# Did YOU KNOW

**#2019-010**

**DATE LAST REVISED**
**30 AUG 2019**

Written By: Ryan Perry

**Question:** Can you accurately flow a different gas through a flow control device not calibrated for the same gas?

**QUITE OFTEN, WHEN IN THE FIELD, IT BECOMES NECESSARY TO USE ANOTHER GAS THROUGH A FLOW CONTROL DEVICE SUCH AS A FLOWMETER, FLOWMETER REGULATOR, OR FLOW GAUGE REGULATOR. WHILE THE FLOW CONTROL DEVICE MAY BE SAFE AND COMPATIBLE FOR THE OTHER GAS, THE ISSUE OFTEN BECOMES ONE OF ACCURACY.**

For example, while flowing helium or a helium blend through a flowmeter calibrated for argon is safe and chemically compatible, the user could experience a very expensive waste (up to 200%) of shielding gas, or could even adversely affect the quality of the weld. Additionally, there have been instances where heavy fines were levied on fabricators for not using the proper shielding gas flow rates required by specific weld procedures.

When using flow control devices not calibrated for the gas being used, the difference in flow can easily be compensated by using a correction factor (CF). Correction factors are calculated by comparing the densities* of different gases. There are many websites that list CF for common gases. See the table below for a list of the more common CFs and how they are determined.

| GAS FOR WHICH TUBE OR GAUGE IS CALIBRATED | CORRECTION FACTORS | GAS BEING USED | | | | | |
|---|---|---|---|---|---|---|---|
| **Gases** | **Specific Gravity (Density Realtive To Air)** | **HELIUM** | **NITROGEN** | **AIR** | **Oxygen** | **Argon** | **CO2** |
| **Helium** | 0.138 | 1 | .38 | .37 | .35 | .32 | .3 |
| **Nitrogen** | 0.97 | 2.64 | 1 | 1 | .94 | .84 | .8 |
| **Air** | 1 | 2.69 | 1.02 | 1 | .95 | .85 | .81 |
| **Oxygen** | 1.1 | 2.82 | 1.06 | 1.05 | 1 | .9 | .85 |
| **Argon** | 1.37 | 3.15 | 1.19 | 1.17 | 1.12 | 1 | .94 |
| **CO2** | 1.53 | 3.33 | 1.26 | 1.24 | 1.18 | 1.06 | 1 |


## HOW TO USE OTHER GASES THROUGH CALIBRATED FLOW DEVICES

A flow control device like the Harris Model 355-2 can be used for gases other than those for which it was calibrated. Accurate flow rates for any gas can be determined by using the proper scale on the flow device and the proper gas CF. Harris recommends using only gases that are not flammable and are compatible with the materials used in the construction of the flow device being used.

## INDICATED GAS FLOW (ON FLOWTUBE) X CORRECTION FACTOR (ON CHART) = ACTUAL GAS FLOW

Example: Determine actual Helium flow through a flow device calibrated for Argon

| ARGON TUBE READING | X | CF FROM CHART ABOVE | = | ACTUAL ARGON FLOW |
|---|---|---|---|---|
| 20 SCFH | | 3.15 | | 63 SCFH |

*Gas Density - In our industry all gases are assigned a value referred to a Specific Gravity (SG). That value is the density of the specific gas when compared to air. For example, CO2 has a SG of 1.53 - or it is a little over 1 ½ times more dense than air. We will be publishing a future article where we will discuss how to determine the correct flow and compensate for potential errors when welding with mixed shielding gases.