>	<u>8" 300#</u>	<u>W.N. FLG</u>	<u>"</u>	<u>Sch. 80</u>	<u>"</u>	<u>Welded</u>

10. INSPECTION Manholes, No. 2 Size 18" 300# Location Heads

OPENINGS Handholes, No. _____ Size _____ Location _____

Threaded, No. _____ Size _____ Location _____

11. SUPPORTS: Skirt _____ Lugs _____ Legs _____ Other Saddle Attached Welded to Shell
(Yes or No) (Number) (Number) (Describe) (Where & How)

12. REMARKS: Contents of Vessel unknown; not to be used in Nuclear or Lethal Service.

<u>8</u>	<u>2" 300#</u>	<u>W.N. FLG</u>	<u>SA-350-CLT</u>	<u>A-333-1</u>	<u>Sch. 160</u>	<u>Welded</u>
<u>2</u>	<u>4" 300#</u>	<u>W.N. FLG</u>	<u>SA-350-CLT</u>	<u>A-333-1</u>	<u>Sch. 80</u>	<u>Welded</u>
<u>2</u>	<u>1 1/2" 300#</u>	<u>W.N. FLG</u>	<u>SA-350-CLT</u>	<u>A-333-1</u>	<u>Sch. 80</u>	<u>Welded</u>

P.O. #70353-LEH

Item # 2D-220 A

(Brief description of purpose of the vessel, as Air Tank, After Cooler, Jacketed Cooker, etc. State contents of each part.)

1 If Postweld Heat-Treated 2 List other internal or external pressures with coincident temperature when applicable.

We certify that the statements made in this report are correct and that all details of design, material, construction, and workmanship of this vessel conform to the ASME Code for Unfired Pressure Vessels.

Date 3-16-67 19 _____ Signed Wilson Eng. & Mfg. Co. By Glenn T. Lewis
(Manufacturer)

Certificate of Authorization Expires December 31, 1967

CERTIFICATE OF SHOP INSPECTION

VESSEL MADE BY WELCO at Houston, Texas

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the State of Texas and employed by H.S.B.I. & I. Co.

of Conn. have inspected the pressure vessel described in this manufacturer's data report on 10-27-67 19 _____, and state that to the best of my knowledge and belief, the manufacturer has constructed this pressure vessel in accordance with the applicable sections of the ASME Boiler and Pressure Vessel Code. By signing this certificate neither the Inspector nor his employer makes any warranty, expressed or implied, concerning the pressure vessel described in this manufacturer's data report. Furthermore, neither the Inspector nor his employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date 10-30-67 19 _____
T. B. Dwyer
Inspector's Signature

Commissions Texas # 14
Nat'l Board or State and No.

05/30/95 10:44

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PF1 = VIEW SPEC      PF4 =                PF7 = PREV RECORD  PF10 =
PF2 =                PF5 =                PF8 = NEXT RECORD   PF11 =
PF3 = BROWSE         PF6 = MENU           PF9 =                PF12 = MAIN MENU

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DO A 031291
CONFIDENTIAL.

103 COMMAND ==> INQUIRE FIXED EQUIPMENT 05/30/95 10:44

Equip ID: PSV 2D-220 AB Eq Desc: SAFETY VALVE #807951 Unit: 00048
Cost Center: 0000 Criticality: 01 Area: STORGE Project: 17
Serial #: 2824-K Equip Code: Type: 434
ssoc Ser #: Equip Cond: Spec:
Parent ID: 2D-220 A Grid: Fleet MGMT?:
Install Dt:
MFR Abbrev: ANDRSN Model #:
Model Type: 33410L46-S Model Size: 4" X L X 6"
GEMTS-> Prod / Process: PRODUCT DISTRIBUTION 2D-220 SYST
 Eqp Group / Type : PRESSURE VESSEL/VALVE PRESSURE R
 * * * SPECIFICATION TEXT * * *
INSPECTION SCHEDULE: 60 MONTHS VALVE SET PRESSURE: 500 PSIG
OPERATING TEMP: -25 DEG. F OPERATING PRESSURE: 450 PSIG
BACK PRESSURE: 0 PRODUCT: ETHYLENE VAPORS
MTD Cost: 0 YTD Cost: 0 LTD Cost: 245
Last PM: Date Installed:
Sel: 0 Last Updated By: NPL0467 Date: 06/06/94
GN-10 < RESET COMPLETE >

