



INSPECTION REPORT

August 24, 2015

FAHSS / TÜV NORD

Third Party Inspection and Testing witness of Blast Resistant Double Leave Door

	Issued by	Checked by	Approved by
Name / Sig.	Said Waseem FAHSS/TÜV	Maher El-khidir FAHSS/TÜV 	Maher El-khidir FAHSS/TÜV Riyadh Branch Manager 
Location	Riyadh		
Date of Fulfilled inspection	22-August-15.		
Special and Safety Work Nissren Factory Reference	SSW/15-197		
FAHSS/TÜV Reference	E-mail Sat 8/22/2015 3:21 PM		



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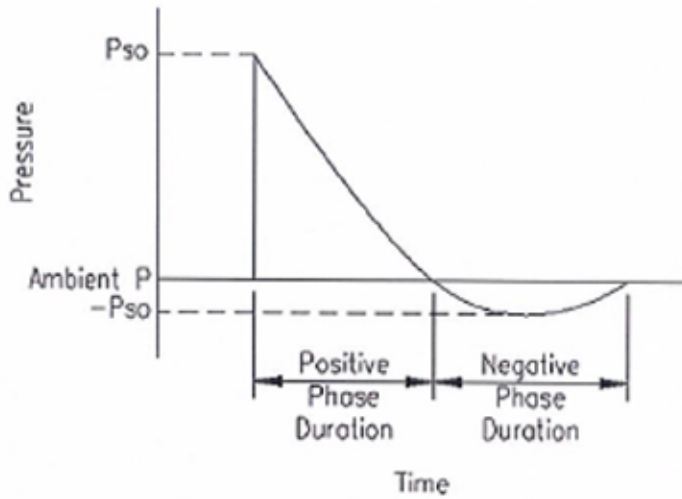
info@fahsstuv.com

www.tuev-nord.de



Handwritten signature and circular stamp of TÜV NORD SAUDI ARABIA. The stamp contains the text: TÜV NORD SAUDI ARABIA, TECHNICAL INSPECTION & TESTING, and the number 99.

TESTING FOR BLAST RESISTANT DOUBLE LEAF DOOR



DATE. DAELIM – SPECIAL PROJECTS GROUP MANAGER

DATE. SAMHOON – MANUFACTURING ENGINEER

DATE. TUV NORD – TEST ENGINEER

DATE. TUV NORD – QUALITY ASSURANCE

DATE. TUV NORD – TEST WITNESS



To. DAELIM . Co

KUWAIT NATIONAL PETROLEUM COMPANY

PROJECT: SULPHUR FACILITY

TEST REPORT NO: SAM 3229 KU

TEST REPORT FOR BLAST RESISTANT DOOR – DOUBLE LEAF

- Double Leaf : 3150 mmW x 2900 mmH x 85.5mmT
- Pressure : 15.7 Psi
- Time : 3 Minutes
- Test Date : 22th August 2015
- Report Date : 25th August 2015
- Sample Identification of Specimen : SM – Single
- Manufacturer : SAMHOON CO. LTD.
- Source of Supply : SEAUF – SOUTH KOREA
- Sample Dimension : 3150 mmW x 2900 mmH x 85.5mmT
- Model Number : _____
- Specimen Details : As Attached Drawings
- Test Standard : ASTM F2247 – 11 [Standard test method for metal doors used in
Blast resistant applications (Equivalent Static Load Method)]
- Procedure Test : Comply with B (Materials as specified on drawing)
- Category Required : Category 1



1. SPONSOR TEST STANDARD SCOPE – ASTM F2247:-

1	This test method covers the structural performance of metal doors and frames
2	Hardware (such as latches and hinges) used as a blast resistant doors by is applied
3	Equivalent static pressure
4	Static tests are valid for the unit size tested or for smaller units of analogous construction.
5	This test method requires knowledge of the principles of pressure, deflection, and when applicable, strain gauge measurement.
6	Specimens may be tested to determine ultimate static capacity or tested to specific static test loads.

2. SPECIMEN PREPARATION:-

1	Construction – The door panel shall meet the general definition of a metal door as outlined.
2	The design of the door panel is based upon the target pressure rating established by the specifier or door manufacturer.
3	Size of the specimen (door panel and frame) shall be representative or larger than the application under investigation.
4	Space between stiffeners may be filled with insulation.
5	In case no structural threshold door panel shall be considered as a three side supported, one edge free loading condition for a seating load case, the bottom edge of the door panel is free.
6	In case a structural threshold, door panel may be considered as a four side supported condition for a seating load case.
7	Door panel is supported by the restraining hardware During the unseating load case.
8	Door panel will be attached to the frame with the same quantity and size of hinge fasteners.
9	Door frame shall be attached to the test fixture using the same quantity, size, and spacing of fasteners or anchors.




3. CRITERIA CATEGORY:-

Category I	The specimen is unchanged (no permanent deformation) after the loading incident and the door is fully operable. The specimen remains intact and responds elastically. In field tests, a tolerance of 2 mm (5/64-inch) difference between pretest and post-test measurements is allowed for elastic response.
Category II	The door is operable, but measurable, permanent deformation to the door panel exceeding 2 mm (5/64-inch) has been experienced. The specimen remains as an integral system.
Category III	Non-catastrophic failure. No structural failure occurs to the specimen that prevents the specimen from providing a barrier to blast wave propagation. However, the specimen is permanently deformed and the door panel is inoperable.
Category IV	The door panel is severely deformed. For the seating direction, the deformation of the door panel must be limited to a level that does not cause the door panel to be forced through the door frame opening. For the unseating direction, the latching mechanism is permitted to fail, allowing the door to swing open; however, the door panel shall remain supported by the hinges and it is evident that the door panel will not become a flying debris hazard.

