RICH: VALIDATION OF NEW CH4 SUPPLIER
AND RADIATOR GAS CLEANING

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OUTLINE

> CH4 transparency measurement
> RICH radiator gas cleaning
CH4 TRANSPARENCY MEASUREMENT
PURPOSE OF THE MEASUREMENT

Purpose: compare the transparency to UV light of two “different” CH4 provided by two companies (PANGAS and ALPHAGAZ).

CERN changed CH4 provider, we need to validate the purity of the “new” gas (PANGAS)

> measurement of transparency with RICH monochromator
> non-explosive mixture (CH4 at 3%, N2 97%)

0.03 x 190 cm = 5.7 cm
~ dimension of PDs

The new, atex compliant, gas mixing system
The system is equipped with two filters (hydrosorb and oxysorb) that can be bypassed.
THE MEASUREMENT

PROCEDURE: Gas is mixed in ATEX mixing system and monochromator is filled with non explosive mixture (filtered).

Once several volumes are flushed (>6) Transparency is measured

Repeat with filters bypassed

LIST OF MEASUREMENTS in chronological order

> PANGAS filtered
> PANGAS non filtered
> ALPHAGAZ filtered
> ALPHAGAZ non filtered
THE MEASUREMENT

PANGAS CH4 transparency in UV region is higher than 97% in the considered wavelength range.

VALIDATED

LIST OF MEASUREMENTS
in chronological order

> PANGAS filtered
> PANGAS non filtered
> ALPHAGAZ filtered
> ALPHAGAZ non filtered
RICH RADIATOR GAS CLEANING
Purpose: filter $C_4F_{10}$ from impurities until it becomes transparent to UV (155nm - 220 nm)

Main contaminants are:
- Hydrocarbons > activated C
- $H_2O$ vapour > molecular sieve 3A
- $O_2$ > activated Cu

Transparency is measured with RICH monochromator (see appendix)
THE TASK

$C_4F_{10}$ delivered in a big bottle (630 kg, 930 l)

In order to clean it all:

1) spilling into smaller bottle (65 l)

2) cleaning through “cleaning setup”

Run 2021 need $\sim$350kg

Cleaning started in beginning of March
Step 1
Gas transfer

$C_4F_{10}$

Step 2
Closed loop gas filtering

In each filter set: 1 AC + 1 3A

3M

Active Copper

3A Molecular sieve

Active Carbon

Optional

LIQUIFIER

Set A

Set B

IN

OUT

65l
WE FACED MANY PROBLEMS...

> Few pipes were found broken in different parts of the system (pump bypass, filters) > repaired
> Pump membranes broke twice > replaced*

* At present no spares, expected to be delivered soon.
## SUMMARY TABLE

PROCEDURE (to reduce gas losses):
Cleaning through the same filter set (A) and change extra filters when needed.
Status after 2 months in table. Remarkable amount of work

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Efficiency is lowered by huge losses in few circumstances. Hopefully we will increase cleaning efficiency

Cleaning Efficiency = **72.89 %**
SUMMARY TABLE

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Cleaning Efficiency = 72.89%

Enough gas is ready for 2021 run!

STILL
124.14 kg to be processed
80.3 kg in 3M bottle
43.84 kg in big bottle

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