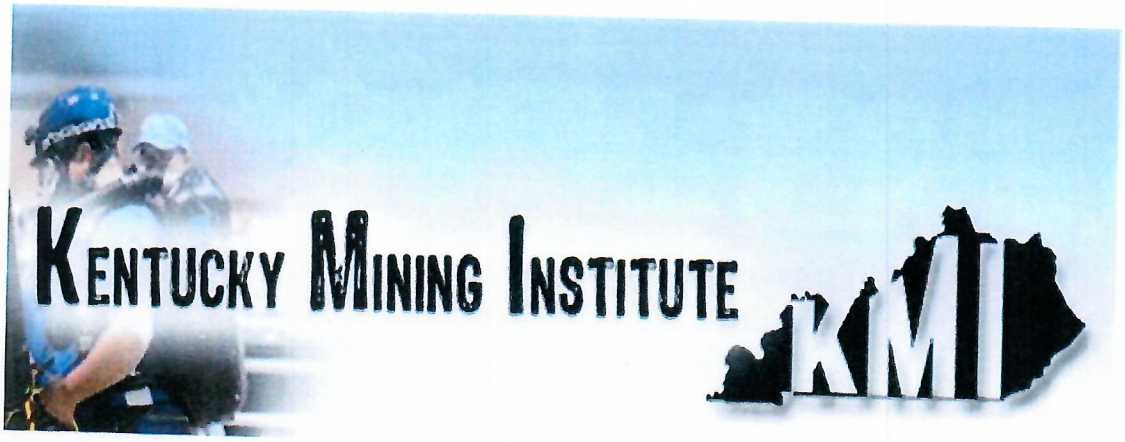
2023 KMI CONTEST



TEAM TECH CONTEST

AUGUST 17, 2023

LEXINGTON KENTUCKY

TEAM KENTUCKY

ENERGY AND ENVIRONMENT CABINET

Contestant Directions:

You have 2 instruments in front of you. The aspirated monitor has been calibrated in the last 30 days, and we do not know what is wrong with the diffusion monitor. Talk through your steps with the judges and identify any bugs to get both instruments ready for use. For the unknown gas, apply the gas mixture to your personal instrument. When you are content with your readings, read them out to the judge to be recorded on the scorecard.

Judge notes below

Instrument is Ready for Use if:

- **Monitor has been bump tested**
  - The contestant may apply gas to the instrument and observe the sensors readying gas and alarms activating
- **Peaks are cleared**
  - If you are unsure if the contestant cleared the peaks, navigate to the peaks option under the sensor tab. Screen must show 0s for toxic gases and LEL and ≈20.9% Oxygen.
    - To find the peaks screen: Press the middle power button twice -> Press the right button once to sensor -> Press the middle button-> Press the down button to peaks

Aspirated Monitor Bugs

- Clogged Filter
  - Contestant must request a replacement filter to put in the monitor

Diffusion Monitor Bugs

- NO2 calibration gas value set to 10 ppm
  - *NO2 calibration gas should match the bottle at 5 ppm*
- Oxygen alarm values are flipped showing low alarm at 23.5% and high alarm at 19.5%
  - *Oxygen alarm values should be low alarm of 19.5% and high alarm at 23.5%*
- Audible and Vibration alarms are turned off
  - *Contestant must turn both alarms on*
- Calibration Cup is broken
  - *Contestant must ask for a new calibration cup to calibrate properly*
- Diffusion panel will block the NO2 gas readings
  - *Contestant must ask for and replace diffusion panel*