4. TEST PROCEDURE :-

1	The door and frame unit was installed into the test chamber as shown in Figures 2 and 3. The test fixture was positioned vertically, with the specimen hung in the operational mode.
2	The backside of the test chamber was covered with a rubber membrane and back plate, as shown in figures 2 and 4. The membrane allowed uninhibited load transfer to the specimen. The membrane did not prevent movement or failure of the specimen. The membrane was applied loosely, with extra folds of material at each corner and at all offsets and recesses.
3	The door unit was checked for proper adjustments and clearances in the closed position.
4	The required deflection devices were installed at their suggested locations. Refer figure 1.
5	The test chamber was pressurized until the desired static pressure load was achieved and maintained at a steady state until the deflections from the dial indicators were read and recorded. This step was repeated for each desired pressure increment.
6	After a set number of pressure increments, the pressure load was reduced to zero and deflection readings were taken to determine any permanent deformation. The latching device was also checked for proper operation.
7	The damage level category was determined in accordance to ASTM F2247 criteria.
8	When the behavior of the door unit under load indicated that sudden failure may occur, the dial indicators were removed to prevent damage to them. Once all the dial indicators were removed, the door unit was continuously loaded until the maximum was reached and the door failed.



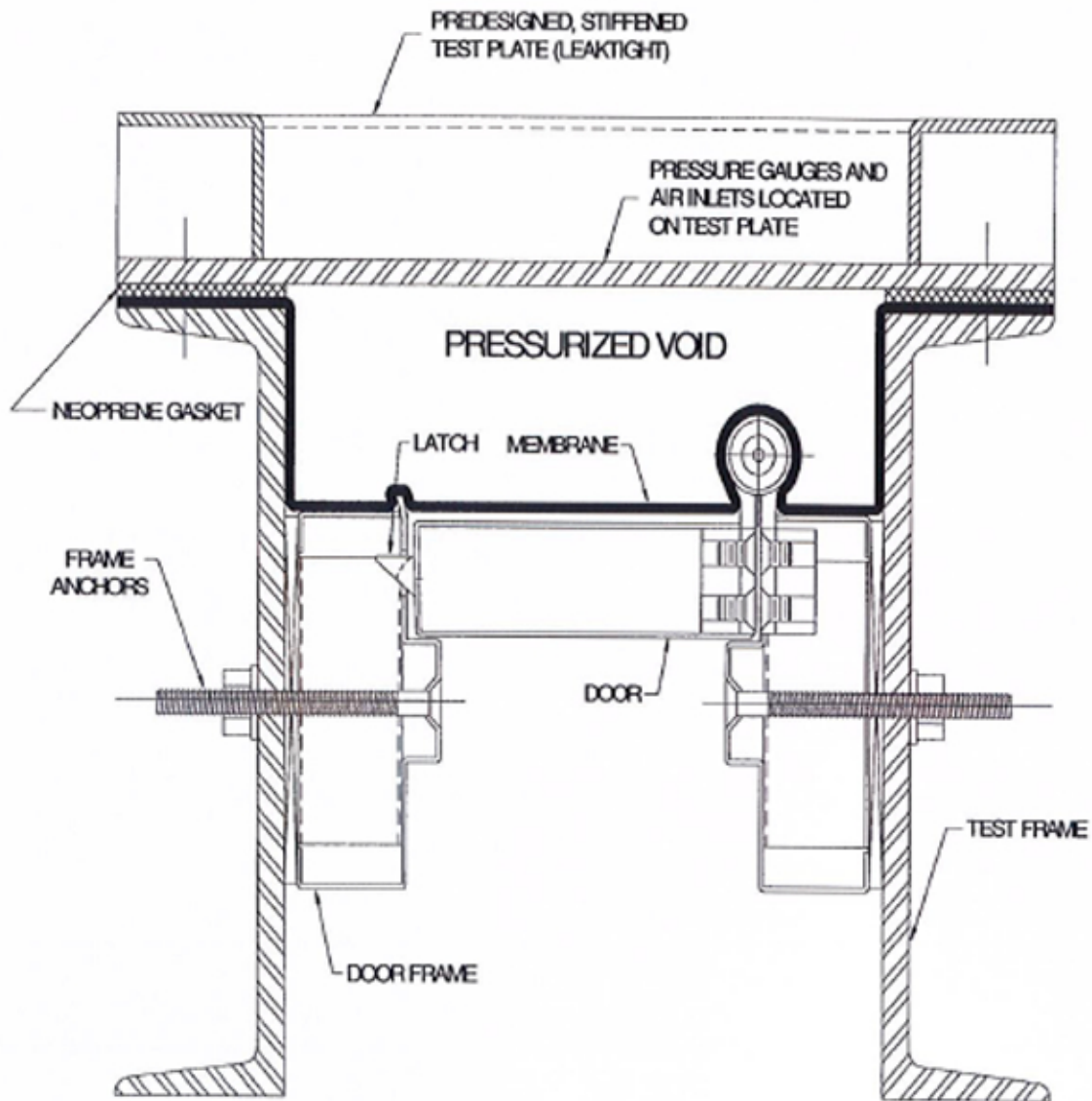



Figure 2

M

The logo consists of a blue signature "M" and a circular blue stamp. The stamp contains the text "TUV NORD" at the top, "SAUDI ARABIA" at the bottom, and "INSPECTION & TESTING" in the center.

