

Test Report

REPORT No.: SHE23-82642R1

CUSTOMER: Jinan Hengyu
Environmental Protection
Technology Co., Ltd

SAMPLE (S): Flue Gas(3)

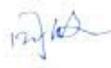
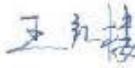
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DATE REPORTED: 2024/01/18

PROJECT: -

REMARKS

- 1.The results apply to the sample(s) as sampled.
- 2.The report is translated from SHE23-82642R0.

Edited by: Reviewed by: Approved by: 

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符号表/Legend

"-" 未测试该参数或不适用/The parameter is not tested or not applicable

↑ 提高检出限/Detection limit raised

↓ 降低检出限/Detection limit lowered

ND 未检出/Not Detected



List of test method

| Sample No. | Martrix | Parameter | Method |
|---------------------|----------|-------------------------|--|
| SHE23-82642-001~003 | Flue Gas | The Flue Gas Parameters | GB/T 16157-1996 《Determination of particulates and sampling methods of gaseous pollutants emitted from exhaust gas of stationary source》 and modification list HJ/T 397-2007 《Technical specifications for emission monitoring of stationary source》 |
| SHE23-82642-001~003 | Flue Gas | Dioxins | HJ 77.2-2008 《Ambient air and waste gas Determination of polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs) isotope dilution HRGC-HRMS》 |

List of test equipment

| No. | Equipment | Equipment Number | Factory Number | Equipment Model |
|-----|------------------------|------------------|------------------|------------------|
| 1 | Flue Gas Sampling Pump | ENV1520-4 | 3720A90021533 | ZR-3720 |
| 2 | HRGC/HRMS | P882 | AutoSpec Premier | AutoSpec Premier |



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Sampling procedure for dioxins(Flue Gas)

| Item | Step | Content |
|------|-----------------------------------|---|
| 1 | Prepare equipment | Prepare equipment, filters and sorbent resin. |
| 2 | Pre-sampling | Select the sampling site and the minimum number of sampling points according to GB/T 16157 Determine the stack pressure, temperature, the range of velocity heads and moisture content Select a nozzle sized based on the range of velocity heads Select a suitable probe liner |
| 3 | Sampling Train preparation | Clean and set up the train |
| 4 | Sampling and leak Check Procedure | Spike Pretest Leak-Check Add the sampling Isotope standard During the sampling run, maintain an isokinetic sampling rate and a temperature around the probe and the filter of 105~125℃ |
| 5 | Sample Recovery | Seal the nozzle end of the sampling probe with Teflon tape or aluminum foil Carefully remove the filter from the filter holder and transfer to the container any particulate matter and filter fibers which adhere to the filter holder gasket, seal the container Remove the adsorbent module from the train, tightly cap both ends, label it, and cover with aluminum foil Quantitatively recover material deposited in the nozzle, probe transfer lines, and the front half of the filter holder, by brushing while rinsing 3 times with acetone-toluene-acetone then collect all the rinses in container Note the color of the indicating silica gel and make a notation of its condition |
| 6 | Analysis | Sending to SGS SH Lab for analysis. |



Test procedure for dioxins(Flue Gas)

| Item | Step | Content |
|------|--------------------|--|
| 1 | Take sample | Add the extraction Isotope standard |
| 2 | Extraction | Dry XAD-2 resin Filter the lotion, dry the filter Acidate, clean and dry the filter |
| | | Combine the lotion and condensate, then extract it by liquid-liquid extraction mode Extract filter, XAD-2 resin and QFF by soxhlet extraction Combine all extractant, then convert the solvent |
| 3 | Cleanup | Add the cleanup Isotope standard |
| | | Clean up with sulfuric acid Clean up with composite adsorption column |
| | | Collect purified sample |
| 4 | HRGC-HRMS analysis | Concentrate sample Add the injection Isotope standard |
| | | Analysis by HRGC-HRMS |
| 5 | Report | Mass spectrogram analysis |
| | | Data analysis Issue report |



