MUREX CORED WIRES

Features

Cored wires, as a result of their superior deposition rates, enable the fabricator to achieve genuine savings in welding times and hence labour costs. Increased sidewall penetration is another major process attribute, often leading to further economies. Additional benefits are outlined below.

Flux Cored Wires
- All-position capability
- Good slag removal characteristic
- Low hydrogen levels
- Ideal for Use with Ar/20%CO_2
- Able to deal with heavy rust and scale
- Produce a consistent level of mechanical properties

Metal Cored Wires
- High metal recovery (up to 95%)
- No inter-run de-slagging
- Good weld appearance
- Tolerant to variations in welding current
- Caters for majority of downhand applications at one current setting

Self Shielded or Gasless Wires
- No gas shield required
- Good on-site accessibility

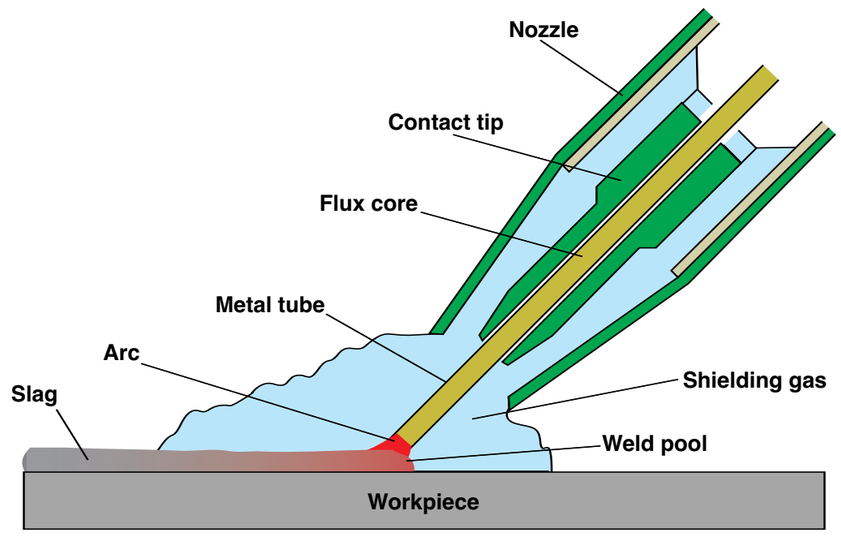
Applications

Consumables are available for use in numerous applications. Some typical applications are given below. Contact your nearest Murex distributor for details of selection to meet specific requirements.

Flux Cored Wires
- General fabrication of mild steel
- General fabrication of medium steel under conditions of high restraint.
- All-positional welding
- Heavy deposition in downhand butt and flat or HV fillet joints
- Positional welding of structural work for service down to -60°C.
- Welding of stainless steels

Metal Cored Wires
- General fabrication of mild steel
- General fabrication of medium tensile steel
- Welding of high tensile as well as quench and tempered steels
- Fabrication of mild and medium tensile steels with provision for weathering qualities when welding CORTEN A & B steels
- Structural steelwork and offshore structures for service down to -50°C.

Self Shielded or Gasless
- Hard surfacing of worn components
- Buffering layers



WARNING: Adequate safety precautions must be taken to offset the effect of heat, glare and fumes

What is Cored Wire?

A cored wire is formed by filling a 'U' shaped metal strip with flux and/or metal powder, and drawing it out into a filled tube. In simple terms therefore this process produces an 'inside out' covered welding rod with the flux material concentrated in the 'heart' of the arc.
The MUREX cored wire range is designed to provide the fabricator with a selection of wires to meet a wide range of applications at welding speeds up to three times faster than manual metal arc electrodes.
Cored wires are available for general purpose, high productivity welding, critical structures and pressure vessels, where good mechanical properties plus notch toughness are required. In addition a range of wires for 'hard surfacing' is also available.

- High deposition rates
- High quality weld metal properties
- Increased penetration compared to solid wire
- Lower incidences of rejects, resulting in lower total fabrication costs
- Positional welding capabilities

MUREX manufacture two ranges of cored wires: Corofil Flux cored and Coromig metal cored.