Double Door Test

Static Test of Large Double Door					
Test Specimen					
<p>Double door as shown in drawings provided by Samhoun Co.Ltd. Overall frame dimensions of the door were 3150 mm by 2900mm. The hardware provided on the door was limited to two lever handles to operate a single latch point on the active leaf, and manual flush bolts on the inactive leaf. The door was installed in the test frame with bearing supports on the non-load side of the door. No connection details were shown on the drawings. The bearing support approach was agreed upon by ... The perimeter frame was not grout filled as shown on the drawings. The door did not operate well before the test. Each door leaf could be opened, but significant force was required to swing each door. Also, the active leaf did not close such that the latch would engage the inactive leaf, with the bottom of the door fully closed and the top of the door approximately 17 mm from fully closed.</p>					
Response Description					
<p>The tested door was satisfied with Category 1 according to ASTM F 2247 criteria about your required test results which high pressure short duration triangular shock loading side-on overpressure of 10 psi (69kPa) with a duration of 20 milliseconds, and the pressure load can be converted 15.7 psi with 3 minutes duration according to ASTM standards.</p>					
Test Specimen Size		Height		Width	
		inches	mm	inches	mm
	Specimen	114.17	2900.00	124.02	3150.00
	FrameContribution	0.00	0.00	0.00	0.00
	Total	114.17	2900.00	124.02	3150.00
Loaded Area (Height (max 120 inches) x Width (max 120 inches))					
Height	Width	Area			
114.17	120.00	13700.79			
Test Loads					
				Total Reaction (lbs)	Total Reaction (kN)
Target Load	15.7psi	108.5	kPa	78350	348.4
50%Load	7.85psi		54.1 kPa	34251.75	174.25



Fielded Instrumentation						
Reaction Force Load Cells (Check Appendix A)						
Gauge Number	Guage Type	Serial Number	Sensitivity (mV/V)	Reaction at 50% Load	Reaction at 100% Load	
R1	LC8400-200-100K	328691	2.212	6717.5	13435	
R2	LC8400-200-100K	328696	2.218	4501	9002	
R3	LC8400-200-100K	328702	2.217	7625	15250	
R4	LC8400-200-100K	328708	2.211	10700	21400	
R5	LC8400-200-100K	250542	2.214	7160	14320	
Total Reaction				36703.5	73407	
Effective Pressure (psi)				7.85	15.7	
Effective Pressure (kPa)				54.1	108.5	
LaserDistanceMeters (Check Appendix B)						
	Model	Manufacture Date	Sensitivity (mV/mm)	Deflection at 50% Load (inches)	Deflection at 100% Load (inches)	Deflection at 100% Load (mm)
D1	OADM 2016581/S14F	Feb-12	12.5	0.3	0.61	15.49
D2	OADM 2016581/S14F	Feb-12	12.5	0.32	0.68	17.27
D3	OADM 2016581/S14F	Oct-14	12.5	0.18	0.35	8.89
See measurement diagram for instrument locations.						