| DIOXIN ANALYSIS(Flue Gas) | | | | |
|---------------------------|-------------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| Sample No. | | SHE23-82642-001 | SHE23-82642-002 | SHE23-82642-003 |
| Sampling Date | | 2023/12/07 | 2023/12/07 | 2023/12/07 |
| Sampling Time | | 10:01-12:02 | 12:40-14:40 | 14:58-16:59 |
| Weather | | Sunny | Sunny | Sunny |
| Address | | | | |
| Sampling Point | | After purification Exhaust funnel | After purification Exhaust funnel | After purification Exhaust funnel |
| Test Date | | 2023/12/14-2023/12/22 | 2023/12/14-2023/12/22 | 2023/12/14-2023/12/22 |
| ITEM | UNIT | Flue Gas | Flue Gas | Flue Gas |
| Actual Pressure | kPa | 98.7 | 98.4 | 98.4 |
| Gas meter Temp. | ℃ | 66.7 | 67.2 | 67.6 |
| Stack gas velocity | m/s | 29.8 | 29.4 | 29.5 |
| Moist Actual Flow Rate | ×10 ³ m ³ /h | 19.4 | 19.1 | 19.2 |
| Dry Standard Flow Rate | ×10 ³ Nm ³ /h | 13.3 | 13.1 | 13.1 |
| Humidity | % | 12.8 | 12.6 | 12.7 |
| Oxygen | % | 18.3 | 18.1 | 18.4 |
| Sec.ar. | m ² | 0.181 | 0.181 | 0.181 |
| Exhaust Height | m | 35 | 35 | 35 |
| Dry Std cond. volume | m ³ | 2.3 | 2.3 | 2.3 |
| Dioxin | I-TEQ ng | 0.0047 | 0.0060 | 0.012 |
| Dioxin (Actual conc.) | I-TEQ ng/m ³ | 0.0020 | 0.0026 | 0.0052 |



DIOXIN ANALYSIS(Flue Gas)

| Sample No. | SHE23-82642-001 | | | | SHE23-82642-002 | | | |
|--------------------------|-----------------------------------|--------------------|---------------------|--------------------------|-----------------------------------|--------------------|---------------------|--------------------------|
| Sampling Date | 2023/12/07 | | | | 2023/12/07 | | | |
| Sampling Time | 10:01-12:02 | | | | 12:40-14:40 | | | |
| Sampling point | After purification Exhaust funnel | | | | After purification Exhaust funnel | | | |
| Test Date | 2023/12/14-2023/12/22 | | | | 2023/12/14-2023/12/22 | | | |
| ITEM | MDL (ng) | Concentration (ng) | I-TEF ¹⁾ | I-TEQ ²⁾ (ng) | MDL (ng) | Concentration (ng) | I-TEF ¹⁾ | I-TEQ ²⁾ (ng) |
| PCDDs & PCDFs | | | | | | | | |
| 2,3,7,8-TCDF | 0.0005 | 0.0024 | 0.1 | 0.00024 | 0.0004 | 0.0036 | 0.1 | 0.00036 |
| 1,2,3,7,8-PeCDF | 0.0005 | 0.0019 | 0.05 | 0.000095 | 0.0004 | 0.0028 | 0.05 | 0.00014 |
| 2,3,4,7,8-PeCDF | 0.0005 | 0.0052 | 0.5 | 0.0026 | 0.0005 | 0.0041 | 0.5 | 0.0020 |
| 1,2,3,4,7,8-HxCDF | 0.0004 | 0.0031 | 0.1 | 0.00031 | 0.0002 | 0.0027 | 0.1 | 0.00027 |
| 1,2,3,6,7,8-HxCDF | 0.0004 | 0.0028 | 0.1 | 0.00028 | 0.0002 | 0.0022 | 0.1 | 0.00022 |
| 2,3,4,6,7,8-HxCDF | 0.0004 | 0.0043 | 0.1 | 0.00043 | 0.0002 | 0.0025 | 0.1 | 0.00025 |
| 1,2,3,7,8,9-HxCDF | 0.0006 | < 0.0006 | 0.1 | 0.00003 | 0.0002 | 0.0008 | 0.1 | 0.00008 |
| 1,2,3,4,6,7,8-HpCDF | 0.0002 | 0.0066 | 0.01 | 0.000066 | 0.00009 | 0.0044 | 0.01 | 0.000044 |
| 1,2,3,4,7,8,9-HpCDF | 0.0002 | 0.0016 | 0.01 | 0.000016 | 0.0001 | 0.0011 | 0.01 | 0.000011 |
| OCDF | 0.0005 | 0.011 | 0.001 | 0.000011 | 0.0002 | 0.018 | 0.001 | 0.000018 |
| 2,3,7,8-TCDD | 0.0005 | < 0.0005 | 1 | 0.0002 | 0.0004 | 0.0021 | 1 | 0.0021 |
| 1,2,3,7,8-PeCDD | 0.0005 | < 0.0005 | 0.5 | 0.0001 | 0.0004 | 0.0008 | 0.5 | 0.0004 |
| 1,2,3,4,7,8-HxCDD | 0.0003 | < 0.0003 | 0.1 | 0.00002 | 0.0005 | < 0.0005 | 0.1 | 0.00002 |
| 1,2,3,6,7,8-HxCDD | 0.0003 | 0.0013 | 0.1 | 0.00013 | 0.0005 | < 0.0005 | 0.1 | 0.00002 |
| 1,2,3,7,8,9-HxCDD | 0.0003 | 0.0013 | 0.1 | 0.00013 | 0.0005 | < 0.0005 | 0.1 | 0.00002 |
| 1,2,3,4,6,7,8-HpCDD | 0.001 | 0.005 | 0.01 | 0.00005 | 0.0005 | 0.0025 | 0.01 | 0.000025 |
| OCDD | 0.0005 | 0.014 | 0.001 | 0.000014 | 0.0002 | 0.012 | 0.001 | 0.000012 |
| Total | | | | 0.0047 | | | | 0.0060 |

