Service Note

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ChroZen GC & YL6500 GC (S.N number: SNGC-202107-03)

The new capillary FID jet for ChroZen GC & YL6500 GC

Update date: July.28th, 2021

We recently figured out that the retention time and peak area results among batch product of ChroZen GC FIDs are out of acceptable reproducibility results due to the irregular orifice size of capillary jet. New type of capillary jet from RESTEK, USA is installed in new manufactured GC FID and applied to the given serial number as below for the improvement of reproducibility result. Old jet will be obsolete after we spend all old jets in our stock, therefore, replace the old jet with the new jet for future service case.

- ChroZen GC: S/N G67000114 ~
- YL6500 GC: S/N G65001580A~

Figure 1. Capillary Jet for FID Detector (Old & New)

I. Major Changes of the new FID Jet

	Old FID Jet (Will be discontinued soon)	New FID Jet
Manufacturer	YCM, South Korea	RESTEK, USA
Part No.	1001132240	1001132241
List price	USD 80.00	USD 120.00
Orifice size	0.2-0.25 mm	0.29 mm
Applicable	Capillary FID jet for both YL6500 GC and ChroZen GC	

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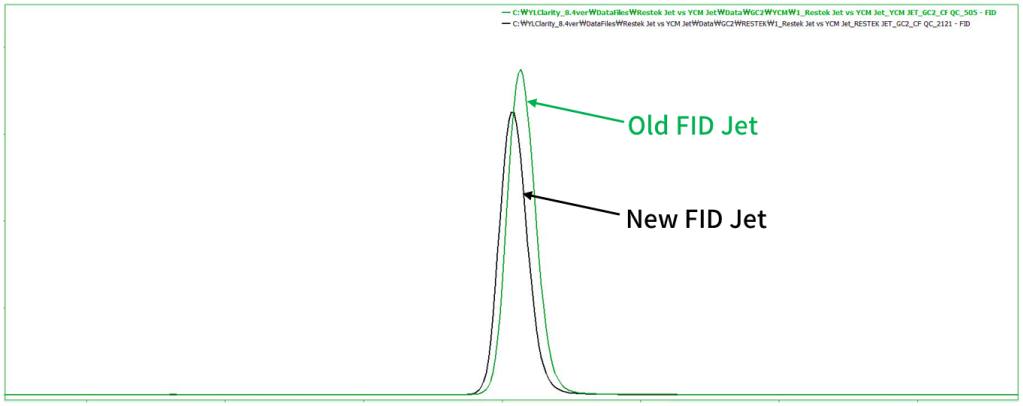
II. Test Results

1. Sensitivity & Minimum Detection Limit (MDL) Test of both FID Jet under the Same GC Conditions

- Under the same GC conditions, sensitivity result with new jet is slightly lower than the old jet. Even though new jet results lower sensitivity (see Figure 2), we`d like to suggest using the new jet to solve the reproducibility problem among GCs.



Capillary Jet	Area	Height	Noise	MDL	S/N
Old	111.82	75.917	0.026	1.72	2953.969
New	94.709	65.043	0.025	1.98	2591.355

Figure 2. Peak comparison of the old & new FID jet

- We expect that jet clogged problem is significantly reduced since the orifice size of the new jet is larger than that of old jet.

Table 1. GC parameters for comparing two FID jets

	Old FID Jet	New FID Jet
Carrier gas	N_2	N_2
GC Column	HP-5 (30 m, 0.32 mm, 0.25 μm)	HP-5 (30 m, 0.32 mm, 0.25 μm)
Column flow	3 mL/min	3 mL/min
Split ratio	1:20	1:20
FID Air flow	300 mL/min	300 mL/min
FID H_2 flow	30 mL/min	30 mL/min
FID Mkup flow	20 mL/min (Mkup gas : N_2)	20 mL/min (Mkup gas : N_2)

- To increase the sensitivity when using the new jet, we changed several GC conditions and tested them.

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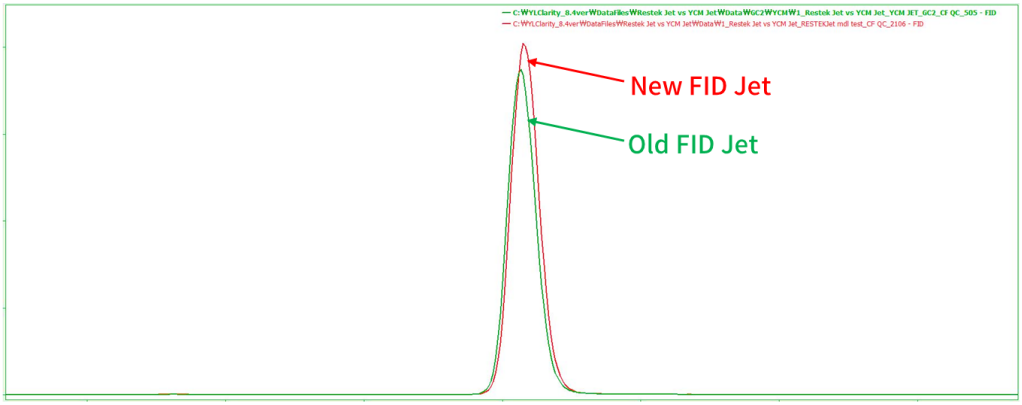
2. Sensitivity & MDL Test of both FID Jet After Changing GC Conditions

- To solve low sensitivity problem with new jet, we increased set value of FID Air flow rate from 300 mL/min to 400 mL/min, and H_2 flow rate from 30 mL/min to 40 mL/min.
- As shown in Figure 3, the new FID jet's S/N ratio and MDL became similar to old FID jet's S/N ratio and MDL, furthermore peak area and height were higher (The flow rate of Air and H_2 is optimized to obtain the largest S/N value.).