Corofil – Flux cored wires
The Corofil flux cored wire range is divided into two types, Rutile (R) and Basic (B) each producing a stable arc, easy slag removal, good appearance, plus a high recovery of approximately 90%. Corofil flux cored wires can be used with argon rich shielding gases with a CO_2 content of 15-25% and some with CO_2 and are recommended where high quality is required.

Coromig – Metal cored wires
The Coromig range of metal cored wires represent a novel concept in cored wire welding. Utilising a metal powder core and argon rich shielding gases, Coromig wires offer exceptionally fast welding speeds and deposition efficiency. Welding is particularly smooth and almost spatter-free with a minimum of slag, and with fume levels comparable to those of solid wire MAG welding. In addition Coromig 58 can be run on CO_2 shielding gas for single pass fillet welds.
Developed to meet a wide range of welding applications Coromig wires are available for high speed general purpose, low temperature and high strength requirements.

Equipment

Power sources
Standard production MIG rectifiers are suitable for operating cored wires provided they have sufficient current capacity to match the amperage specified for a given size of wire. In addition the power source should have an appropriate duty cycle compatible with the component being welded.

Wire Feeders
The efficient feeding of cored wires will depend on the type of feed rolls used. While 1.0mm, 1.2mm and 1.4mm cored wires are satisfactory when used in conjunction with a grooved drive roll and flat pressure roll, it is recommended that geared and knurled feed rolls should be used for the larger sizes on both single and tandem systems.

Torches
Careful consideration should be given to the torch selected relative to wire diameter, proposed current level and duty cycle. In certain circumstances water cooling Is required e.g. for 1.6mm and larger diameter wires at high currents and high duty cycles.

Shielding gases
With the exception of Corofil R58, which is designed for use with CO_2, the flux cored wires can be used with either Ar + 15/20% CO_2 gas mixtures or in some cases CO_2 gas. For optimum mechanical properties, careful selection of an appropriate shielding gas is recommended, and advice should be sought from your gas supplier or direct from Murex. The metal cored wires must always be used with Ar + 15/20% CO_2 mixtures as the use Of CO_2 will result in a serious deterioration in weld appearance and the degree of fume and spatter will be excessive. Coromig 58 has also been designed to run on CO_2 gas for single pass fillet welding. A flow rate of 15/20 litres per minute should be maintained at the torch nozzle.

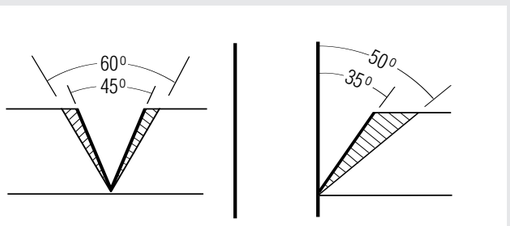
Polarity
DC electrode positive polarity is recommended for the Corofil rutile flux cored wires since the use of the negative pole produces inferior running characteristics and can occasionally produce porosity.
The Coromig metal and basic flux cored wires on the other hand, benefit from the use of DC electrode negative polarity giving an improved arc action and weld finish with a reduction in spatter.

Amperage
With flux cored wires the amperage used is ideally in the top half of the range specified for a particular size except when positional welding with 1.0mm, 1.2mm, 1.4mm, and 1.6mm wires, when the dip transfer mode is used at current below 220 amps. Coromig metal cored wires eliminate the need for current variations relative to plate thicknesses since one current setting for a given wire size will cater for 90% of flat & HV applications. The weld cross-section is controlled by the travel speed whereas solid wire would require considerable current re-setting to achieve the same flexibility.

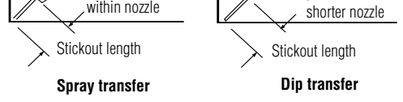
Voltage
Arc voltage has a direct influence on the arc length which controls the weld shape, depth of penetration and spatter level. As the arc voltage is reduced the penetration increases and this is particularly important in V butt joints.
An increase in voltage will result in a long arc length and increase the risk of porosity and undercut.
When operating on dip transfer for positional welding at comparatively low currents the arc voltage should be kept at the highest practicable level to ensure adequate side wall fusion.

