PT Transformator Servis Indonesia
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KAN Komite Akreditasi Nasional LP-1763-IDN

TRANSFORMER OIL ANALYSIS REPORT

Customer Name	PT SANDIKA KURNIA PERMATA	**Order Number**	: TSI 027
Location / Project	PT Petrokimia Gresik	**Lab. Number**	: 0112 / TR/2024

Transformer data

Unit ID	: TR 2281B Bottom	**Manufacture**	: AEG
Serial Number	: 307710-01	**Year (Age)**	: - (-)
Rating	: 25 MVA	**Oil Brand**	: -
Voltage	: 11.5 / 6 kV	**Sample Point**	: BMT
Oil Volume	: - Kg	**Oil Temperature °C**	: - C

DISSOLVED GAS ANALYSIS OF TRANSFORMER OILS BY GAS CHROMATOGRAPH (GC)

								Gassing Concentration Limit [1] IEEE C57.104-2019		
Sampling Date		28-Jan-24								
Received Date		29-Jan-24								
Test Date		30-Jan-24								
ASTM D3612-B								**Table 1**	**Table 2**	**Status**
Gas Parameter	**Unit**	**1st**	**2nd**	**3rd**	**4th**	**5th**	**6th**			
Hydrogen (H2)	ppm	0						**80**	**200**	**Low**
Methane (CH4)	ppm	0						**90**	**150**	**Low**
Ethane (C2H6)	ppm	0						**90**	**175**	**Low**
Ethylene (C2H4)	ppm	0						**50**	**100**	**Low**
Acetylene(C2H2)	ppm	0						**1**	**2**	**Low**
Carbon Monoxide (CO)	ppm	31						**900**	**1100**	**Low**
Carbon Dioxide (CO2)	ppm	515						**9000**	**12500**	**Low**
Oxygen	ppm	6182						**-**	**-**	**-**
Nitrogen	ppm	39572						-	-	-
O2/N2	-	0.16						-	-	-
CO2/CO	-	16.61						**3-20****		**Normal**
NEI Oil	-	0.00						-	-	-
NEI Paper	-	0.83						**-**	**-**	**-**

DELTA & RATE GAS CALCULATION							**DGA RESULT**			
Gas Parameter	**Unit**	**Delta Gas [2]**	**Limit Table 3**	**Interval Pengujian: (Bulan)**		**Kurang Data**	**Table Norms**	**Gassing [1]**	**Delta Gas [2]**	**Rate Gas [3]**
				Rate Gas (Day)	**Rate Gas [3] (Year)**	**Limit Table 4**		**Low**	-	-
Hydrogen (H2)	ppm	-	-	-	-	-	**DGA STATUS**	-		
Methane (CH4)	ppm	-	-	-	-	-				
Ethane (C2H6)	ppm	-	-	-	-	-				
Ethylene (C2H4)	ppm	-	-	-	-	-	**DGA OVERALL RESULT**	**NORMAL OPERATION**		
Acetylene(C2H2)	ppm	-	-	-	-	-				
Carbon Monoxide (CO)	ppm	-	-	-	-	-				
Carbon Dioxide (CO2)	ppm	-	-	-	-	-				

*Delta Gas adalah kenaikan gas dari 2 pengujian terakhir
*Rate Gas adalah laju kenaikan gas dalam 1 tahun dengan syarat terdapat 3 - 6 data pengujian DGA dalam rentang waktu 4 - 24 Bulan
** Rasio berlaku jika CO diatas 1.000 ppm atau CO2 diatas 10.000 ppm
** Jika CO dan CO2 dibawah table 1, merupakan kondisi normal gassing.
*** NEI: Normalized Energy Intensity

