

MATHESON *Select*® Shielding Gas HC-725 for GMAW on Nickel-based Alloys: Stainless Steel, Inconel®, Hastelloy®, Monel®

One shielding gas ideal for all: short arc, spray and pulsed spray; improved operator appeal and safety

This optimized composition of He, CO₂, and Ar, uses Argon (not Helium) as the principal component to produce a high quality weld but at lower arc temperatures. This results in a smaller heat-affected zone, less warpage and damage to the base material, and greatly reduced hexavalent chromium emissions.

Typical challenges associated with welding nickel based alloys

- Problems with high arc temperatures
- Difficulty welding lighter gauge materials
- Sluggish filler metal transfer

Key Benefits of HC-725

- High concentration of Ar enables lower arc temperature
- Greatly reduced hexavalent chromium emissions improves operator comfort and safety
- Versatile - optimized within the wide range of 14 to 36 V
- Reduced spatter
- Reduced heat affected zone
- Single shielding gas ideal for short arc, spray, and pulsed spray application
- Limits oxide formation on weld bead surface (reduces need for re-work)
- Smaller droplet size is easier to control - improved flow
- Improved weld puddle control
- Replacement for Ar/O₂ for spray and pulsed spray welding

Other Benefits

- Excellent wettability and penetration
- Improved bead appearance
- Low oxidation potential
- Longer cylinder fill life - homogenously mixed to enable more complete usage of cylinder contents
- More cubic feet of gas per cylinder



All MATHESON *Select*® Shielding Gas Mixtures are certified to AWS A5.32 and ISO 14.175 Standards - the best choice for mixture quality, welding efficiency, and to ensure compliance in certified welding operations.

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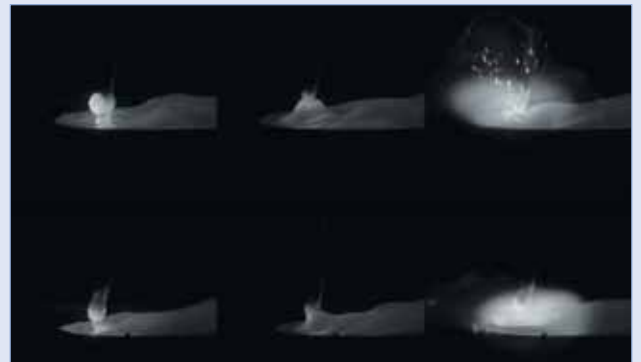
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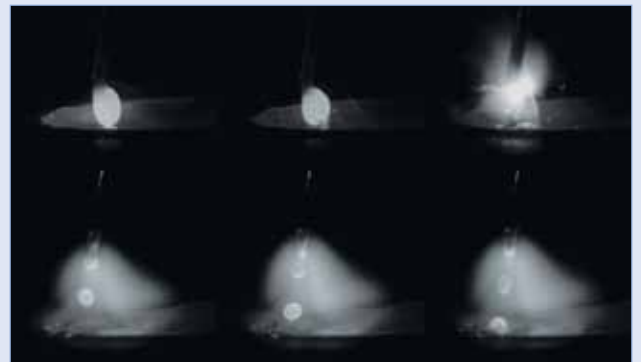
Stainless steel was welded using 90%He / 7.5%Ar / 2.5%CO₂ and with MATHESON *Select*® HC-725 as the shielding gas. High speed video was used to produce the comparisons in the still-frame images below.

Short Circuit Arc



Note the large droplet formation, globular puddling, and explosive spatter in the upper series where 90%He / 7.5%Ar / 2.5%CO₂ was used. In the lower series (using HC-725 as the shielding gas), the droplet is smaller and puddling is smoother, giving the user better overall control (and a better appearance). In addition, re-ignition of the arc with HC-725 is less explosive, causing less spatter.

Normal Spray Arc



It is generally well-known that 90%He is not suitable for use with spray arc welding on stainless – these images in the series at the top help us understand why this is so. The arc plasma has a noticeable plasma shift; droplet formation is large and the transfer is explosive. The lower series of images demonstrates the suitability of HC-725 for spray arc welding. Droplet formation and transfer are smooth and consistent; and the plasma is stable.



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