Welding Technique

Plate Preparation
Due to superior side wall fusion obtained particularly from the metal cored wires the combined angles of preparations can generally be reduced. A V-Butt joint for instance that would normally need a 60° included angle for manual arc welding can be reduced to 45° thereby saving plate and hence weld metal to fill the joint. Cored wires have a higher level of deoxidents than solid wires and normally operate at higher current densities. This facility allows them to be used where light mill scale and primer have to be tolerated. For optimum radiographic standards with flux cored wires excessive rust and scale should be removed by grinding which will also serve to reduce slag formation to a minimum when using the metal cored wires.



Electrode extension
This term describes the distance between the contact tip of the torch and the workpiece, sometimes described as 'electrode stickout'.
The current conditions should be set for the job in hand but during welding it may be necessary to reduce the amount of heat in the weld pool to accommodate poor fit-up or out of position welding.
An increase in the stickout length and the extra electrical resistance that results will produce a cooler less fluid weld pool. Similarly any decrease in electrode extension will have the effect of increasing welding current and this characteristic can be of benefit in controlling penetration especially where inconsistent fit-up is encountered.

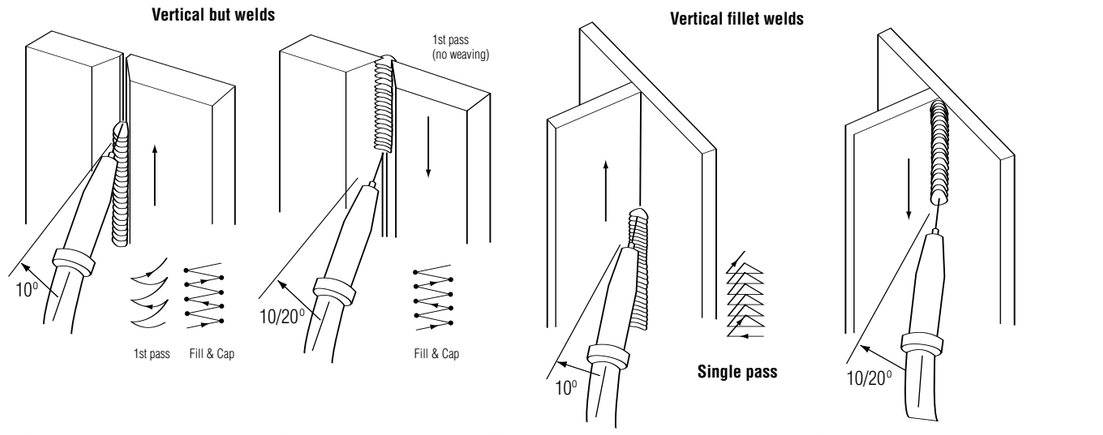


When operating with dip transfer a stickout length of 12mm will suffice for most applications, where as spray transfer produces a greater amount of radiated heat and should have an extension of approximately 25/35mm. During actual welding any large variation in stickout length produces an inconsistent weld deposit and excessive stickout will reduce the effectiveness of the gas shield. For a given wire feed rate an extension of the stickout has the effect of reducing the amperage drawn from the power source. Therefore, increasing the wire feed speed to compensate for the current drop, will result in a significant increase in metal deposition. For example, a 1.6mm metal cored wire at 400A using a stickout of 30mm will achieve a deposition rate of 9kg/hr as compared with 8kg/hr at the same current with a stickout of only 10mm.

Gas Shroud
To ensure adequate gas coverage when using spray transfer a long shroud should be used and will extend beyond the contact tip by about 6mm. However, a short shroud may be necessary when welding in the bottom of deep grooves to allow for easier access whilst maintaining the required stickout. In order to observe the weld pool and maintain a stable arc when using dip transfer a short shroud is recommended.
In this case the contact tip will extend beyond the shroud by 4/5mm.

Travel Speed
Travel speed has an important influence on penetration. For example when using a 1.6mm metal cored wire at 350A an increase in travel speed from 30cm/min to 60cm/min approximately doubles penetration beyond the root of the fillet.
At speeds in excess of 80-100cm/min penetration will decrease.
Similarly a reduction in penetration will occur if the welding speed should fall to below 30cm/min, as the arc can impinge on the molten pool in preference to the base material.
In addition the use of slow travel speeds should be avoided when low temperature impact properties are required. While the joint may be filled in fewer passes the individual weld deposits will be of large cross-section and therefore impact resistance will be reduced. Apart from this, in the case of flux cored wires, there is the obvious difficulty of slag control to be considered.