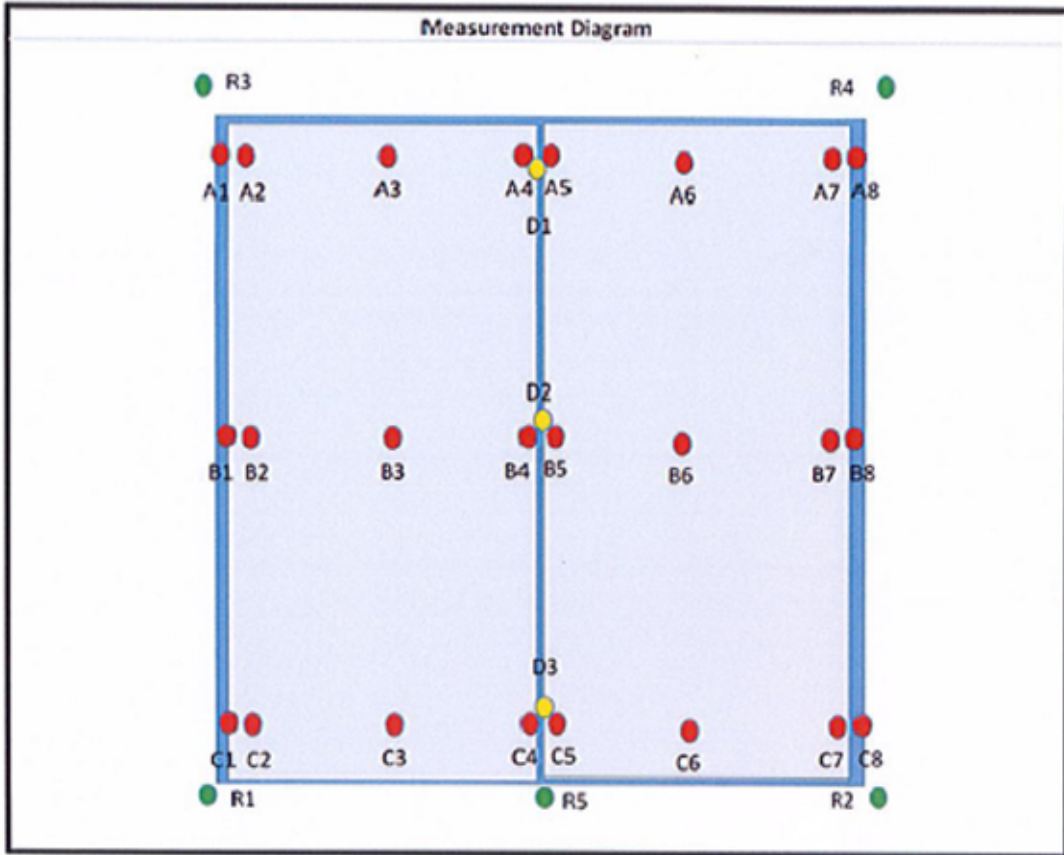
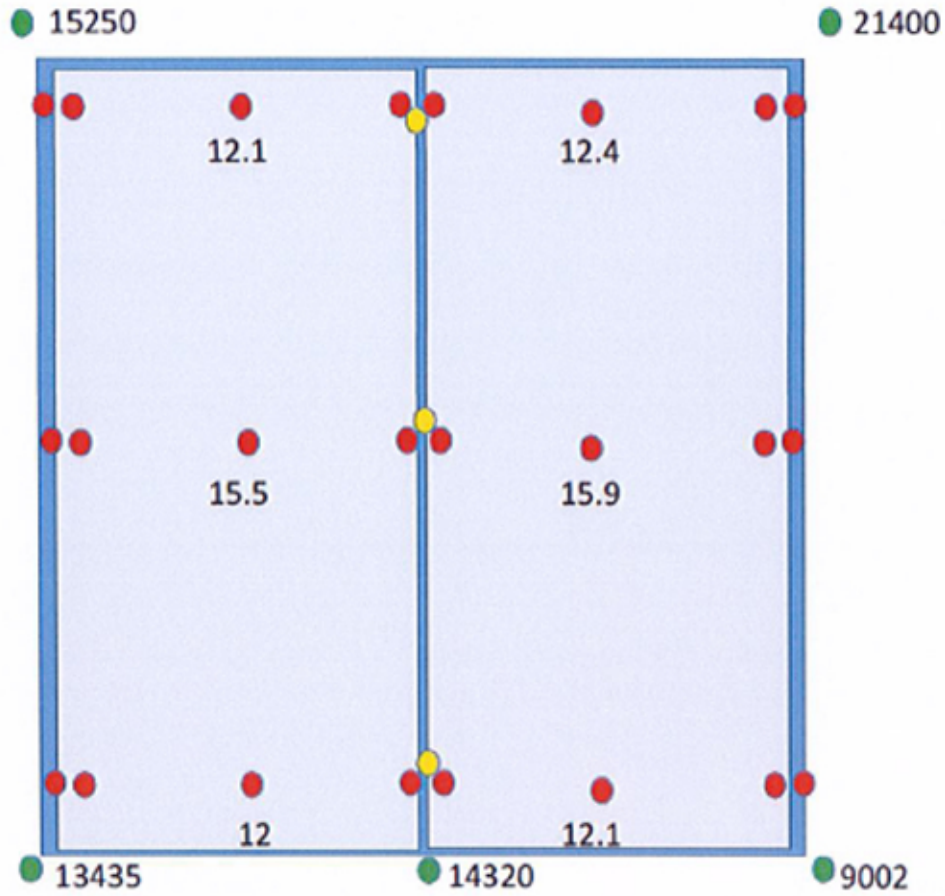



Figure 1

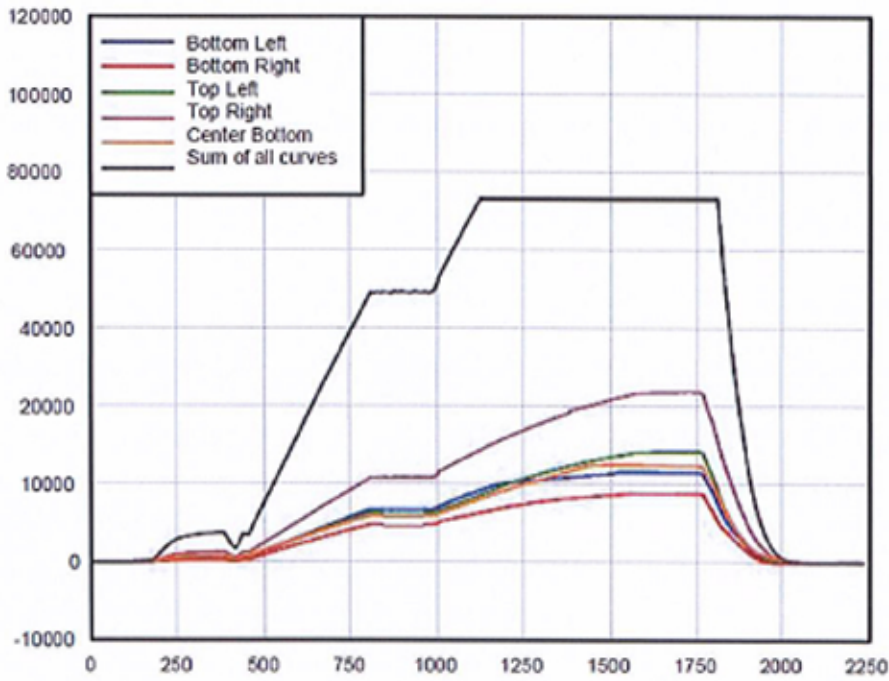
A handwritten signature in blue ink is located below a circular blue stamp. The stamp contains the text "TUV NORD SAUDI ARABIA" and "373".



