E907 Chamber Testing in Lab 6 Gas Setup
Risk Class Determination
Monday, August 20,2001
Bill Mayes and Rajendran Raja

Lab 6 Risk Class

We have moved the old E690 drift chambers into Lab 6, and we need to check to see that they are still operational. For that reason, we ask flammable gas approval of E907 Chamber Testing in Lab 6. The chambers will be flushed at approximately 1 SCFH, while the normal flow rate will be less than 0.1 SCFH.

Lab 6 already contains the BTeV flammable gas setup, which has one 81 SCF bottle of 50%/50% Argon-Ethane. The H_2 equivalent of the BTeV setup is

$Q_{BteV} = 40.5\ ft^3 * 0.028\ m^3/ft^3 * 1.26\ kg/m^3 * 0.36$ (H_2 equivalence factor for ethane)
$Q_{BteV} = 0.514$ kg

E907 plans on having one bottle of premixed 82% Argon, 15% isobutane, and 3% methylal (dimethoxymethane). See attached sheet for the ordering information when this gas was obtained. A full bottle of the premix contains 29 SCF of the gas at 115 psia. The H_2 equivalent of the isobutane is

$Q_{isobutane} = 29\ ft^3 * 15\% * 0.028\ m^3/ft^3 * 1.26\ kg/m^3 * 0.34$ (H_2 equivalence factor for isobutane)
$Q_{isobutane} = 0.052$ kg

The H_2 equivalent for methylal (dimethoxymethane). Based on information on the National Institute for Standards and Technology (NIST) web pages it is

$Q_{methylal} = 29\ ft^3 * 3\% * 0.028\ m^3/ft^3 * 1.26\ kg/m^3 * 0.032$ (H_2 equivalence factor for methylal from NIST data)
$Q_{methylal} = 0.001$ kg

Thus the total H_2 equivalent in Lab 6 becomes

$Q_{total} = 0.514\ kg + 0.052\ kg + 0.001\ kg$
$Q_{total} = 0.567$ kg

The volume of Lab 6 is approximately

$V_{Lab\ 6} = 145\ ft * 210\ ft * 15\ ft$
$V_{Lab\ 6} = 456{,}750\ ft^3$

Because of the large volume of Lab 6, the percentage of flammable gas in the air would be 0.01% if all of the gas for E907 and BTeV were simultaneously released. This is well below the flammable concentration for any of the flammable gases involved in Lab 6.

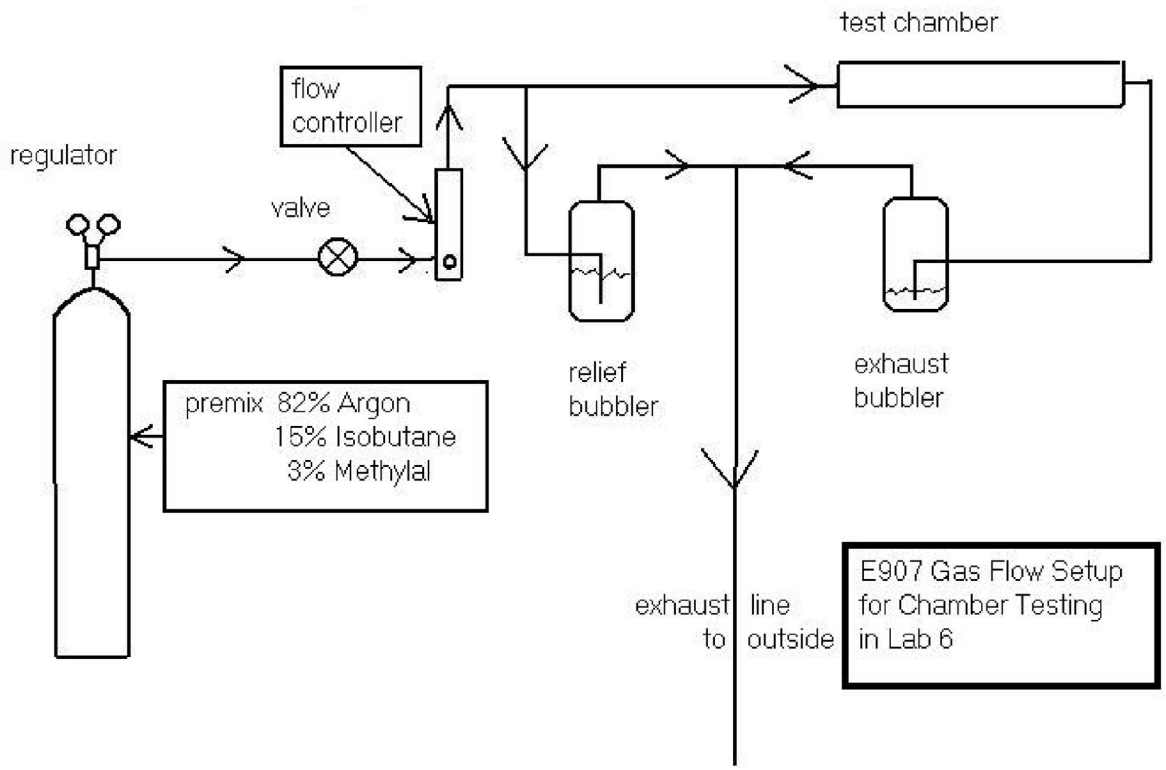
Using ES&H Manual 6020.3, the above calculated hydrogen equivalent inventory, and enclosure volume calculations, Lab 6 would still be a Risk Class zero Installation