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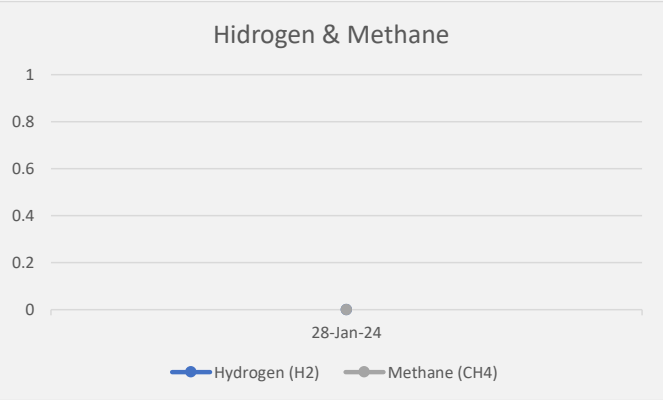
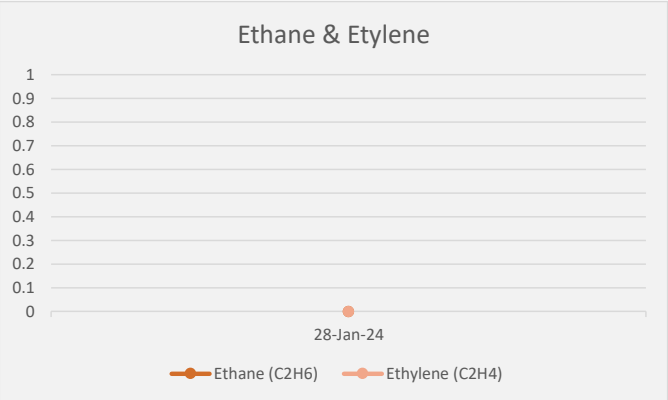
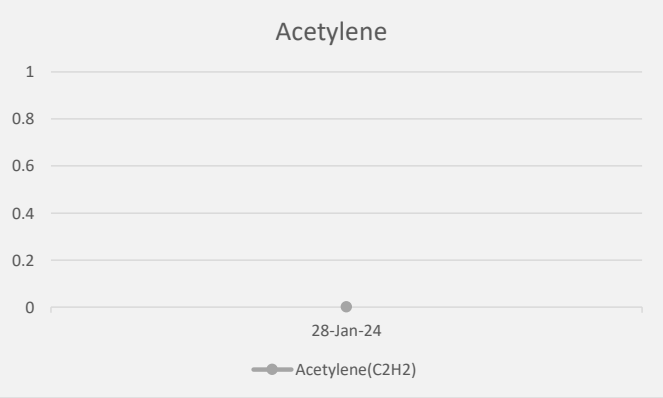
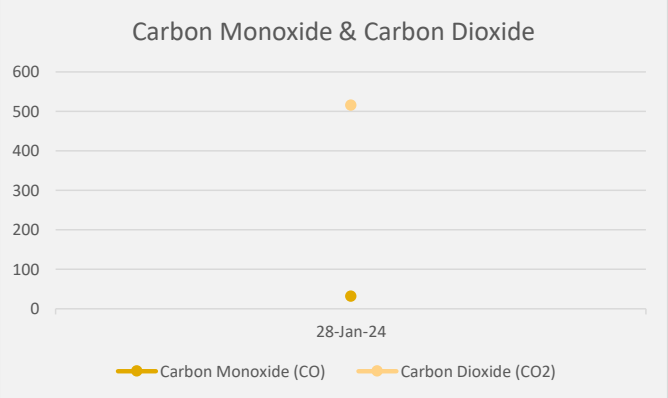
Oil Volume	: - Kg	**Oil Temperature °C**	: - C









Analysis Comments

Data pengujian DGA pertama digunakan sebagai initial verification, dibutuhkan 3-6 data dengan rentang waktu 4-24 bulan untuk memeperoleh hasil interpretasi status kondisi trafo berdasarkan standar IEEE C57.104-2019.
Dibutuhkan 2 data pengujian tambahan untuk mengkategorikan status trafo. Akan tetapi dari hasil pengujian semua individual gas masih dalam konsentrasi low gassing, hal ini mengindikasikan trafo tidak terindikasi mengalami gangguan / fault yang menyebabkan kenaikan konsentrasi gas sejak pengujian sebelumnya (Normal Operation).

Recommendation

Periodic Screening Sample dengan resampling rentang waktu 4 - 8 bulan untuk monitoring perkembangan kondisi gas pada Trafo.