How to score

- All Alarm set points must be correct and match scorecard
  - 5-point discount for each that is incorrect
- Functional (bump) test not performed
  - Both instruments must be bump tested
  - 20-point discount for each instrument not bump tested
- Multi Gas instruments "not ready for use"
  - 5-point discount for each instrument not ready
- Deficiency (bug) not corrected
  - 5-point discount for each bug not found
- Each instance of incorrect procedure or equipment use during calibration of instrument
  - 20-point discount for each incorrect procedure
    - If an instrument is taken apart, it must be calibrated and bump tested after
- Unknown gas mixture not identified:
  - Contestant uses their own personal monitor to test the calibration gas. When they are content with their gas readings on screen, have them read them out and verify the readings. If they are a greater variance than outlined on scorecard, points are discounted at 15 each

Worksheet for calculating air readings
Will be provided to contestant(s) and is to be completed and returned to judge(s)

Smoke Tube Reading

Pull 10 foot out on the tape measure in the entry and observe the time it takes for a puff of smoke to travel the length of the 10 foot tape measure in each of four quadrants;

1st quadrant_____seconds *Space for calculations*

2nd quadrant_____seconds

3rd quadrant_____seconds

4th quadrant_____seconds

Total ____/4 = _____ = average time

Distance in Feet (10)/Average time = ____/_____ = _____feet per second (FPS).