PF1 = VIEW SPEC PF4 = PF7 = PREV RECORD PF10 =
PF2 = PF5 = PF8 = NEXT RECORD PF11 =
PF3 = BROWSE PF6 = MENU PF9 = PF12 = MAIN MENU

DO A 031292
CONFIDENTIAL

Equip ID: PSV 2D-220 BA Eq Desc: SAFETY VALVE #807941 Unit: 00048
Cost Cent: 0000063 Criticality: 01 Area: STORGE Project: 00
Serial #: 2825-K Equip Code: Type: 434
Assoc Ser #: Equip Cond: Spec:
Parent ID: 2D-220 B Grid: Fleet MGMT?:
Install Dt:
MFR Abbrev: ANDRSN Model #:
Model Type: 33410L46-S Model Size: 4" X L X 6"
GEMTS-> Prod / Process: PRODUCT DISTRIBUTION 2D-220 SYST
Eqp Group / Type : PRESSURE VESSEL/VALVE PRESSURE R
* * * SPECIFICATION TEXT * * *
INSPECTION SCHEDULE: 60 MONTHS VALVE SET PRESSURE: 500 PSIG
OPERATING TEMP: -25 DEG. F OPERATING PRESSURE: 450 PSIG
BACK PRESSURE: 0 PRODUCT: ETHYLENE VAPORS
MTD Cost: 0 YTD Cost: 0 LTD Cost: 0
Last PM: Date Installed:
Sel: 0 Last Updated By: NPL0467 Date: 06/06/94
GN-10 < RESET COMPLETE >

PF1 = VIEW SPEC PF4 = PF7 = PREV RECORD PF10 =
PF2 = PF5 = PF8 = NEXT RECORD PF11 =
PF3 = BROWSE PF6 = MENU PF9 = PF12 = MAIN MENU

DO A 031293
CONFIDENTIAL

05/30/95 10:44

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PF1 = VIEW SPEC      PF4 =          PF7 = PREV RECORD  PF10 =
PF2 =                PF5 =          PF8 = NEXT RECORD  PF11 =
PF3 = BROWSE         PF6 = MENU      PF9 =          PF12 = MAIN MENU
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DO A 031294
CONFIDENTIAL

05/30/95 10:44

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PF1 = VIEW SPEC      PF4 =                PF7 = PREV RECORD    PF10 =
PF2 =                PF5 =                PF8 = NEXT RECORD      PF11 =
PF3 = BROWSE         PF6 = MENU           PF9 =                PF12 = MAIN MENU
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DO A 031295
CONFIDENTIAL

05/30/95 10:44

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PF1 = VIEW SPEC      PF4 =          PF7 = PREV RECORD   PF10 =
PF2 =                PF5 =          PF8 = NEXT RECORD   PF11 =
PF3 = BROWSE         PF6 = MENU      PF9 =              PF12 = MAIN MENU
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DO A 031296
CONFIDENTIAL

103 COMMAND ==>

INQUIRE FIXED EQUIPMENT

05/30/95 10:44

Equip ID: PSV 2D-220 DA Eq Desc: SAFETY VALVE #807946 Unit: 00048
Cost Center: 0000063 Criticality: 01 Area: STORGE Project: 17
Serial #: 2827-K Equip Code: Type: 434
Assoc Ser #: Equip Cond: Spec:
Parent ID: 2D-220 D Grid: Fleet MGMT?:
Install Dt:
MFR Abbrev: ANDRSN Model #:
Model Type: 33410L46-S Model Size: 4" X L X 6"
GEMTS-> Prod / Process: PRODUCT DISTRIBUTION 2D-220 SYST
Eqp Group / Type : PRESSURE VESSEL/VALVE PRESSURE R
* * * SPECIFICATION TEXT * * *
INSPECTION SCHEDULE: 60 MONTHS VALVE SET PRESSURE: 500 PSIG
OPERATING TEMP: -25 DEG. F OPERATING PRESSURE: 450 PSIG
BACK PRESSURE: 0 PRODUCT: ETHYLENE VAPORS
MTD Cost: 0 YTD Cost: 0 LTD Cost: 245
Last PM: Date Installed:
Sel: 0 Last Updated By: NPL0467 Date: 06/06/94
GN-10 < RESET COMPLETE >