Torch angles and manipulation



Preparation with root face

Preparation with feather edges

Triangular weave for single pass fillets. If necessary subsequent weld runs should be deposited using technique similar to that for filling vertical butt joints. No weaving is necessary for single pass fillets when using Corofil R56XL.

Restrict vertical down technique to thin plate or leg lengths of 6mm maximum. May be used for first pass of multi pass joints

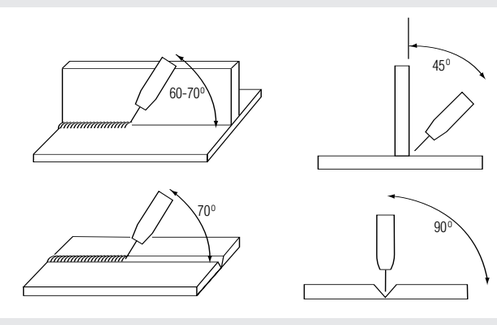
Positional Welding
All the 1.0mm, 1.2mm and 1.4mm metal and flux cored wires are ideally suited to positional welding of open butt and fillet joints. Root runs in butt welds with rutile wires require ceramic backing tiles.

Butt Welds
For vertical open butt welds requiring complete root penetration both the vertical up or vertical down technique can be used for root passes. When filling and capping butt welds in the vertical position the vertical up method is preferred using triangular or single weave patterns. Here again, where low temperature impact properties are required, care should be taken to minimise the cross section of individual beads. Savings can be made in plate penetration costs with Coromig metal cored wires as a uniform bead of penetration is possible without root faces when the vertical down technique is employed.

Fillet Welds
Fillet joints may be welded using either the vertical-up or vertical-down techniques. The choice will depend on the thickness of material being welded and degree of root penetration specified. Multi-pass fillet welds should be completed on a similar basis to that of butt welds using the vertical up technique.

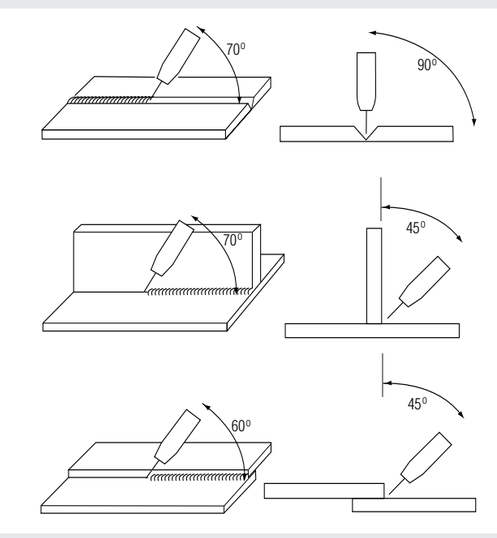
Torch Angles

Flux Cored Wires
With Corofil flux cored wires the torch angle has a significant effect on slag control and weld deposit profile. For both fillet and butt joints the recommended angle between the wire axis and the line of joint is between 60°-70° and using a backhand technique i.e. pulling, with the wire pointing toward the completed weld. In this way the arc force prevents the slag from running in front of the weld pool and reduces the risk of slag traps. For HV fillets the wire tip should be directed toward the bottom plate at approximately 3mm from the line of the joint with a torch angle of 45° from the vertical plate.



In certain circumstances the forehand technique i.e. pushing, can be used to advantage. On small fillet welds where penetration is not of paramount importance the higher welding speeds required are such that the molten slag is prevented from running ahead of the weld pool. This also has the advantage of producing a mitre fillet where as the backhand method tends to produce a more convex profile.

Metal Cored Wires
Maximum penetration is obtained using a backhand (pulling) technique with a torch angle of 70/80° between the wire axis and the joint line. This will also serve to optimise gas coverage and is particularly relevant to multipass butt welds.



For fillet and lap welds superior weld appearance is achieved using a torch angle of 60/70°, and a forehand technique (pushing). This results in a more even distribution of weld metal, accompanied by a slight reduction in penetration.