



Transport and Storage of Propellants: Procedure 5

AVOIDING NON-CONDENSABLE GASES IN STOCK TANKS

General

Non-condensable gases (sometimes referred to as 'Non Absorbable Gases' or 'NAGS') are gases such as nitrogen and oxygen, which cannot be condensed into liquid form. They typically arise in propellant stock tanks as a result of the ingress of air to the installation. If present in a closed system, they can cause high pressures. In pharmaceutical inhalers they can affect the performance of the formulations.

Specification Limit

The specification limit for non-condensable gases in the vapour space above ZEPHEX® propellants is set at not greater than 1.5% v/v. All deliveries of ZEPHEX® propellants will be compliant with this specification, and it is this level which needs to be achieved within a stock tank installation.

Sources of Non Condensable Gases

The main sources of non condensable gases in a stock tank installation is lack of evacuation of the system either:

- at the initial installation stage or,
- after periodic internal inspections of the storage installation or,
- after maintenance activities carried out on ancillary equipment attached to the system.

Sampling for Non Condensable Gases

In order to determine the level of non-condensable gases within a stock tank installation it is essential to take a vapour sample only. The presence of liquid from the point where the system is to be sampled must be avoided, as this will give false results.

- Ideally the sample should be taken from the top of the storage tank. In some cases the sample point will need to be safely vented to remove the presence of liquid.
- The recommended frequency of sampling is after the first delivery and once every year thereafter.

Method of Analysis

The Method of Analysis for the determination of the level of non-condensable gases in the vapour phase above the liquified propellant is contained within the Analysis Methods section of the Customer Zone of www.zephex.com.

Removal of Non Condensable Gases

If it is found that non-condensable gases are present in the bulk storage tank these can be removed by controlled venting from the vapour side of the storage installation.

This recovery must be via a vapour recovery system and it is extremely important that there is a procedure in place to prevent backflow into the storage tank from this venting/recovery process.

Recommendations for the Avoidance of Non Condensable Gases

1. All new bulk storage installations must be evacuated immediately prior to the first filling.
2. After all invasive maintenance activities the respective part of the installation is evacuated before refilling with product. This is particularly important after periodic internal inspection of the storage tank.
3. Hoses used for offloading bulk delivery tanks should be left permanently attached to the installation with an isolation valve as close as practicable to the end of the hose nearest to the delivery vehicle.

Or, if the hoses are removed then self-seal couplings are used to retain product pressure on disconnection.

Or the hoses should be blanked off after disconnection and then after reconnection between the installation and the delivery vehicle. At the time of the next delivery they are either evacuated or purged with product to remove the air.

4. The required vacuum level for the evacuations carried out as above is less than 8 mbar absolute.

It is essential that precautions are taken to prevent backflow during the evacuation process to prevent either moist air, or oil from the vacuum pump, getting back into the installation.



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