PF1 = VIEW SPEC PF4 = PF7 = PREV RECORD PF10 =
PF2 = PF5 = PF8 = NEXT RECORD PF11 =
PF3 = BROWSE PF6 = MENU PF9 = PF12 = MAIN MENU

DO A 031297
CONFIDENTIAL

05/30/95 10:45

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PF1 = VIEW SPEC      PF4 =          PF7 = PREV RECORD  PF10 =
PF2 =                PF5 =          PF8 = NEXT RECORD  PF11 =
PF3 = BROWSE         PF6 = MENU      PF9 =          PF12 = MAIN MENU
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DO A 031298
CONFIDENTIAL.

Equip ID: PSV 2D-30 AA Eq Desc: SAFETY VALVE #803169 Unit: 00048
Cost Center: 0000063 Criticality: 01 Ar a: STORGE Proj ct: 17
Serial #: 34855 M4 Equip Code: Type: 434
Assoc Ser #: Equip Cond: Spec:
Parent ID: 2D-30 A Grid: Fleet MGMT?:
Install Dt:
MFR Abbrev: CROSBY Model #:
Model Type: JO-35-A Model Size: 4" X M X 6"
GEMTS-> Prod / Process: PRODUCT DISTRIBUTION 2D-30 A/B
Eqp Group / Type : PRESSURE VESSEL/VALVE PRESSURE R
* * * SPECIFICATION TEXT * * *
INSPECTION SCHEDULE: 60 MONTHS VALVE SET PRESSURE: 300 PSIG
OPERATING TEMP: 80 DEG. F OPERATING PRESSURE: 200 PSIG
BACK PRESSURE: 0 PRODUCT: PROPYLENE VAPORS
MTD Cost: 0 YTD Cost: 0 LTD Cost: 0
Last PM: Date Installed:
Sel: 1 Last Updated By: U432414 Date: 10/30/89

PF1 = VIEW SPEC PF4 = PF7 = PREV RECORD PF10 =
PF2 = PF5 = PF8 = NEXT RECORD PF11 =
PF3 = BROWSE PF6 = MENU PF9 = PF12 = MAIN MENU

DO A 031299
CONFIDENTIAL

05/30/95 10:45

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PF1 = VIEW SPEC      PF4 =          PF7 = PREV RECORD  PF10 =
PF2 =                PF5 =          PF8 = NEXT RECORD  PF11 =
PF3 = BROWSE         PF6 = MENU      PF9 =          PF12 = MAIN MENU
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DO A 031300
CONFIDENTIAL.

Equip ID: PSV 2D-30 AB Eq Desc: SAFETY VALVE #803168 Unit: 00048
Cost Center: 0000063 Criticality: 01 Area: STORGE Project: 17
Serial #: 34855 M4 Equip Code: Type: 434
Assoc Ser #: Equip Cond: Spec:
Parent ID: 2D-30 A Grid: Fleet MGMT?:
Install Dt:
MFR Abbrev: CROSBY Model #:
Model Type: JO-35-A Model Size: 4" X M X 6"
GEMTS-> Prod / Process: PRODUCT DISTRIBUTION 2D-30 A/B
Eqp Group / Type : PRESSURE VESSEL/VALVE PRESSURE R
* * * SPECIFICATION TEXT * * *
INSPECTION SCHEDULE: 60 MONTHS VALVE SET PRESSURE: 300 PSIG
OPERATING TEMP: 80 DEG. F OPERATING PRESSURE: 200 PSIG
BACK PRESSURE: 0 PRODUCT: PROPYLENE VAPORS
MTD Cost: 0 YTD Cost: 0 LTD Cost: 124
Last PM: Date Installed:
Sel: 0 Last Updated By: U432414 Date: 10/30/89
GN-10 < RESET COMPLETE >

PF1 = VIEW SPEC PF4 = PF7 = PREV RECORD PF10 =
PF2 = PF5 = PF8 = NEXT RECORD PF11 =
PF3 = BROWSE PF6 = MENU PF9 = PF12 = MAIN MENU