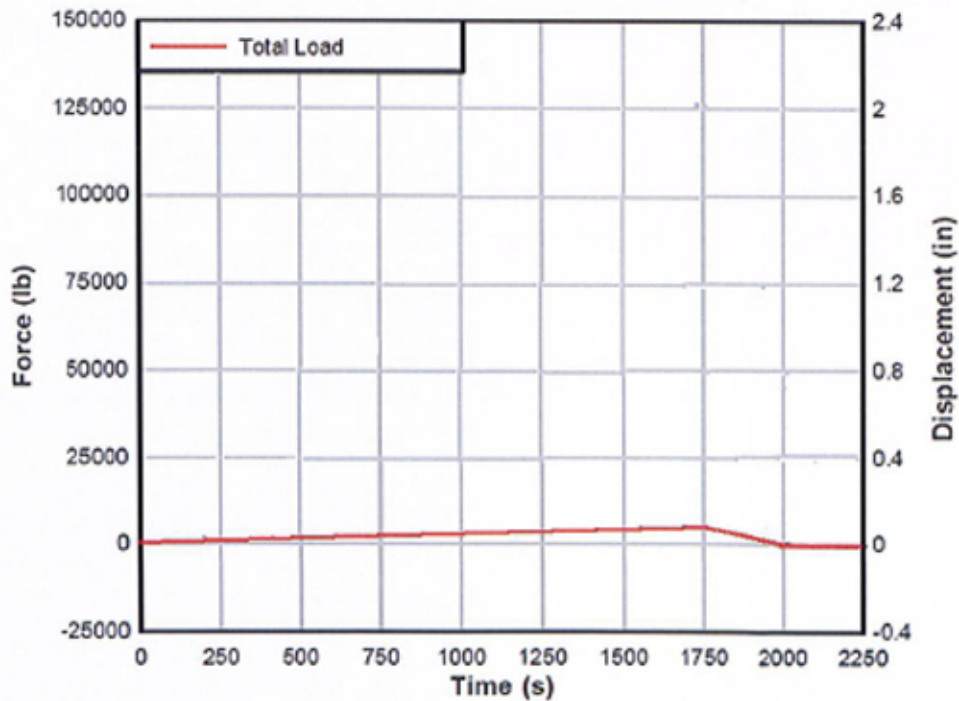
[Handwritten signature]

Deflection Measurements						
Measurement	Pre-Test (inches)	Post-Test (CM)	Permanent Deflection (inches)	Permanent Deflection (mm)		
A1	0.08	2.1	0.05	1		
A2	0.29	7.3	0.05	1		
A3	0.48	12.1	0.05	1		
A4	0.45	11.5	0.05	1		
A5	0.46	11.7	0.05	1		
A6	0.49	12.4	0.05	1		
A7	0.30	7.5	0.05	1		
A8	0.09	2.3	0.05	1		
B1	0.13	3.2	0.05	1		
B2	0.39	9.8	0.05	1		
B3	0.22	15.5	0.05	1		
B4	0.56	14.3	0.05	1		
B5	0.57	14.4	0.05	1		
B6	0.63	15.9	0.05	1		
B7	0.36	9.2	0.05	1		
B8	0.12	3.1	0.05	1		
C1	0.09	2.3	0.05	1		
C2	0.29	7.3	0.05	1		
C3	0.47	12	0.05	1		
C4	0.44	11.1	0.05	1		
C5	0.44	11.3	0.05	1		
C6	0.48	12.1	0.05	1		
C7	0.30	7.7	0.05	1		
C8	0.10	2.5	0.05	1		



Force Measurements from Test 1



Deflection Measurements with Total Force Data



Appendix A

LARGE-ID THROUGH-HOLE LOAD CELLS 2.00 TO 3.13" ID

Compression
0-1000 lb to 0-100K lb
0-455 kgf to 0-45,372 kgf

1 Newton = 0.2248 lb
1 daNewton = 10 Newtons
1 lb = 454 g
1 t = 1000 kgf = 2204 lb

LC8313/LC8400 Large Series



- ✓ For Large-ID Applications
- ✓ All Stainless Steel Construction
- ✓ Rugged Industrial Design

The LC8313, LC8400, and LC8450 Series donut load cells are space-saving solutions to applications requiring a large through-hole. With their rugged construction and design, these load cells are ideal for applications such as loading forces on large bolts or other suspended load applications. These series, with their all stainless steel construction and environmental protection, have proved reliable in tough industrial applications.

SPECIFICATIONS

Output: 2 mV/V nominal
Input: 10 Vdc (15V maximum)
Accuracy Class: $\pm 0.5\%$ linearity, hysteresis and repeatability combined
Zero Balance: $\pm 2.0\%$ FSO
Operating Temp Range: -54 to 121°C (-65 to 250°F)
Compensated Temp Range: 16 to 71°C (60 to 160°F)
Thermal Effects:
Zero: $\pm 0.009\%$ FSO/°C
Span: $\pm 0.018\%$ rdg/°C
Safe Overload: 150% of capacity
Ultimate Overload: 300% of capacity
Input Resistance: 360 Ω minimum
Output Resistance: 350 $\pm 5 \Omega$
Construction: 17-4 PH stainless steel
Electrical: 1.5 m (5') 4-conductor shielded cable

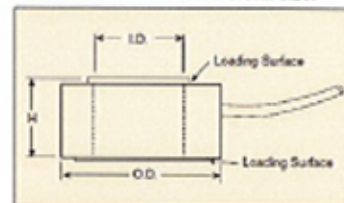


LC8400-213-10K shown smaller than actual size.