FPS x 60 (seconds/minute) =_____FPM

Entry width____x Entry height _____= _____area in square feet

Area_____ x Velocity _____FPM = _____ CFM

Anemometer Reading

Entry width_____x Entry height _____= _____area in square feet

FPM reading _____+ or – correction factor -30 = 1109 corrected FPM

Area _____x (corrected) FPM velocity _____= _____CFM

Space for calculations

Magnehelic gauge

Record dial reading _____ Positive_____ Negative_____

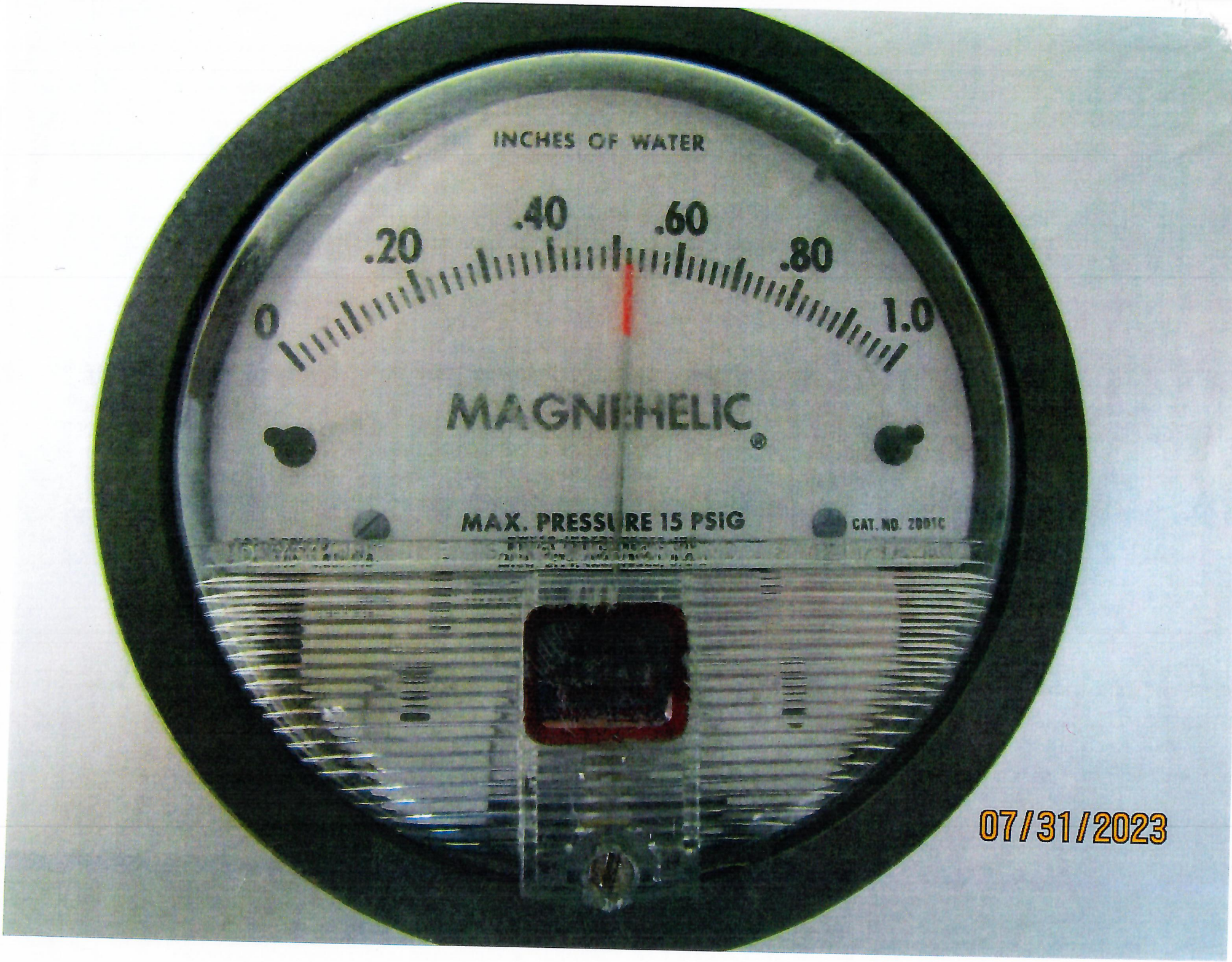
KMI Smoke Tube Variables - 2023

1st Quadrant	34 seconds
2nd Quadrant	29 seconds
3rd Quadrant	25 seconds
4th Quadrant	32 seconds