DO A 031301
CONFIDENTIAL

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100  COMMAND ==>          INQUIRE FIXED EQUIPMENT          05/30/95 10:
-----
Equip ID: PSV 2D-30 BB      Eq Desc: SAFETY VALVE #803171      Unit: 00041
Cost Center: 0000063        Criticality: 01      Area: STORGE      Project: 17
Serial #: 34855 M4          Equip Code: _____      Type: 434
Assoc Ser #: _____      Equip Cond: _____      Spec: _____
Parent ID: 2D-30 B          Grid: _____      Fleet MGMT?: _____
Install Dt: _____
MFR Abbrev: CROSBY          Model #: _____
Model Type: JO-35-A          Model Size: 4" X M X 6"
GEMTS->  Prod / Process:  PRODUCT DISTRIBUTION      2D-30 A/B
          Eqp Group / Type :  PRESSURE VESSEL/VALVE      PRESSURE R
                        * * * SPECIFICATION TEXT * * *
INSPECTION SCHEDULE: 60 MONTHS      VALVE SET PRESSURE: 300 PSIG
OPERATING TEMP: 80 DEG. F          OPERATING PRESSURE: 200 PSIG
BACK PRESSURE: 0                  PRODUCT: PROPYLENE VAPORS
MTD Cost: _____      0 YTD Cost: _____      0 LTD Cost: _____      450
Last PM: _____      Date Installed: _____
# Sel: 0      Last Updated By: U432414      Date: 10/30/89
GN-10      < RESET COMPLETE >
-----
PF1 = VIEW SPEC      PF4 = _____      PF7 = PREV RECORD      PF10 = _____
PF2 = _____      PF5 = _____      PF8 = NEXT RECORD      PF11 = _____
PF3 = BROWSE          PF6 = MENU          PF9 = _____      PF12 = MAIN MENU

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FIRE & EXPLOSION INDEX

DOW

AREA/COUNTRY	DIVISION	LOCATION	DATE
USA	Louisiana	Plaquemine	June 19, 1995
SITE	MANUFACTURING UNIT	PROCESS UNIT	
Louisiana	Light Hydrocarbon II	DeMethanizer (2C-51)	
PREPARED BY:	APPROVED BY: (Superintendent)	BUILDING	
Holly Reed	?	B4801	
REVIEWED BY: (Management)	REVIEWED BY: (Technology Center)	REVIEWED BY: (Safety & Loss Prevention)	
?	?	?	
MATERIALS IN PROCESS UNIT			
Hydrogen, Methane, Ethylene, Ethane, Propane, Propylene			
STATE OF OPERATION		BASIC MATERIAL(S) FOR MATERIAL FACTOR	
DESIGN ☐ START UP ☒ NORMAL OPERATION ☐ SHUTDOWN		Ethylene	
MATERIAL FACTOR (See Table 1 or Appendices A or B) Note requirements when unit temperatures over 140 °F			24
1. General Process Hazards		Penalty Factor Range	Penalty Factor Used (1)
Base Factor		1.00	1.00
A. Exothermic Chemical Reactions		0.30 to 1.25	0.00
B. Endothermic Processes		0.20 to 0.40	0.00
C. Material Handling and Transfer		0.25 to 1.05	0.00
D. Enclosed or Indoor Process Units		0.25 to 0.90	0.00
E. Access		0.20 to 0.35	0.00
F. Drainage and Spill Control 75,890 gallons		0.25 to 0.50	0.50
General Process Hazards Factor (F1)			1.50
2. Special Process Hazards			
Base Factor		1.00	1.00
A. Toxic Material(s)		0.20 to 0.80	0.20
B. Sub-Atmospheric Pressure (< 500 mm Hg)		0.50	0.00
C. Operation In or Near Flammable Range ☐ INERTED ☒ NOT INERTED			
1. Tank Farms Storage Flammable Liquids		0.50	0.00
2. Process Upset or Purge Failure		0.30	0.00
3. Always in Flammable Range		0.80	0.00
D. Dust Explosion (See Table 3)		0.25 to 2.00	0.00
E. Pressure (See Figure 2) Operating Pressure 380 psig Relief Setting 575 psig			0.80
F. Low Temperature		0.20 to 0.30	0.30
G. Quantity of Flammable/Unstable Material Quantity 21,846 lb Hc = 20,800 BTU/lb			
1. Liquids or Gases in Process (See Figure 3)			0.84
2. Liquids or Gases in Storage (See Figure 4)			0.00
3. Combustible Solids in Storage, Dust in Process (See Figure 5)			0.00
H. Corrosion and Erosion		0.10 to 0.75	0.10
I. Leakage - Joints and Packing		0.10 to 1.50	0.10
J. Use of Fired Equipment (See Figure 6)			0.00
K. Hot Oil Heat Exchange System (See Table 5)		0.15 to 1.15	0.00
L. Rotating Equipment		0.50	0.00
Special Process Hazards Factor (F2)			3.24
Process Unit Hazards Factor (F1 x F2) = F3			4.86
Fire and Explosion Index (F3 x MF = F&EI)			117

