



NARROW GROOVE WELDING (GTAW)

The Preferred Choice for Automated Heavy Wall, Pipe, Vessel, and Valve Welding



Oscillating Electrode Narrow Groove Welding, pioneered by AMI, has developed significantly since the early 90's and has been recognized as the most efficient and affordable welding technique to weld and repair thick-walled components, without compromising weld quality.

Among the many advantages of Narrow Groove welding are: higher productivity rates; reduced weld volume (70%+ vs. conventional grooves); and lower heat input. While traditional weld preps are 37.5 degree wide, Narrow Groove welding uses a 12 to 14 mm wide groove with 0 to 5 degree sidewalls which requires much less filler metal and results in higher quality welds due to efficient heat input and shorter weld times.

AMI Narrow Gap Torch (NGT) - Oscillating Electrode

The Arc Machines NGT torch (Oscillating Electrode) is ideal for high quality heavy-wall pipe and vessel welding.

Benefits:

- Reduced weld volume → shorter welding time.
- Lower heat input → less residual stresses.
- Less consumption of filling material and shielding gas.
- Improved weldment properties.
- Lower incidence of weld metal defects.



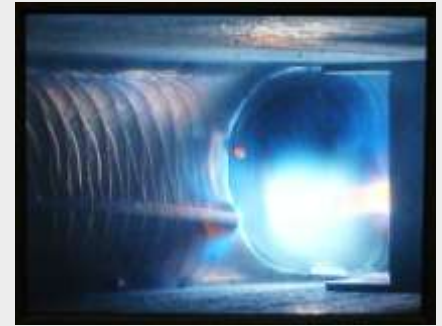
Since its launch in 1994, AMI has supplied over 300 NGT Systems worldwide.



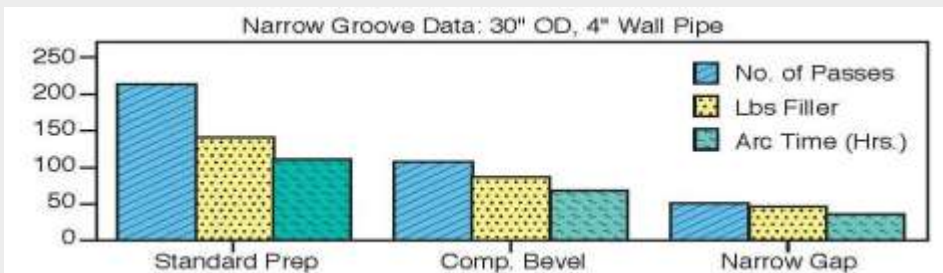
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METALLURGICAL BENEFITS OF THE AMI NGT PROCESS

The Oscillating Electrode of the AMI NGT torch improves the post-weld mechanical and metallurgical properties of the weldment by reducing the heat input, the residual stresses, and the grain structure in the HAZ (Heat Affected Zone). The reduced heat input is achieved by pointing the electrode towards the side wall of the joint and therefore achieving the desired side wall fusion with lower amperage levels. The electrode oscillates between the sidewalls of the joint and the heat (current) is efficiently delivered to the sidewalls. Conventional, non-oscillating fixed electrode, narrow gap torches require up to 40% higher current settings to achieve the desired side wall melting. In non-oscillating torches, the heat is delivered to the center of the joint and only a fraction of the heat reaches the sidewalls of the joint.



Leading edge camera view



NGT weld cross section

KEY FEATURES OF THE AMI NGT TORCH

- **Oscillating Electrode** - Provides mechanical manipulation of the arc and wire feed tip within the groove.
- **Oscillating Wire Guide** - Electrode rotation is synchronized with the wire feeder manipulator and the pulse rate of the power supply. The wire and the electrode are always on the same side of the joint which assures that the filler wire will feed in the molten pool.
- **Modular Design** - The torch can be configured to weld joints of up to 12" (305 mm) in thickness. The modular design allows torch length to be increased from 2" (50 mm) to 8" (203 mm), in 2" increments.
- **Maximum Groove Depth** - 12" (305 mm) version is available.
- **Capping Cup** - Easy switch over from narrow groove to capping pass welding. The same torch can be used to weld out the complete joint and no torch switching is required for the capping passes.
- **Arc View** - AMI's NGT torch is equipped with the industry's best vision system with servo driven illumination. AMI's camera technology uses an "active" light frequency blocking technique and there's no need for additional controls or interfaces between the camera system and the welding equipment.



