

How to Specify a Hydrocarbon Dew Point (HCDP) Analyzer

EXECUTIVE SUMMARY

When specifying a hydrocarbon dew point (HCDP) analyzer, several important parameters have to be specified. This note discusses these parameters and optimal values for them.

INTRODUCTION

Hydrocarbon dew point is an important quality parameter for natural gas production, transmission, storage and use. When specifying a hydrocarbon dew point analyzer, it is important to understand each specification parameter and design it to meet the specific conditions of use. There parameters are:

1. Method of detection
2. Mirror material
3. Maximum cooling range without the use of external or addition coolers
4. Maximum operating temperature
5. Maximum operating pressure
6. Communication protocols
7. Communication Software
8. Data logging capabilities
9. Power requirements
10. Hazardous Area Certification

1- Method of Detection

The only acceptable method of detection for hydrocarbon dew point is a chilled-mirror approach. GC-based calculations do not have the required accuracy to be of any utility. In the chilled-mirror method, a mirror is cooled and its surface is monitored for the onset of condensation (dew forming). The temperature of the mirror when condensation happens is the dew point.

Amongst the chilled-mirror methods, there are two different approached. The older technology is based on light scattering. Although different manufacturers have devised different names for this method, they are all based on the same concept: Shining a beam of light on a mirror and monitoring the reflections for intensity changes that (ideally) would indicate the onset of condensation.

The other method called CEIRS™, patented by ZEGAZ Instruments, offer many advantages (For a full discussion of CEIRS™ method, visit www.ZEGAZ.com). This method overcomes many of the issue of the light scattering method. It is still fundamentally a chilled-mirror method, but combined with spectroscopy, it offers a much more accurate, repeatable, and trouble-free measurement.

2- **Mirror material**

The mirror material is also important. Some instruments use a metallic mirror. Metallic mirrors are prone to degradation in the natural gas environment due to presence of acids and other corrosive substances. Other vendors, such as ZEGAZ Instruments, use inert ceramic material.

In case of ZEGAZ instruments analyzers, this mirror is made of a highly inert, polished optical material. It will not react with any acids or other chemicals found in natural gas and do not need to be replaced. It is very important that the specifications call for inert non-metallic mirrors to avoid to degradation of the mirror which leads to maintenance, drift, and stability problems.

3- **Maximum cooling range without the use of external or addition coolers**

This parameter specifies the robustness of the cooling system. It is the temperature difference that the cooling system of the analyzer can achieve compared to the ambient. This figure should not include the use of any external cooling such as Vortex coolers or cabinet cooling. In other words, this is temperature difference that the analyzer can achieve by itself.

There are some vendors that offer a 30 °C (54 °F). Some offer a 50 °C (90 °F). ZEGAZ Instruments offers a 60 °C (108 °F). In most cases, it can achieve closer to 70 °C (126 °F).

With a cooling range of 60 C (108 F), a ZEGAZ Instruments' analyzer can cool the mirror (and thus detect a dew point) at -20 °C (-4 °F), even when outside ambient temperature is +40 °C (104 °F)

This cooling range number is important, particularly for hot climates, or cases where the unit has to be place in high-temperature enclosures.

4- **Maximum operating temperature**

This parameter refers to the maximum ambient temperature under which the analyzer can work. This figure may become important in very hot climates or if the unit has to be placed in heated enclosures.

5- **Maximum operating pressure**

This parameter refers to the maximum gas pressure that the unit can be exposed to. This is very important from a safety perspective. Even if a user chooses to measure the HCDP at 27 bar (which is typical in some parts of the world), the unit should be able to handle the maximum pressure of the process lines, in case the regulator malfunctions or maximum process pressure is inadvertently introduced to the unit.

ZEGAZ Instruments products are certified for 2000 psi (137 bar) and are routinely tested at several factors higher.

6- **Communication protocols**

All online analyzers are typically required to have communication protocols to communicate with a central computer system. Typical communication protocols are:

- a- Analog outputs (4-20 mA).
The user should specify how many AOs are needed and if any redundancies are required. ZEGAZ Instrument analyzers offer 4 programmable 4-20mA outputs that offer some level of redundancy.

The user should also specify whether or not 4-20mA outputs should be internally or externally (loop) powered. ZEGAZ Instruments products are configurable to offer both internal and external powering of the analog outputs.
- b- Digital outputs (RS-232 and RS-485)
The user should specify whether RS-232 and/or RS-485 are required. ZEGAZ Instruments offers both, standard on all of its on-line analyzers.
- c- Ethernet
The user should specify whether Ethernet communications (or MODBUS over Ethernet) is required. ZEGAZ Instruments offers MODBUS over Ethernet, standard on all of its on-line analyzers.
- d- Alarms (Relays)
The user should specify alarm connections are needed. ZEGAZ Instruments products offer 3 programmable alarms.

7- User interface (UI) software

Most analyzers have some user interface software. The user should specify whether or not the units need custom UI software installed on a computer to communicate with the analyzer. With the concern about cyber security, most customers would prefer not to install custom UI software on their computers.

ZEGAZ Instruments has taken a novel approach to this problem. The user does not need any custom software. A normal browser (such as Chrome or Firefox) can be used to interface with the ZEGAZ Instruments analyzers. This eliminates the need for the user to install a software package on his/her computer.

8- Data logging capabilities

Is data logging needed? How long data should be logged on the unit? How should the logged-data be accessed?

ZEGAZ Instruments offers 16 Gb of data logging capability on its units. This corresponds to many years worth of data. This data can be accessed using the UI through the browser, or downloaded from an embedded USB flash drive.

9- Power requirements

The user should specify what type of power is needed AC or DC as well as specifying the voltage range. Furthermore average and maximum power requirements should be specified.

10- Hazardous Area Certification

Most HCDP analyzers are installed in hazardous areas. The certification requirements are different in different areas of the world. The user should check their local regulations and specify the appropriate requirements for HazLoc certification.

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