(1) For no penalty use 0.00.

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LOSS CONTROL CREDIT FACTORS

1. Process Control Credit Factor (C1)

Feature	Credit Factor Range	Credit Factor Used (2)	Feature	Credit Factor Range	Credit Factor Used (2)
a. Emergency Power	0.98	0.98	f. Inert Gas	0.94 to 0.96	1.00
b. Cooling	0.97 to 0.99	1.00	g. Operating Instructions/Procedures	0.91 to 0.99	1.00
c. Explosion Control	0.84 to 0.88	1.00	h. Reactive Chemical Review	0.91 to 0.98	0.91
d. Emergency Shutdown	0.96 to 0.99	1.00	i. Other Process Hazard Analysis	0.91 to 0.98	0.98
e. Computer Control	0.93 to 0.99	1.00			

C1 Value (3) 0.874

2. Material Isolation Credit Factor (C2)

Feature	Credit Factor Range	Credit Factor Used (2)	Feature	Credit Factor Range	Credit Factor Used (2)
a. Remote Control Valves	0.96 to 0.98	1.00	c. Drainage	0.91 to 0.97	1.00
b. Dump/Blowdown	0.96 to 0.98	1.00	d. Interlock	0.98	1.00

C2 Value (3) 1.000

3. Fire Protection Credit Factor (C3)

Feature	Credit Factor Range	Credit Factor Used (2)	Feature	Credit Factor Range	Credit Factor Used (2)
a. Leak Detection	0.94 to 0.98	0.98	f. Water Curtains	0.97 to 0.98	1.00
b. Structural Steel	0.95 to 0.98	1.00	g. Foam	0.92 to 0.97	1.00
c. Fire Water Supply	0.94 to 0.97	0.94	h. Hand Extinguishers/Monitors	0.93 to 0.98	0.97
d. Special Systems	0.91	1.00	i. Cable Protection	0.94 to 0.98	1.00
e. Sprinkler Systems	0.74 to 0.97	0.87			

C3 Value (3) 0.867

Loss Control Credit Factor = C1 x C2 x C3 (3) = 0.758

PROCESS UNIT RISK ANALYSIS SUMMARY

1. Fire and Explosion Index (F&EI)	(See Front)	117	
2. Radius of Exposure	(Figure 7)	98	ft
3. Area of Exposure		30135	sq. ft.
4. Value of Area of Exposure (1994 Dollars).....			\$MM 27.55
5. Damage Factor	(Figure 8)	0.80	
6. Base Maximum Probable Property Damage - (Base MPPD) [4 x 5]			\$MM 21.94
7. Loss Control Credit Factor	(See Above)	0.76	
8. Actual Maximum Probable Property Damage - (Actual MPPD) [6 x 7]			\$MM 16.62
9. Maximum Probable Days Outage - (MPDO)	(Figure 9)	112	days
10. Business Interruption - (BI)			\$MM 78.23

(2) For no credit factor enter 1.00

(3) Product of all factors used

Refer to "Fire & Explosion Index Hazard Classification Guide" (Form #471-00001) for details

BACK OF FORM C-22380 Rev/01-94 (471-00038) - [FIE-7 System Ver-2.1 - 8/31/94]

Print Date: 7/10/95

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FIRE & EXPLOSION INDEX - DATA AND COMMENTS

