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Degradation of Glycol In TEG reboiler



ARIJIT SEN

Proposal Engineer at Process Group International

In one of the project in am working on TEG reboiler is using steam to as a heat source. Reboiler temperature is at 204 deg C . Steam is coming at 30 barg at saturated condition of 235 deg C. My concern is that is there is a chance of TEG degradation because as per DOW Chemical TEG specification onset of initial decomposition is at 240 deg Celsius. But as per practice we consider 210 as decomposition temperature.

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[kyoumars rahimi](#), [Jaganathan B](#) like this

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Wilfredo

Wilfredo Garcia

Process Specialist at Ecopetrol

Dear Arijt,

For this particular case, you have to consider that TEG degradation temperature is the one specified by the chemical supplier, maybe in your project you don't want the temperature to go beyond 210°C, in this case, you have to introduce temperature controllers at the reboiler to regulate the steam flow to reboiler, of course, TEG boiling temperature will depend at what pressure is the regenerator operating. In conclusion, you have to introduce a temperature controller set at the required boiling temperature and a trip for high temperature set at 210°C. For more information regarding this subject, please visit the GPSA section regarding gas dehydration.

Cheers,

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kyoumars

kyoumars rahimi

Deputy of Process Engineering Manager

Dear Sir

The TEG degradation is started at 210C and 205C is good temperature for TEG regeneration as per engineering practice it is better to operate TEG between 200 to 205C. So it is very important to know if aromatics components such as BTX is existed in wet gas polymerization of BTX will be occurred and this is main problem in TEG REBOILER. It is better to keep temperature profile not much more than 210 C on tube wall. It is better to put TIC on reboiler which is cascade to FIC on steam stream for temperature controlling. Additional TIC which is measured tube side prepared shut down signal at 215C. Please see GAS PROCESSING and CONDITIONING CAMPLE in this regards.

Regards

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ARIJIT

ARIJIT SEN

Proposal Engineer at Process Group International

@ Wilfredo, kyoumars Thanks for your reply.

My concern is not about reboiler temperature . System is having a TCV which will regulate steam

flow but what will happen to the glycol who are in direct touch of tube bundle and will there be an impact of skin temperature on the glycol coming in direct contact of reboiler bundle.

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Lutfhi

Lutfhi L

Offshore Operation Engineer at Pertamina Hulu Energi ONWJ Ltd

Arijit, to calculate how much the TEG temperature will rise in reboiler you will need help from steam table.

1. Calculate how much differential specific enthalpy based on steam inlet temperature and steam outlet temperature.
2. multiply differential specific enthalpy from point no.1 by mass flow rate of steam then the results will be Q
3. Now, using simple formula $Q = m \cdot c_p \cdot (\Delta T)$, you can get how much temperature of TEG will rise.

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Vasu

Vasu Vasudevan

Lead Process Engineer at Santos Ltd

Arijit

To ensure that there is no degradation of the TEG you also have to ensure that the heat flux is not very high. There are guidelines on the recommended heat flux for fired re boilers but in your case I guess you have a steam coil. I am sure GPSA provides guidelines on allowable heat flux for different scenario. I will check from my sources and see if I can find any specific numbers. Cheers

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Azhar

Azhar Ali

Process Professional at Aker Engineering Malaysia

If saturated steam at 30 barg gives 235 degC, then to prevent/lessen overheating or degradation of TEG at 210 degC, you can reduce steam pressure in the coil, say to 25 barg (226 degC). This will correspondingly reduce the TEG film temperature on the tube/coil.

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Suresh

Suresh Venkatesh

Senior Lead Engineer - Process

Arijit,

with regard to your 2nd posting..

skin temperature is primarily the (tube) metal surface temperature.

The steam temperature may be 235C, but that doesn't necessarily translate to higher glycol side metal surface temperature. Also remember that steam is introduced only after completion of the initial glycol fill. In other words, the glycol side metal surface temp raises from near ambient condition at start. The glycol bath is often heated gradually once the glycol circulation has been established.

The glycol (or cold) side metal surface temperature depends on a number of factors, mainly the following;

1. Heat transfer area
2. Rate of heat transfer.

The heat transfer area is usually selected based on the flux rates – as others have already mentioned. For steam reboiler, the flux rate should not exceed 7600 Btu/hr.ft² or 24 kW/m². For instance - if TEG reboiler duty is 240 kW, the heat transfer area should be >10 m².

Rate of heat transfer relates to glycol load & steam rate. A properly designed temp control valve on steam line usually takes care of the steam rate.

If heat transfer surface area provided is less &/or steam rate is high – this often leads to higher skin temp & consequent glycol degradation.

Hope this helps..

Suresh

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