Dimensions: mm (inch)

MODEL	OD	H
LC8313	80 (3.13)	13 (0.50)
LC8400 (1K to 50K)	102 (4.00)	25 (1.00)
LC8400 ($\geq 100K$)	102 (4.00)	51 (2.00)
LC8450	114 (4.50)	32 (1.25)

WIRE	CONNECTION
GN	+Output
WT	-Output
BK	-Input
RD	+Input



INSIDE DIAMETERS (ID)	+ = MOST POPULAR X = AVAILABLE			
ID CODE	200	213	300	313
MODEL	2.00"	2.13"	3.00"	3.13"
LC8313	+	X		
LC8400	+	X		
LC8450			X	+

Also available in metric configurations, consult engineering for details.

To Order

CAPACITY	MODEL NO.	COMPATIBLE METERS**
Model LC8313 with a 3.13" OD and Selectable ID		
1 K lb / 455 kg	LC8313-[*]-1K	DP41-S, DP25B-S, DPIS
3 K lb / 1361 kg	LC8313-[*]-3K	DP41-S, DP25B-S, DPIS
5 K lb / 2269 kg	LC8313-[*]-5K	DP41-S, DP25B-S, DPIS
7.5 K lb / 3403 kg	LC8313-[*]-7.5K	DP41-S, DP25B-S, DPIS
10 K lb / 4537 kg	LC8313-[*]-10K	DP41-S, DP25B-S, DPIS
Model LC8400 with a 4.00" OD and Selectable ID		
1 K lb / 455 kg	LC8400-[*]-1K	DP41-S, DP25B-S, DPIS
3 K lb / 1361 kg	LC8400-[*]-3K	DP41-S, DP25B-S, DPIS
5 K lb / 2269 kg	LC8400-[*]-5K	DP41-S, DP25B-S, DPIS
10 K lb / 4537 kg	LC8400-[*]-10K	DP41-S, DP25B-S, DPIS
25 K lb / 11,343 kg	LC8400-[*]-25K	DP41-S, DP25B-S, DPIS
50 K lb / 22,686 kg	LC8400-[*]-50K	DP41-S, DP25B-S, DPIS
100 K lb / 45,372 kg	LC8400-[*]-100K	DP41-S, DP25B-S, DPIS
200 K lb / 90,744 kg	LC8400-[*]-200K	DP41-S, DP25B-S, DPIS
Model LC8450 with a 4.50" OD and Selectable ID		
1 K lb / 455 kg	LC8450-[*]-1K	DP41-S, DP25B-S, DPIS
3 K lb / 1361 kg	LC8450-[*]-3K	DP41-S, DP25B-S, DPIS
5 K lb / 2269 kg	LC8450-[*]-5K	DP41-S, DP25B-S, DPIS
10 K lb / 4537 kg	LC8450-[*]-10K	DP41-S, DP25B-S, DPIS

Comes complete with 5-point NIST-traceable calibration and 59 k Ω shunt data.

** Visit us online for compatible meters.

[*] Select ID Code from table above to complete model number.

Ordering Examples: LC8313-200-3K, 3000 lb capacity load cell, 3.13" OD and 2.00" ID.

LC8400-200-10K, 10,000 lb capacity load cell, 4.00" OD and 2.00" ID.

LC8400-213-25K, 25,000 lb capacity load cell, 4.00" OD and 2.13" ID.

LC8450-313-5K, 5000 lb capacity load cell, 4.50" OD and 3.13" ID.

F-92

LOAD CELLS



Appendix B

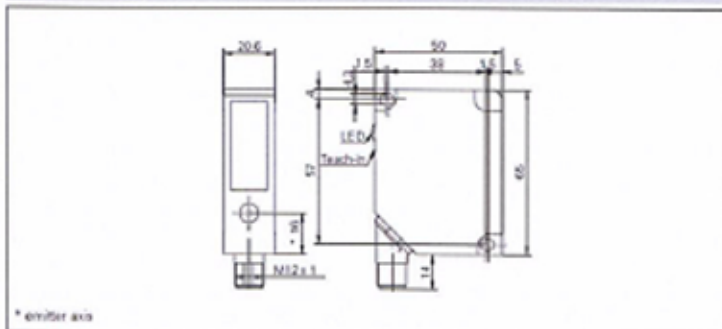
Baumer

Photoelectric sensors

Distance sensors

OADM 20 (Laser, connector 8 pins, > 300 mm)

sample drawing



general data

adjustment	Teach-in: button / external
power on indication	LED green
soiled lens indicator	LED red
light source	pulsed red laser diode
wave length	650 nm
laser class	2

measuring distance Sd = 100 ... 600 mm

Teach-in range min.	> 10 mm
resolution	0,015 ... 0,67 mm
linearity error	± 0,05 ... ± 2 mm
temperature drift	< 0,03 % Sd/°K

measuring distance Sd = 200 ... 1000 mm

Teach-in range min.	> 20 mm
resolution	0,12 ... 2,5 mm
linearity error	± 0,48 ... ± 10 mm
temperature drift	< 0,06 % Sd/°K

electrical data

response time / release time	< 0,9 ms
voltage supply range +Vs	12 ... 28 VDC
current consumption max. (no load)	100 mA
output circuit	analog
output signal	4 ... 20 mA / 0 ... 10 VDC
load resistance (analog I)	< (+Vs - 6 V) / 0,02 A
load resistance (analog U)	> 100 kOhm
output current	< 100 mA
alarm output	PNP
short circuit protection	yes
reverse polarity protection	yes, Vs to GND

sample picture



laser warning



remarks

For objects with a reflectivity < 7 % (OADM 2016x80/S14F) or < 15 % (OADM 2016x81/S14F) the response time/release time is increased automatically up to 2,8 ms.