KMI Smoke Tube Area – 2023

Height = 13 feet

Width = 23 feet


INCHES OF WATER
0
.20
.40
.60
.80
1.0
MAGNEHELIC
MAX. PRESSURE 15 PSIG
CAT. NO. 2001C
07/31/2023

07/26/2023

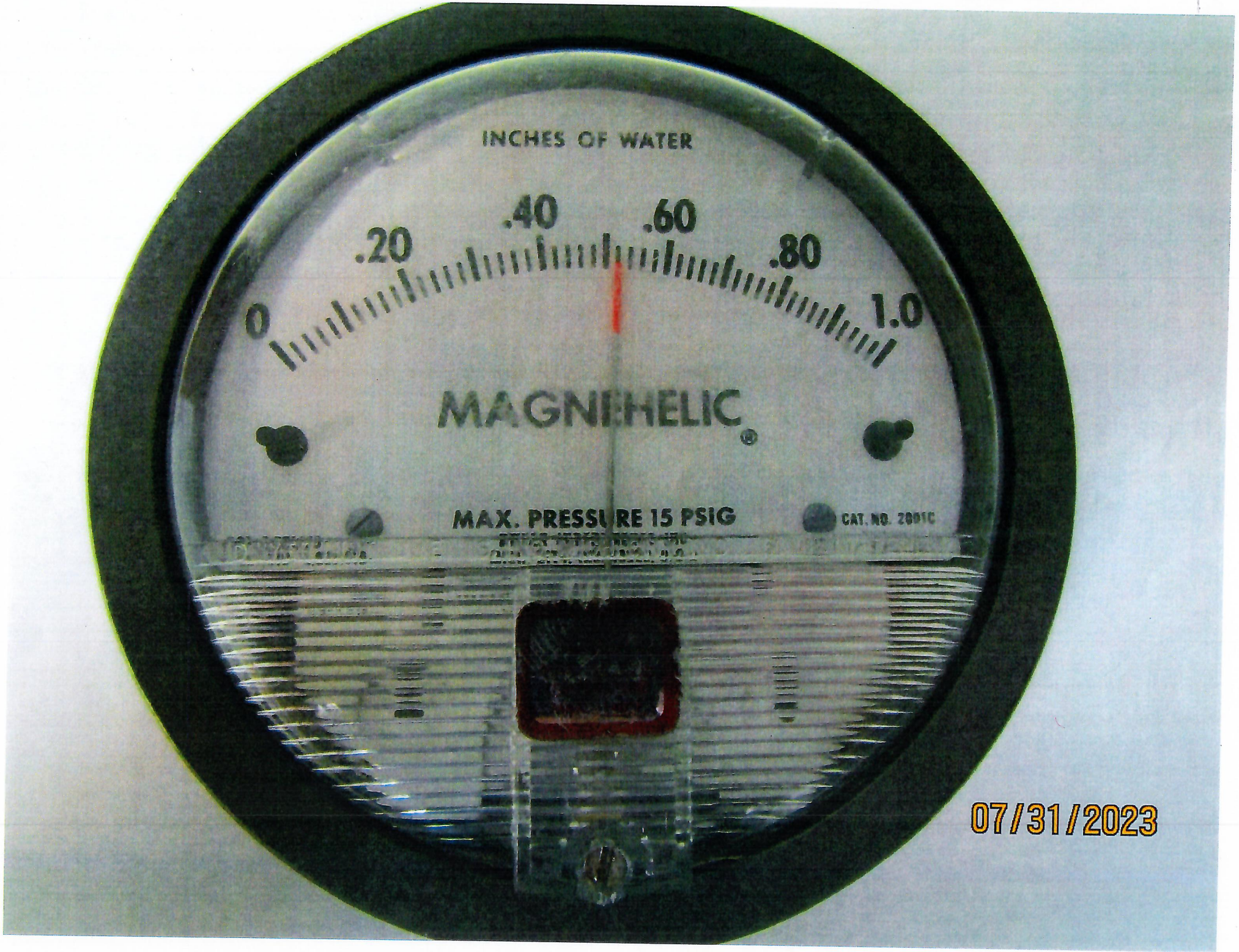
KMI Smoke Tube Variables - 2023

1st Quadrant	34 seconds
2nd Quadrant	29 seconds
3rd Quadrant	25 seconds
4th Quadrant	32 seconds

KMI Smoke Tube Area – 2023

Height = 13 feet

Width = 23 feet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0
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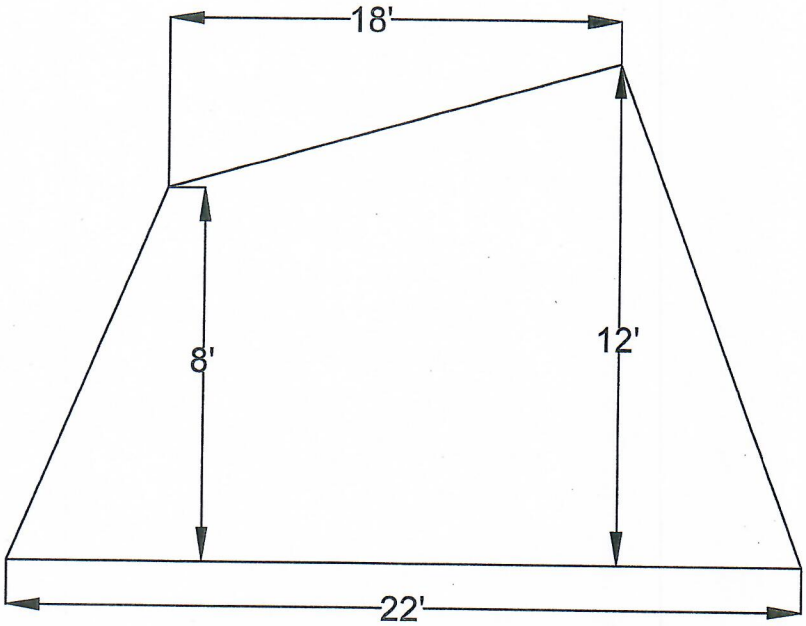
ANEMOMETER PARAMETERS