E907 Chamber Testing in Lab 6 ES&H Information

The E907 chamber testing in Lab 6 is a flammable gas risk class zero installation. Even in a risk class zero installation, several conditions must be met in order to operate safely. The specific requirements are found in Chapter 6020.3 of the Fermilab ES&H manual. The following conditions are minimum requirements for the E907 chamber testing in Lab 6.

A. <u>Risk Class 0 Installations</u>

1. The area shall be posted "Danger-Flammable Gases, No Ignition Sources" using standard signs available from the Fermilab ES&H Section, Health and Safety Group. A list of responsible persons with their phone numbers shall also be posted.
2. Combustibles and ignition sources shall be minimized within three meters of gas handling equipment, piping or apparatus.
3. A pressure regulator appropriate for the gas and its environment shall be used.
4. An orifice, excess flow valve, or other fixed means of limiting the flow to no higher than ten times the operational flow-rate shall be installed.
5. The gas cylinder in use shall be secured with cylinder clamps. Only one gas cylinder will be allowed in Lab 6 at any given time. Cylinders when empty shall be capped and promptly removed.
6. Leaks from experimental devices such as drift chambers shall be measured and documented prior to initial installation (with nonflammable gas, if possible). Leakage above seven liters/hour from any one chamber shall be mitigated. Recheck for leaks after major repairs or modifications, and at least every twelve months. Leakage exceeding 20% of the lower explosive limit at a distance over two inches from an identified "point" leak shall be repaired.
7. Welding permits shall not be issued for areas within ten meters of the equipment containing flammable gas unless approved in advance by the responsible Division/Section head or designee.


test chamber
flow
controller
regulator
valve
relief
bubbler
exhaust
bubbler
premix 82% Argon
15% Isobutane
3% Methylal
exhaust line
to outside
E907 Gas Flow Setup
for Chamber Testing
in Lab 6

From: <B90095B%FNALVM.BITNET@pucc,PRINCETON.EDU>
To: <DCC@FNAL.GOV>
Sent, Tuesday, March 26, 1996 9:18 PM
Subject- BITNET mail follows

> PTIONS: NOACK LOG SHORT NONOTEBOOK ALL
> ATE- 26 Mar 1996 20:18:24 Ct)T
> ROM- FNAL::NERO (8S/INFORMATION SYSTEMS)
> UBJECT: COPY OF PURCHASE ORDER TO REQUESTOR

> BELOW IS A COPY OF THE CURRENT PO - V06170 THAT
> AS YOUR REQUISITION - 6376500 INCLUDED.

> THIS IS A COPY OF ACTIVE ORDER V06170

MS 122
> DAVID CHRISTIAN AP 50 653L V06170 PPF
CHRISTIAN
> PRE MIXED GAS 41 B/N
N05639 EX 4001
> 16262

PAGE I

V06170

> GREAT LAKES AIRGAS
> 1250 WEST WASHINGTON ST.
> WEST CHICAGO IL 60185

> VENDOR DOES NOT RECEIVE A COPY OF THE PURCHASE ORDER

> 03/26/96 SEE BELOW DESTINATION NET 10
VENDOR'S CHOICE
>
> 1 4 CYLINDER, SIZE FX, PRE-MIXED GAS
$218.00 $872.00
> 82% ARGON, 15% ISOBUTANE, 3% METHYLAL
> (& ASSAY REPORT), CGA 510 FITTING
> DELIVERY 4 DUE 04/12/96

> LOC *** DAVID CHRISTIAN AP 50
>
> NOTE: TERMS & CONDITIONS OF SUBCONTRACT
>
> ALL FERMILAB-FURNISHED MATERIALS TO BE
> RETURNED WITH THE COMPLETED ORDER AND
> NOTED **ON** THE PACKING LIST FOR CHECK-IN
> BY RECEIVING. PAYMENT WILL NOT BE MADE
> UNTIL ALL PHOTOS (&DISKS) ARE RECEIVED.
> #D32350 APPLY TO THIS ORDER.
>
> ALL FERMILAB-FURNISHED MATERIALS TO BE
> RETURNED WITH THE COMPLETED ORDER AND
> NOTED **ON** THE PACKING LIST FOR CHECK-IN
> BY RECEIVING. PAYMENT WILL NOT BE MADE
> UNTIL ALL PHOTOS (&DISKS) ARE RECEIVED.
>
> CONFIRMED TO STEVE/03-25-96
> DIR/JAS REQ **NO.** 63765
$872.00

LAST PAGE OF I

> D.
ROGUS