Material Factor

Material Is From Database
Material Name - Ethylene
Base Material Factor = 24
Adjusted Material Factor = 24
Heat of Combustion (BTU/lb) = 20800
Nh = 1
Nf = 4
Nr = 2
Flash Point (°F) = Gas
Boiling Point (°F) = -156
Process Unit Temperature (°F) = 25
Exotherm Temperature (°F) = 1000000
Autoignition Temperature (°F) = 842

Data For User Specified Material

General Process Hazards

- A. Exothermic Chemical Reactions
Process Unit NOT A REACTOR and/or NO EXOTHERM occurs (Penalty=0)
Comme 0
- B. Endothermic Processes
Process Unit NOT A REACTOR ==> Penalty=0
Comme 0
- C. Material Handling and Transfer
None of the following situations apply (Penalty=0)
Comme 0
- D. Enclosed or Indoor Process Units
Process is NOT ENCLOSED (Penalty=0)
Comme 0
- E. Access
Access determined adequate for emergency equipment (Penalty=0)
Comme 0
- F. Drainage and Spill Control
Flat, undiked area which allows spills to spread out (Penalty=0 50)
Comme 0

Special Process Hazards

- A. Toxic Material(s)
Equals two tenths of the Nh
- B. Sub-Atmospheric Pressure (< 500 mm Hg)
Greater than 500 mmHg (Penalty=0)
Comme 0
- C. Operation In or Near Flammable Range
Process will not reach the flammable range (Penalty=0).
Comme 0
- D. Dust Explosion
Process does not include dusts (Penalty=0)
Comme 0
- E. Pressure
Comme 0
- F. Low Temperature
Process utilizes carbon steel below its transition temperature
Comme 0
- G. Quantity of Flammable/Unstable Material
In Process
Comme 0
- H. Corrosion and Erosion
Corrosion rates below 0.5 mm/yr WITH risk of pitting and/or
Comme 0
- I. Leakage - Joints and Packing
Minor leakage likely at pump and gland seals (Penalty=0.10)
Comme 0
- J. Use of Fired Equipment
DOES NOT exist in the plant with the Process Unit
Comme 0
- K. Hot Oil Heat Exchange System
Process does not use a hot oil exchange system, or the hot oil
Comme 0
- L. Rotating Equipment
No rotating equipment deemed to be a hazard (No Penalty)
Comme 0

LOSS CONTROL CREDIT FACTORS - DATA AND COMMENTS

Process Control Credit Factor (C1)

- a) Emergency Power
Automatic switch to emergency power for CRITICAL SERVICES
Comme 0
- b) Cooling
No credit (Factor=1.0)
Comme 0
- c) Explosion Control
No credit (Factor=1.0)
Comme 0
- d) Emergency Shutdown
No credit (Factor=1.0)

Comme 0
- e) Computer Control
No credit (Factor=1.0)
Comme 0
- f) Inert Gas
No credit (Factor=1.0)
Comme 0
- g) Operating Instructions/Procedures

Comme 0
- h) Reactive Chemical Review
Reactive Chemical program is a continuing part of operations
Comme 0
- i) Other Process Hazard Analysis
Management of Change Review (Factor=0.98)
Comme 0

Material Isolation Credit Factor (C2)

- a) Remote Control Valves
No credit (Factor=1.0)
Comme 0
- b) Dump/Blowdown
No credit (Factor=1.0)
Comme 0
- c) Drainage
No credit (Factor=1.0)
Comme 0
- d) Interlock
No credit (Factor=1.0)
Comme 0

Fire Protection Credit Factor (C3)

- a) Leak Detection
Gas detectors alarm and identify a zone only (Factor=0.98)
Comme 0
- b) Structural Steel
No credit (Factor=1.0)
Comme 0
- c) Fire Water Supply
Firefighting water can be supplied for 4 hours at 100 psig (7
Comme 0
- d) Special Systems
No credit (Factor=1.0)
Comme 0
- e) Sprinkler Systems
Deluge system protects process (Factor=0.97)
Comme 0
- f) Water Curtains
No credit (Factor=1.0)
Comme 0
- g) Foam
No credit (Factor=1.0)
Comme 0
- h) Hand Extinguishers/Monitors
The process is protected by monitor guns (Factor=0.97)
Comme 0
- i) Cable Protection
No credit (Factor=1.0)
Comme 0

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