

Doc Number: SEP-XL-100-3PS-ET00-W0001

Release: 1

Issued by: Susie Almaguer
CLIENT: TransCanada Keystone Pipeline Limited Partnership

TRANSFORMER DATA SHEET

SHT 1 OF 3

PROJECT: Keystone XL Oil Pipeline Project
FABR. SPEC: 25472-100-3PS-ET00-W0001

TAG NO.: 128-GRSSY-BO-T-01
SERVICE: Power Transformer
SITE: Grassy Creek Station

APPLICABLE TO: ☐ QUOTATION ☐ PURCHASE ☐ AS-BUILT
MANUFACTURER: Siemens Transformers S.A. de C.V.
SERIAL NO.: T040N 001092.02

MODEL: _____
NO. REQUIRED: 1

SITE CONDITIONS
ALT (m): Less than 1000 m
ATM PRESS (kpa(a)): _____
RELATIVE HUMIDITY: MIN (%) _____ MAX (%) 95
OUTDOOR TEMPERATURE: MIN (°C) -40 MAX (°C) 40
INDOOR TEMPERATURE: MIN (°C) _____ MAX (°C) _____
SEISMIC DATA: Per separately provided climate data
LOCATION: ☐ INDOOR ☒ OUTDOOR
☐ TROPICAL ☐ DUST
☐ CORROSIVE GASES
☒ OTHER: Blowing Snow and Dust

CURRENT TRANSFORMER		
ITEM	PRIMARY	SECONDARY
MANUFACTURER	Meramec	Meramec
TYPE	Bushing	Bushing
VOLTAGE CLASS	1.1 kV	1.1 kV
QUANTITY	6	3
MOUNTING LOCATION	Bushing	Bushing
RATIO	200/5A	4000/5A
ACCURACY	C200	C200
THERMAL RF RATING	2.0	2.0

POWER SYSTEM
UTILITY COMPANY: SaskPower CONTACT: _____
PHONE No.: _____
FAULT LEVEL: _____
MVA BASE: _____
POSITIVE: X/R RATIO Note 11 R pu Note 11 X pu Note 11
ZERO: X/R RATIO Note 11 R pu Note 11 X pu Note 11

BUSHING DATA		
ITEM	PRIMARY (Note 10)	SECONDARY (Note 5)
MANUFACTURER	ABB	ABB
TYPE	Oil Filled	Porcelain
VOLTAGE RATING (V)	138	15
CURRENT RATING (A)	800	4000
INSULATION	Oil	Porcelain
CREEPAGE(HIGH CREEP/HIGH STRENGTH)	3188 mm	351 mm
BIL (KV)	650	110
LOW FREQ. FLASHOVER-WET/DRY (KV)	Note 1	Note 1

TRANSFORMER DESIGN
DISTRIBUTION TRANSFORMER: ☐ CSA C2 ☐ ☐ ☐
RATING (3 PHASE, 60 HZ): ☒ 20/22.4/26.66/29.86/33.33/37.33 MVA
TEMP. RISE: ☐ 65°C ☐ 55°C
PAD MOUNTED TRANSFORMER: ☐ CSA C227.5 ☐ CSA C227.4 (Dead Front)
IMPEDANCE: ☐ STD 9.7 %
POSITIVE SEQ. IMP: 9.7 %
ZERO SEQ. IMP: 7.92 %
POWER TRANSFORMER: ☒ CSA, ANSI, IEEE, ASTM ☐ ANSI, IEEE, ASTM
X/R RATIO: 23.6
COOLING TYPE: ☐ ONAN ☒ ONAN/ONAF/ONAF (Note 2)

SURGE ARRESTER (Note 6)
☒ REQUIRED ☐ NON REQUIRED
LOCATION: ☒ HIGH VOLTAGE ☐ LOW VOLTAGE

25472-101-V1A-MPC0-W0127
02
Supplier Document Status
Code 1
Code 1 = Work may proceed.
Code 2 = Revise and resubmit. Work may proceed subject to resolution of indicated comments.
Code 3 = Revise and resubmit. Work may not proceed.
Code 4 = Review not required. Work may proceed.
Permission to proceed does not constitute acceptance or approval of design details, calculations, analyses, test methods, or materials developed or selected by the Supplier and does not relieve the Supplier from full compliance with contractual obligations.
Responsible Engineer: Kothari Manish
Date Signed: 05/02/2011
VPTL - VPTL-02386
Equipment No.: 128-GRSSY-BO-T-01

WINDING CONNECTION
☒ DELTA / WYE ☐ OTHER
☒ VECTOR GROUP Dyn1
☒ PRIMARY 138,000 V ☐ Std BIL ☒ 550 KV
☒ SECONDARY 6,900 V ☐ Std BIL ☒ 110 KV
WINDING MATERIAL
PRIMARY: ☒ COPPER ☐ ALUMINUM
SECONDARY: ☒ COPPER ☐ ALUMINUM