NGT-B Torch with Capping Cup



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● TECHNICAL CHARACTERISTICS OF THE AMI NGT TORCH FAMILY ●

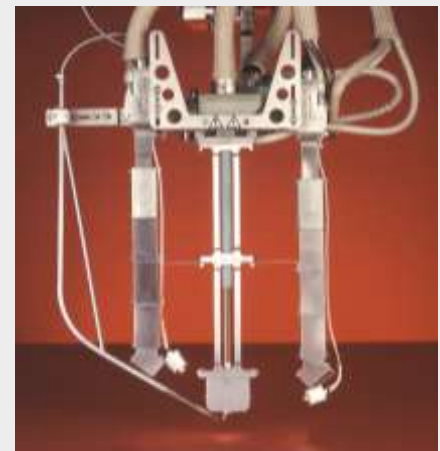
- Current Carrying Capacity = 350 Amp at 100% duty cycle.
- Suitable for welding up to 12" (305 mm) wall thicknesses.
- Torch thickness: 0.446" (11,33 mm) at the gas cup (on the first 2"); 0.480" (12,19 mm) at the torch body.
- The torch can operate in steady state environment of up to 150°C (300° F) at 350 Amps continuous duty cycle.
- The torch body and electrode holder are water cooled.
- Torch can be pivoted around the electrode axis in order to align it with the weld groove.
- Tungsten diameter = 1/8" (3,2 mm); straight or 10 to 15 degree angled tungsten electrodes are available.
- Programmable tungsten oscillator. Resolution in 1 degree increments.
- Total electrode movement +/- 90 degrees.
- Programmable range from 0 to 100 degrees.
- Position accuracy: 1%.
- Oscillating electrode feature.
- Synchronized with wire feed guide tip manipulator.
- Hot or Cold wire welding wire feeding guide tip.
- Wire can be fed from the leading or trailing edge of the weld puddle by changing the rotation direction of the positioned.
- Gas flow rate: capable of 90 CFH of Helium and up to 100 CFH of Argon gas.
- Provides superior gas shielding for the weld puddle and weld area to prevent porosity or weld metal contamination.



NGT-B 4" configuration



Narrow-Gap Welding with Vision



NGT-305 Torch for up to 12" (305 mm) Wall Thicknesses



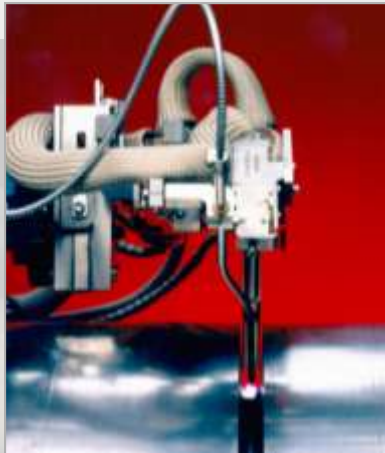
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MOTORIZED WIRE MANIPULATOR

A two axis remote controlled motorized wire manipulator is available with the AMI NGT torch.

Characteristics of the remote wire manipulator:

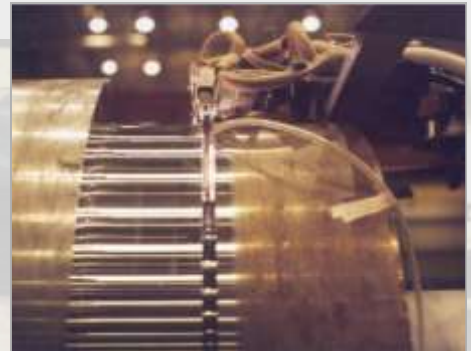
- Wire up/down +/- 0.250" (6,4 mm) linear vertical motion.
- Wire in/out +/- 0.125" (3,2 mm) linear horizontal motion.
- The wire manipulator can be used in both the hot wire and the cold wire process.
- Wire feed tip angle adjustment for cold wire configuration from 10 to 30 degrees.
- Wire feed tip angle adjustment for hot wire configuration from 30 to 60 degrees.
- Wire guide tip mechanical oscillation for leading or trailing wire set-up.
- Motorized X-Y wire guide manipulator in combination with the excellent AMI Vision System, provides true remote welding capability.



NGT Torch in 8" groove



Hot wire NGT welding - 2.5" (64 mm) thick alloy 690 plate



Large diameter steam turbine rotor splicing

The Global Welding Company

For further information please visit our website
or contact us at 1-818-896-9556



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