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Transformer data

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Serial Number	: 307710-01	**Year (Age)**	: - (-)
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Voltage	: 11.5 / 6 kV	**Sample Point**	: BMT
Oil Volume	: - Kg	**Oil Temperature °C**	: - C

OIL QUALITY ANALYSIS OF TRANSFORMER OILS

Sampling Date			**28-Jan-24**						**Normal**	
Received Date			**29-Jan-24**							
Test Date			**30-Jan-24**						**IEC 60422**	
Gas Parameter	**Unit**	**Methode**	**1st**	**2nd**	**3rd**	**4th**	**5th**	**6th**	**Min Limit**	**Max Limit**
Oil Colour / Appearance	-	ASTM D-1500	1.0 / Yellow						-	-
Water Content	mg/kg	IEC 60814	9.6						-	**40**
Acidity	mgKOH/g	IEC 62021-2	0.02						-	**0.3**
Interfacial Tension	mN/m	ASTM D971	37.8						**22**	-
Oil Quality Index	-	WP 222	1890						**160**	-
Breakdown Voltage	kV	IEC 60156	76.2						**30**	-
Flash Point PMCC	°C	ASTM D 93	145						**135**	-
Resistivvity @90°C	G.Ω.m	IEC 60247	-						**0.2**	-
DDF @90°C	-	IEC 60247	-						-	**0.5**
Sediment Content	%w/w	AS 1883	< 0.01						-	**0.02**
Sludge Content	%w/w	AS 1883	< 0.01						-	**0.02**
Spesific Gravity (SG) (	-	ASTM D 1298	0.88						-	**0.91**

FURAN ANALYSIS OF TRANSFORMER OILS

Parameter	**Unit**	**Methode**	**1st**	**2nd**	**3rd**	**4th**	**5th**	**6th**	**Min Limit**	**Max Limit**
5H2F	ppb	IEC 61198	-						-	-
2FOL	ppb	IEC 61198	-						-	-
2FAL	ppb	IEC 61198	-						-	-
2ACF	ppb	IEC 61198	-						-	-
5M2F	ppb	IEC 61198	-						-	-
Total Furan	ppb	IEC 61198	-						-	**250**

5H2F (5-hydroxymethyl-2-furaldehyde) Caused by oxidation (aging and heating) of the paper
2FOL (2-furfurol) caused by high moisture in the paper
2FAL (2-furaldehyde) caused by overheating
2ACF (2-acetylfuran) caused by lightning (rarely found in DGA)
5M2F (5-methyl-2-furaldehyde) caused by local severe overheating (hotspot)

Analysis Comments

Oil Quality Analysis: Kualitas Oli trafo masih memenuhi standard yang ditentukan di dalam IEC 60422.
Furan Analysis : -

Recommendation

Continue operation

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Location / Project	PT Petrokimia Gresik	**Lab. Number**	: 0112 / TR/2024

Transformer data

Unit ID	: TR 2281B Bottom	**Manufacture**	: AEG
Serial Number	: 307710-01	**Year (Age)**	: - (-)
Rating	: 25 MVA	**Oil Brand**	: -
Voltage	: 11.5 / 6 kV	**Sample Point**	: BMT
Oil Volume	: - Kg	**Oil Temperature °C**	: - C

CORROSIVE SULPHUR

Sampling Date			**28-Jan-24**						**Normal**	
Received Date			**29-Jan-24**							
Test Date			**30-Jan-24**						**IEEE C57.106**	
Test	**Unit**	**Method**	**1st**	**2nd**	**3rd**	**4th**	**5th**	**6th**	**Min Limit**	**Max Limit**
Corrosive Suplhur	-	ASTM D 1275-B	Non Corrosive						-	Corrosive
			3a						-	4a

INHIBITOR CONTENT

Test	**Unit**	**Methode**	**1st**	**2nd**	**3rd**	**4th**	**5th**	**6th**	**Min Limit**	**Max Limit**
Inhibitor Content	%	IEC 60666	-						**0.1**	**0.4**

METAL IN OIL

Test	**Unit**	**Methode**	**1st**	**2nd**	**3rd**	**4th**	**5th**	**6th**	**Min Limit**	**Max Limit**
Fe	ppm	ASTM D5185	-						-	**150**
Cu	ppm	ASTM D5185	-						-	**70**
Al	ppm	ASTM D5185	-						-	**25**

Analysis Comments

Corrosive Sulphur : Minyak tidak bersifat korosif.
Inhibitor Content : -.
Metal in Oil : -

Recommendation

Continue operation