FANS AND PUMPS
AUX. POWER SUPPLY: ☒ 208VAC, 3PH, 60 HZ ☒ OTHER Note 7
MOTOR ENCLOSURE: ☒ TEFC ☐ OTHER
INSUL. TEMP. RISE: ☒ CLASS F, CLASS B RISE ☐ OTHER

SYSTEM CONNECTIONS & FEATURES		
PRIMARY	SECONDARY	ITEM
<input checked="" type="checkbox"/>	<input type="checkbox"/>	TOP MOUNTED BUSHINGS (SEGMENT 3 - Note 3)
<input type="checkbox"/>	<input checked="" type="checkbox"/>	SIDE MOUNTED BUSHINGS (SEGMENT 1 - Note 3)
<input checked="" type="checkbox"/>	<input type="checkbox"/>	EXPOSED BUSHINGS
<input type="checkbox"/>	<input checked="" type="checkbox"/>	ENCLOSED BUSHINGS (terminal box)
<input type="checkbox"/>	<input checked="" type="checkbox"/>	NEUTRAL GROUNDING
		<input type="checkbox"/> SOLID
		<input checked="" type="checkbox"/> RESISTANCE NGR 25 A, 10 Sec (Note 4)
		TERMINAL BOX / THROAT
<input type="checkbox"/>	<input type="checkbox"/>	TOP ENTRY
<input type="checkbox"/>	<input checked="" type="checkbox"/>	BOTTOM ENTRY
<input type="checkbox"/>	<input type="checkbox"/>	BUS DUCT ENTRY
<input type="checkbox"/>	<input checked="" type="checkbox"/>	SPACE FOR STRESS CONES
<input type="checkbox"/>	<input type="checkbox"/>	POT HEADS
<input type="checkbox"/>	<input type="checkbox"/>	POT HEADS
		CABLES
<input checked="" type="checkbox"/>	<input type="checkbox"/>	TYPE AAC SIZE 477 MCM NO./PH 1
<input type="checkbox"/>	<input checked="" type="checkbox"/>	TYPE TECK SIZE 750 MCM NO./PH 4


AUTOMATIC CONTROL FOR FANS: ☒ REQUIRED ☐ NON-REQUIRED

TAP CHANGERS
☒ NLTC LOCATION: ☐ LOW VOLTAGE ☒ HIGH VOLTAGE
STEPS: ☒ 4 STEPS OF 2.5% (+5% to -5%) - Full capacity at all taps
☐ OTHER
☒ LTC LOCATION: ☒ LOW VOLTAGE ☐ HIGH VOLTAGE
☒ 32 STEPS OF 5/8% (+10% to -10%) - Full capacity at all taps
☐ OTHER
☒ AUTOMATIC (LTC only)
☐ NON AUTOMATIC

TRANSFORMER CONTROL CABINET
ENCLOSURE: ☒ NEMA 4X ☐ OTHER
☒ HINGED DOOR ☐ OTHER
☒ LOCKABLE
SPACE HEATER WITH THERMOSTAT: ☒ REQUIRED ☐ NON REQUIRED

NOTES:
1. Vendor to fill in data
2. Two stage fan cooling
3. As per ANSI C57.12.10-1997
4. Supplied and installed on a concrete pad by TCPL.
5. 6.9 kV Bushings to be tested as per TCPL/Siemens/WP agreement for ensuring suitability for application (11/06/09)
6. Vendor to fill in on surge arrester Data Sheet 25472-100-EGD-EGLO-W0002

7. Fans are to have individual Circuit Breakers/Fan
8. Insulating Oil must meet or exceed the requirements of C57.106. Note the 'Required' column indicates the limits of new mineral oil as received from the supplier. Other limits apply prior to energisation as noted in C57.106.
9. Transformer tags per separate list, see page 3 of 3.
10. High Voltage Bushings construction shall be in accordance with IEEE C57.19.01
11. Utility supplied data. Data will be added when received.

 WorleyParsons resources & energy	JOB NO. 08E4490 DATA SHEET NO. 25472-100-ETD-ET00-W0002	REV	ISSUED FOR	DATE	BY	CHKD	APPR
		00	Design	14 April 10	FM	GI	AK

Doc Number: 08E4490-EGD-ET00-W0002

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SERIAL NO.: T.040N.001092.02
MODEL: _____
NO. REQUIRED: 1

OPTIONAL ACCESSORIES

- ☒ LIQUID LEVEL INDICATOR W / ALARM CONTACTS
☒ LIQUID TEMP. INDICATOR W / TRIP / ALARM / FAN CONTACTS
☒ WINDING TEMP. INDICATOR W / TRIP / ALARM CONTACTS
☒ VACUUM PRESSURE GAUGE W / ALARM CONTACTS
☒ VACUUM PRESSURE BLEEDER DEVICE
☐ GAS DETECTOR RELAY WITH INDICATOR
☒ SUDDEN PRESSURE RELAY W / TRIP / ALARM CONTACTS
☒ EMERGENCY PRESSURE RELIEF DEVICE W / ALARM CONTACTS
☒ LIQUID DRAIN VALVE WITH THREADED PLUG
☒ LIQUID SAMPLING VALVE WITH THREADED PLUG
☒ RADIATOR VALVES
☒ RADIATOR DRAIN PLUGS AND VENT PLUGS
☒ LIFTING EYES
☒ JACKING FACILITIES
☒ NAMEPLATE FOR BUYER'S EQUIPMENT NUMBER
☒ SPARE PARTS: 1 spare set of gaskets
☐ SPECIAL TOOLS