Remark

1):I-TEF: Toxic Equivalency Factor

2):I-TEQ: the product of measured value and I-TEF of the compound

Toxic Equivalency Concentration I-TEQ:In case the measured value is lower than DL(the limit of detection), 1/2 DL value should be used to calculate I-TEQ.



| DIOXIN ANALYSIS(Flue Gas) | | | | |
|---------------------------|-----------------------------------|--------------------|---------------------|--------------------------|
| Sample No. | SHE23-82642-003 | | | |
| Sampling Date | 2023/12/07 | | | |
| Sampling Time | 14:58-16:59 | | | |
| Sampling point | After purification Exhaust funnel | | | |
| Test Date | 2023/12/14-2023/12/22 | | | |
| ITEM | MDL (ng) | Concentration (ng) | I-TEF ¹⁾ | I-TEQ ²⁾ (ng) |
| PCDDs & PCDFs | | | | |
| 2,3,7,8-TCDF | 0.0003 | 0.0065 | 0.1 | 0.00065 |
| 1,2,3,7,8-PeCDF | 0.0004 | 0.0077 | 0.05 | 0.00038 |
| 2,3,4,7,8-PeCDF | 0.0004 | 0.011 | 0.5 | 0.0055 |
| 1,2,3,4,7,8-HxCDF | 0.0002 | 0.0073 | 0.1 | 0.00073 |
| 1,2,3,6,7,8-HxCDF | 0.0002 | 0.0065 | 0.1 | 0.00065 |
| 2,3,4,6,7,8-HxCDF | 0.0002 | 0.0070 | 0.1 | 0.00070 |
| 1,2,3,7,8,9-HxCDF | 0.0003 | 0.0007 | 0.1 | 0.00007 |
| 1,2,3,4,6,7,8-HpCDF | 0.0001 | 0.0085 | 0.01 | 0.000085 |
| 1,2,3,4,7,8,9-HpCDF | 0.0002 | 0.0013 | 0.01 | 0.000013 |
| OCDF | 0.0002 | 0.0057 | 0.001 | 0.0000057 |
| 2,3,7,8-TCDD | 0.0005 | 0.0015 | 1 | 0.0015 |
| 1,2,3,7,8-PeCDD | 0.0004 | 0.0021 | 0.5 | 0.0010 |
| 1,2,3,4,7,8-HxCDD | 0.0003 | < 0.0003 | 0.1 | 0.00002 |
| 1,2,3,6,7,8-HxCDD | 0.0003 | 0.0018 | 0.1 | 0.00018 |
| 1,2,3,7,8,9-HxCDD | 0.0003 | 0.0011 | 0.1 | 0.00011 |
| 1,2,3,4,6,7,8-HpCDD | 0.0004 | 0.0032 | 0.01 | 0.000032 |
| OCDD | 0.0002 | 0.012 | 0.001 | 0.000012 |
| Total | | | | 0.012 |