Baumer

Photoelectric sensors

Distance sensors

OADM 20 (Laser, connector 8 pins, > 300 mm)

mechanical data	
width / diameter	20,6 mm
height / length	65 mm
depth	50 mm
type	rectangular
housing material	die-cast zinc
front (optics)	glass
connection types	connector M12 8 pin, rotatable

ambient conditions	
operating temperature	0 ... +50 °C
protection class	IP 67

order reference	measuring distance Sd	beam type	beam width	beam height	beam diameter	ambient light immunity
OADM 206480/S14F	100 ... 600 mm	point	-	-	2 mm	< 10 kLux
OADM 206481/S14F	200 ... 1000 mm	point	-	-	2 mm	< 5 kLux
OADM 206580/S14F	100 ... 600 mm	line	2,5 mm	5,5 ... 21 mm	-	< 10 kLux
OADM 206581/S14F	200 ... 1000 mm	line	2,5 mm	8,5 ... 35 mm	-	< 5 kLux





Pretest Photograph of Loaded Side of Door



Pretest Photograph of Non-Loaded Side of Door





Pretest Photograph Showing Closing Issue for Active Leaf



Posttest Photograph of Door

[Handwritten signature]





Posttest Photograph at Top of Frame



Posttest Photograph at Bottom of Frame



Posttest Photographs of Flush Bolts in Bottom and Top Frame

for the content

Eng. Maher El-khidir



FAHSS/TÜV SAUDI ARABIA

NOTE

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. IN ALL DETAILS, UNLESS OTHERWISE SPECIFIED, THE DIMENSIONS SHALL BE TO THE CENTER-LINE OF THE MEMBER.
3. ALL DIMENSIONS SHALL BE TO THE CENTER-LINE OF THE MEMBER.
4. THE PLATE SHALL BE 100% WELD TO THE FRAME.
5. ALL WELDS SHALL BE TO THE CENTER-LINE OF THE MEMBER.
6. THE WELDS SHALL BE TO THE CENTER-LINE OF THE MEMBER.
7. THE WELDS SHALL BE TO THE CENTER-LINE OF THE MEMBER.
8. THE WELDS SHALL BE TO THE CENTER-LINE OF THE MEMBER.
9. THE WELDS SHALL BE TO THE CENTER-LINE OF THE MEMBER.
10. THE WELDS SHALL BE TO THE CENTER-LINE OF THE MEMBER.

NO.	DESCRIPTION	MODEL NO. OR SPEC.	MAKER	REMARKS
1	HEAVY DUTY SPECIAL WEDGE		SAMHOON	STAINLESS
2	VERTICAL TYPE PANE GLASS	TELEVISION	DAELIM	STAINLESS
3	DOOR FRAME	700	SAMHOON	STAINLESS
4	DOOR GLASS	700	SAMHOON	STAINLESS
5	DOOR STOPPER	700	SAMHOON	STAINLESS
6	DOOR STOPPER	700	SAMHOON	STAINLESS
7	DOOR STOPPER	700	SAMHOON	STAINLESS
8	DOOR STOPPER	700	SAMHOON	STAINLESS
9	DOOR STOPPER	700	SAMHOON	STAINLESS
10	DOOR STOPPER	700	SAMHOON	STAINLESS