INSULATING OIL ELECTRICAL DATA (Note 8)

GENERAL	UNITS	REQUIRED	VENDOR CONFIRMATION
MANUFACTURER		PETRO CANADA	
TRADE NAME		LUMINOL	
VENDOR'S CATALOG NUMBER		35	
DIELECTRIC			
DIELECTRIC BREAKDOWN VOLT. 60 Hz, ASTM D877	KV / MIN.	30	55
DIELECTRIC BREAKDOWN VOLT. IMPULSE COND. ASTM D3300	KV / MIN.	Note 1	>300
TEST DATA			
NEUTRALIZATION NUMBER ASTM D 974	mgKOH/g	0.03 Max.	<0.01
WATER CONTENT ASTM D1533	ppm	Note 1	<25
INTERFACIAL TENSION @ 25°C, ASTM D971	dynes/cm	40	48
SPECIFIC GRAVITY @ 15°C, ASTM D1298		0.85	0.835
GASSING TENDENCY, ASTM D2300	µL/min	Note 1	-10
CORROSIVE SULPHUR, ASTM D1275B	Y/N	Note 1	NONCORROSIVE
PCB CONTENT, ASTM D4059	ppm	Nil	NIL

MISCELLANEOUS

PAINT

- ☐ STD
☒ ASA 70 / II Enamel over epoxy (Light gray ANSI 70)
☐

WEIGHTS

- ☒ CORE & COILS: 30164 kg
☒ TANK & FITTINGS: 10668 kg
☒ COOLING LIQUID: 1871 kg
☒ VOLUME TOTAL: 27308 litre
☒ TOTAL INSTALLED WT.: 72575 kg

TRANSFORMER LOSSES @ RATED VOLTAGE

- ☒ NO LOAD: 95 kW
☒ FULL LOAD: 322.03 kW

EFFICIENCY @

- ☒ 50% FULL LOAD: 99.65 %
☒ 75% FULL LOAD: 99.6 %
☒ 100% FULL LOAD: 99.5 %
☒ 125% FULL LOAD: 99.4 %

TESTING

- ☒ As per Specifications

SOUND LEVEL

- ☒ ANSI C57.12.00 ☐ CSA-C88 M90
☒ MAXIMUM AUDIBLE SOUND LEVEL ONAN: 73 dBA
☒ MAXIMUM AUDIBLE SOUND LEVEL ONAF1/2: 75/76 dBA

GROUNDING PADS

- ☒ TWO (2) GROUNDING PADS WITH LUGS
☐ OTHER
☒ REQUIRED FOR # 2/0 AWG to 4/0 AWG CU
☐ OTHER

VISUAL

COLOR, ASTM D1500		Clear/pale amber	<0.5
CONDITION, ASTM D1524		Clear	clear
TEMPERATURE POINTS			
FLASH POINT, ASTM D92	°C	133 Min.	170
POUR POINT, ASTM D5950 / D97	°C	-58 MIN.	-60
ANILINE POINT, ASTM D611	°C	Note 1	NA
OXIDATION STABILITY FOR INHIBITED OIL, ASTM D2440 / D2112			
WT.% Sludge, @ 72 hrs	%	Note 1	NA
NEUTRALIZATION NUMBER @ 72 hrs	mgKOH/g		NA
WT.% Sludge, @ 164 hrs	%	Note 1	<0.01
NEUTRALIZATION NUMBER @ 164 hrs	mgKOH/g	Note 1	<0.01
OXIDATION STABILITY FOR INHIBITED OIL, IEC 61125 Method C			
WT.% Sludge	%	Note 1	<0.02
NEUTRALIZATION NUMBER	mgKOH/g	Note 1	<0.02
POWER FACTOR AT 90°C		Note 1	<0.02
KINEMATIC VISCOSITY, ASTM D445			
VISCOSITY AT 0 °C	Sybolt sec.	Note 1	53
VISCOSITY AT 40 °C	Sybolt sec.	Note 1	9.2
VISCOSITY AT 100 °C	Sybolt sec.	Note 1	2.8
VISCOSITY AT -40 °C	Sybolt sec.	Note 1	1230
POWER FACTOR, ASTM D924			
POWER FACTOR AT 25°C	% MAX	0.05	<0.0001
POWER FACTOR AT 100°C	% MAX	0.3	0.001
INHIBITOR CONTENT, TYPE II OIL, ASTM D2668	%	>0.08 - 0.3	0.20

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REV	ISSUED FOR	DATE	BY	CHKD	APPR
00	Design	14 April 10	FM	GI	SM