Capillary Jet	Area	Height	Noise	MDL	S/N
Old	111.82	75.917	0.026	1.72	2953.969
New	118.496	80.809	0.0276	1.74	2927.862

Figure 3. Peak comparison of the old & new FID jet after changing the Air & H_2 flow rate

- If higher sensitivity is required regardless of noise level issue, you can change the Air and H_2 flow rates to increase the sensitivity.

Table 2. GC parameters for increasing sensitivity

	Old FID Jet	New FID Jet
Carrier gas	N_2	N_2
GC Column	HP-5 (30 m, 0.32 mm, 0.25 μm)	HP-5 (30 m, 0.32 mm, 0.25 μm)
Column flow	3 mL/min	3 mL/min
Split ratio	1:20	1:20
FID Air flow	300 mL/min	400 mL/min
FID H_2 flow	30 mL/min	40 mL/min
FID Mkup flow	20 mL/min (Mkup gas : N_2)	20 mL/min (Mkup gas : N_2)

- After testing peak area, height, noise, MDL, and S/N, we checked the baseline signal from FID detector to compare the effects of using the new jet and old jet.

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3. Baseline Test

- We analyzed Total Petroleum Hydrocarbon (TPH) standards to see how baseline signal is obtained when each jet is used. After collecting and comparing baseline data through ten consecutive runs with each jet, as shown in Figure 4, we found that the baseline drift level among ten results is significantly more similar than when using the old FID jet.

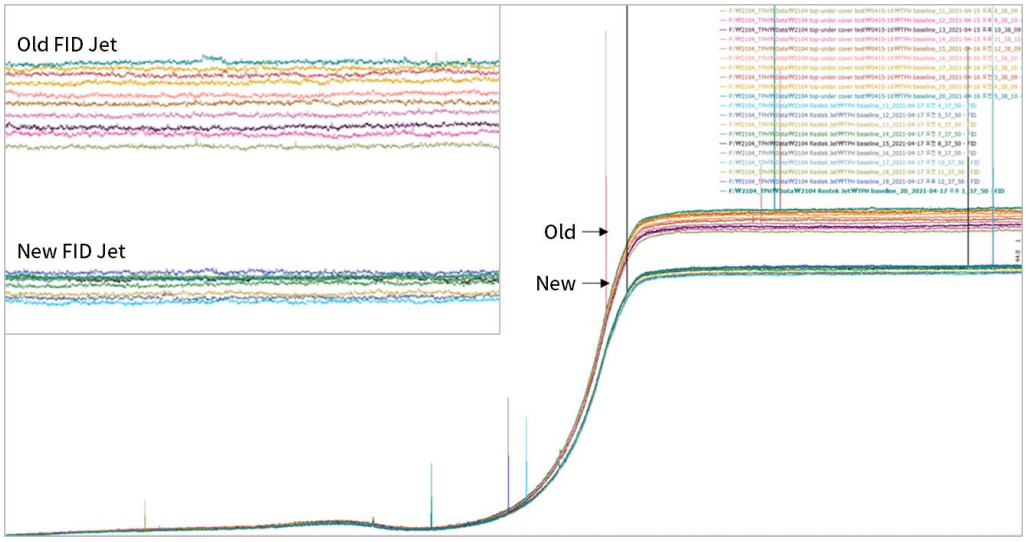

Figure 4. Baseline test using TPH standard

III. Conclusion

We found that retention time and peak area can vary in multiple GCs under the same condition due to the irregular orifice size. To solve this problem, we used a new FID jet with a larger orifice size and compared it with an old FID jet. As a result of using the new FID jet, the sensitivity is slightly reduced, but the problem of retention time and peak area varying among different GCs is much more improved as well as the jet clogged problem. And we also found that the baseline drift level among multiple runs are more similar than when we used the old FID jet.

Therefore, we will only apply the new FID jet to the new batch products of ChroZen GC and YL6500 GC from now, and the old jet will be used only for service purposes.

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Supplement 1. Part Number Information

(1) Old : Capillary FID jet for Service Purpose

Description	Capillary Jet (Will be discontinued soon)
Part Number	1001132240

(2) New : Capillary FID jet for ChroZen GC & YL6500 GC

Description	Capillary Jet
Part Number	1001132241

(3) Packed FID jet for ChroZen GC & YL6500 GC

Description	Packed Jet
Part Number	1001132260

** Do not confuse with the packed jet. The packed jet is independent of the contents of this Service Note and continues to use what was previously used.*

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