REVISION

NO.	DESCRIPTION
1	ISSUED FOR CONSTRUCTION

SAMHOON ENGINEERING

SAMHOON

SAMHOON CO., LTD.
 1000-1, SANGHVI RD., SU-1000, SU-1000, SU-1000
 TEL: 001-123-4567890 FAX: 001-123-4567890

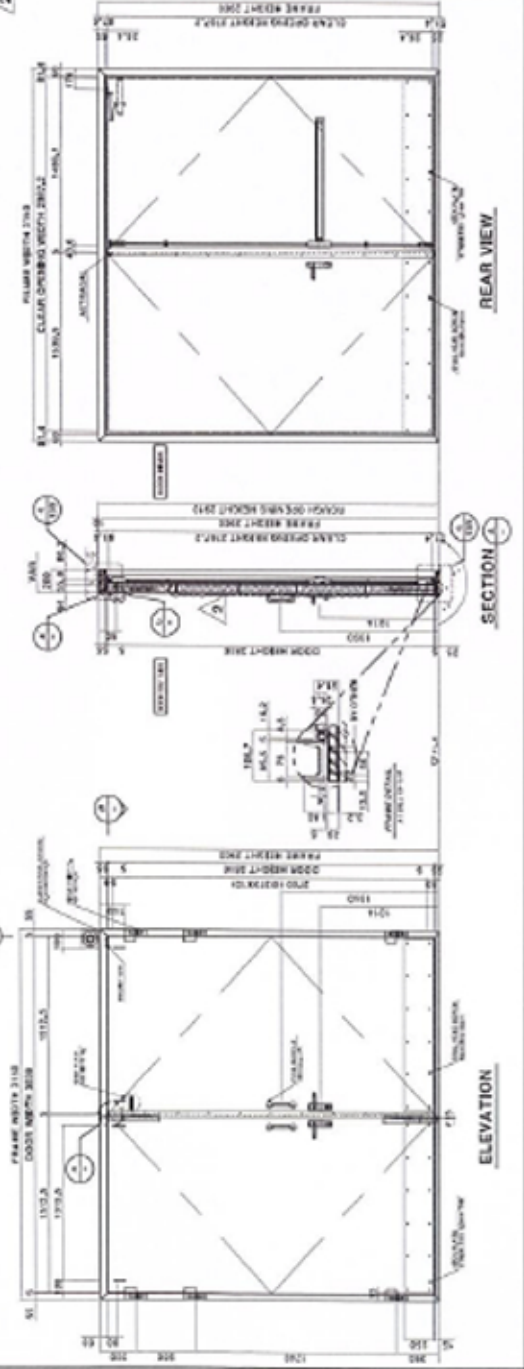
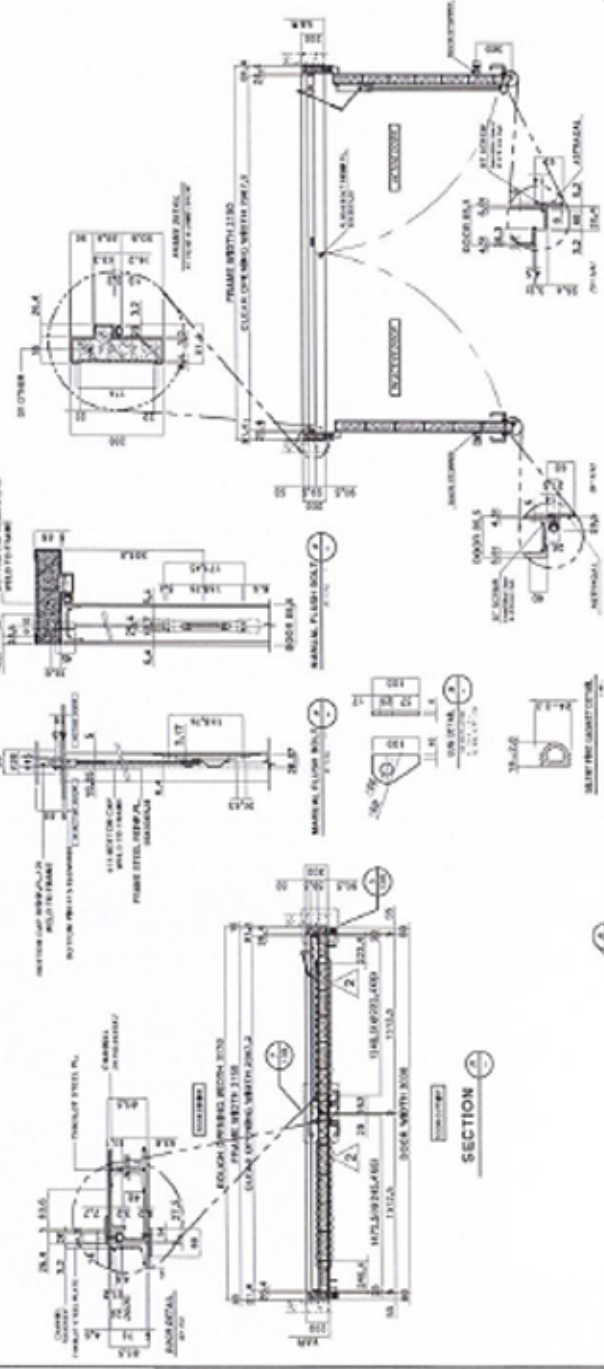
VENDOR DWG NO. VP-43-703-001-401-ALL-SK-12A



KUWAIT NATIONAL PETROLEUM CO. (K.S.C.)
 MINA AL-AHMADI REFINERY

TITLE : SULPHUR HANDLING FACILITIES (RE-AMP AND NEW)
 PROJECT (SHPI) AT MAHA REFINERY

FRAME SIZE 3150.0(W)X2900.0(H)
 (N76.A SUBSTATION BUILDING)



REV	DATE	DESCRIPTION	BY	CHKD	APPD
1		ISSUED FOR APPROVAL	SAJIB	SAJIB	SAJIB
2		ISSUED FOR APPROVAL	SAJIB	SAJIB	SAJIB
3		ISSUED FOR APPROVAL	SAJIB	SAJIB	SAJIB
4		ISSUED FOR APPROVAL	SAJIB	SAJIB	SAJIB
5		ISSUED FOR APPROVAL	SAJIB	SAJIB	SAJIB

PROJECT NO.	CONTRACT NO.	SCALE
135995	CA-CSP00822	1:100

DAELIM SEUL, KOREA

**Special And Safety Work
Nissren Factory**

Tel : +966 1 498 6794
Fax : +966 1 498 9255
Email : Special_Safety@yahoo.com



Materials test, Consulting, Manufacturing, Security systems, Simulations

P.O.Number - SSW/15-197
P.O.Date - 22 / 08 / 2015

Purchase Order

Ordered By

Company Special And Safety Work Nissren Factory
Address Eskan Abahria -Al Kharj Road
Country Kingdom Of Saudi Arabia
Phone Number +966 (1) 498 6794
Fax Number +966 (1) 498 9255
Contact Name Mohammed Azzam Asfour

Deliver To

Company NATIONAL INSPECTION &
TECHNICAL TESTING CO.
Address P.O BOX 27011, RIYADH 11417
Country SAUDI ARABIA
Quotation Reference _____
Quotation Date _____
Phone Number 011 473 3504
Fax Number 011 292 0830

S. NO.	DESCRIPTION	UNIT	REQUIRED QTY.	UNIT PRICE (SAR)	TOTAL PRICE
1	THIRD PARTY INSPECTION FOR BLAST RESISTANT DOOR TEST, SINGLE LEAF AND DOUBLE LEAF	PCS			5,000.00
Total Amount In SAR..					5,000.00

Approved By :  Azzam Asfour
Factory Manager