Remark

1):I-TEF: Toxic Equivalency Factor

2):I-TEQ: the product of measured value and I-TEF of the compound

Toxic Equivalency Concentration I-TEQ:In case the measured value is lower than DL(the limit of detection), 1/2 DL value should be used to calculate I-TEQ.



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| DIOXIN ANALYSIS(Flue Gas) | | | | |
|-------------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|--|
| Sample No. | SHE23-82642-001 | SHE23-82642-002 | SHE23-82642-003 | Requirement of recovery control(%) ³⁾ |
| Sampling Date | 2023/12/07 | 2023/12/07 | 2023/12/07 | |
| Sampling Time | 10:01-12:02 | 12:40-14:40 | 14:58-16:59 | |
| Sampling point | After purification Exhaust funnel | After purification Exhaust funnel | After purification Exhaust funnel | |
| Test Date | 2023/12/14-2023/12/22 | 2023/12/14-2023/12/22 | 2023/12/14-2023/12/22 | |
| ITEM | Flue Gas | Flue Gas | Flue Gas | |
| Sampling Standards Rec(%) | | | | |
| ³⁷ Cl-2,3,7,8-TCDD | 104 | 104 | 101 | 70~130 |
| ¹³ C-2,3,4,7,8-PeCDF | 127 | 129 | 119 | 70~130 |
| ¹³ C-1,2,3,4,7,8-HxCDF | 125 | 125 | 121 | 70~130 |
| ¹³ C-1,2,3,4,7,8,9-HpCDF | 123 | 122 | 122 | 70~130 |
| ¹³ C-1,2,3,4,7,8-HxCDD | 109 | 110 | 105 | 70~130 |
| Extraction Standards Rec(%) | | | | |
| ¹³ C-2,3,7,8-TCDF | 37 | 59 | 59 | 24~169 |
| ¹³ C-1,2,3,7,8-PeCDF | 43 | 60 | 57 | 24~185 |
| ¹³ C-1,2,3,6,7,8-HxCDF | 40 | 46 | 44 | 28~130 |
| ¹³ C-1,2,3,4,6,7,8-HpCDF | 43 | 55 | 53 | 28~143 |
| ¹³ C-2,3,7,8-TCDD | 45 | 66 | 61 | 25~164 |
| ¹³ C-1,2,3,7,8-PeCDD | 50 | 72 | 65 | 25~181 |
| ¹³ C-1,2,3,6,7,8-HxCDD | 50 | 61 | 56 | 28~130 |
| ¹³ C-1,2,3,4,6,7,8-HpCDD | 47 | 65 | 63 | 23~140 |
| ¹³ C-OCDD | 37 | 62 | 65 | 17~157 |
| Purify Standards Rec(%) | | | | |
| ¹³ C-1,2,3,7,8,9-HxCDF | 65 | 82 | 70 | 28~130 |

Remark

3):The recovery is required as HJ77.2-2008.

4):Operating load(100%)、Exhaust Height & Sectional area was provided by the customer.

5):Sampling specification:GB/T 16157-1996 《Determination of particulates and sampling methods of gaseous pollutants emitted from exhaust gas of stationary source》 and modification list

End of Report