Air Measurement Station

Reading (fpm)	Correction	Reading (fpm)	Correction
50	+15	500	-5
75	+15	550	-8
100	+14	600	-10
125	+14	700	-15
150	+14	800	-20
175	+13	900	-25
200	+12	1000	-30
250	+11	1200	-35
300	+10	1400	-45
350	+5	1600	-50
400	0	1800	-60
450	-2	2000	-65

Correction chart to be used for contest

2023 KMI Contest
Team Tech
Air Measurement

ZZ-30

Gas Detector Problem

Sensor		Alarm Points Reqd.	Set	Comments	Discounts
O_2	Low	19.5	✓		
	High	23.5	✓		
CH_4	Low	1.0	✓		
	High	1.5	✓		
CO	Low	50	✓		
	High	100	✓		
NO_2	Low	3.0	✓		
	High	5.0	✓		
Toxic:					
____	Low	___	____	____	____
	High	___	____	____	____

Additional Discounts:

Functional (Bump) Test Not Performed, if required - 20 discounts, each infraction ____

Multi-gas Instrument(s) not "ready for use" 5 discounts (total) ____

Deficiency (bug) not corrected: 5 x ____ = ____

Comments: ____

Each instance of incorrect procedure or equipment use during calibration of instrument - 20 discounts, each infraction 20 x ____ = ____

Comments: ____

"Unknown" gas mixture concentration not identified:

O_2 Concentration - (± 0.5%) Bottle 18 % Team Found 18.4 %

CH_4 Concentration - (± 0.2%) Bottle 2.5 % Team Found 2.5 %

CO Concentration - (+ or - 10%) Bottle 100 ppm Team Found 104 ppm

NO_2 Concentration - (± 3ppm) Bottle 5 ppm Team Found 2.5 ppm

15 discounts, each gas: 15 x ____ = ____

Judge ____ **Gas Detector Discounts:** ____

Air Measurements

DISCOUNTS

D. Anemometer

1. Failure to provide anemometer, measuring tape and timing device . . . . . 1 ____
2. Failure to give a brief description of the anemometer (how to zero and turn on the anemometer) . . . . . 1 ____
3. Failure to take a proper measurement of the area to be tested . . . . . 1 ____
4. Failure to traverse the entry while taking a 1 minute reading in the area. . . . . 1 ____

DISCOUNTS

5. Failure to calculate correctly the air reading for the area in cfm (air reading must be calculated with pencil or pen and submitted to the Judge) . . . . . 1 ____

E. Smoke Tubes

1. Failure to provide smoke tubes with aspirator bulb, measuring tape and timing device . . . . . 1 ____
2. Failure to measure off a distance of 10 feet (per the rule) . . 1 ____
3. Failure of team members to verbally explain how smoke will be released and timed through each of the four quadrants. . . . . 1 ____
4. Failure to take measurement of area to be tested . . . . . 1 ____
5. Failure to apply smoke rule . . . . . 1 ____
6. Failure to calculate smoke air reading for the area in cfm (air reading must be calculated with pencil or pen and submitted to the judge) . . . . . 1 ____

F. Magnehelic

1. Failure to provide a Magnehelic and necessary port hoses and fittings . . . . . 1 ____
2. Failure to explain what the Magnehelic is used to measure. . . . . 1 ____
3. Failure to demonstrate how to zero the Magnehelic . . . . . 1 ____
4. Failure to connect the hoses to Magnehelic properly and simulate the reading . . . . . 1 ____
5. Failure to give and explain the proper reading of the Magnehelic to the judge (positive or negative pressure should be included in the explanation) . . . . . 1 ____

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Air Measurement Discount

____

Gas Detector Discount

General Rules

1. Failure to comply with other written adopted National Rules not covered in Discount Sheet, each infraction 2 x ____ = ____

Written Examination

1. For each incorrect answer 1 x ____ = ____

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Total Discounts