MAIN COVERING TYPES OF STICK ELECTRODES

One stick electrode is not identical to another stick electrode. In addition to the composition of the core wire material, particular significance is attached to the covering of the stick electrode for manual metal arc (MMA) welding. It influences the droplet transfer, the weld appearance and the suitability of the electrode for certain welding positions. As components of the covering very different materials are used such as mineral and organic materials, alloying elements as well as sodium silicate as binder. Through the combination of the various base materials four pure types and several mixed types were developed in the course of time. The letters (short symbols) used to designate the type of covering indicate the properties or the main components of the covering.

pure types	mixed types
A = acid-covered	RA = rutil-acid-covered
B = basic-covered	RB = rutile-basic-covered
C = cellulosic-covered	RC = rutile-cellulosic-covered
R = rutile-covered, RR = thick-rutile-covered	

Basic-covered stick electrodes (B)

The large proportion of alkaline earth carbonates, e.g. calcium carbonate and fluorspar, is characteristic of the thick covering of these stick electrodes. Larger quantities of non-basic constituents such as rutile and quartz may be required in order to improve the welding properties especially for welding with alternating current. The outstanding properties of basic-covered stick electrodes are:

- The notched-bar impact energy of the weld metal is higher, particularly at low temperatures.
- Their resistance to cracking corresponds to the high degree of metallurgical purity of the weld metal.
- The low hydrogen content ensures a low sensitivity to cold cracking (subject to the prerequisite of dry stick electrodes). It is lower than that of all the other stick electrodes.

basic-covered – E 50 4 Mo B 42

Basic-covered stick electrodes are suitable for welding in all positions, except the vertical-down position. Basic stick electrodes which are especially suitable for welding in the vertical-down position have a covering with a particular composition.

Cellulosic-covered stick electrodes (C)

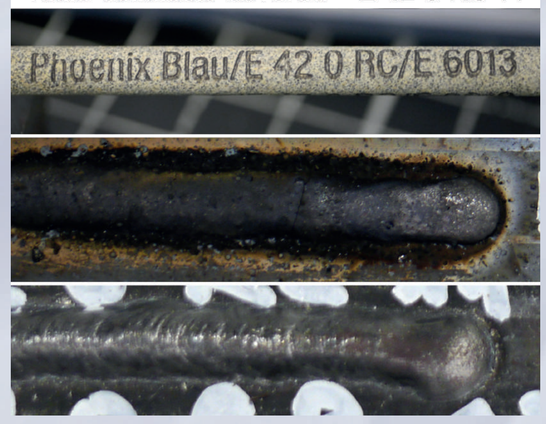
Stick electrodes of this type contain a large proportion of combustible organic substances in the covering, especially cellulose. Due to the intensive arc, they are particularly suitable for welding in the vertical-down position. They are often used in building pipelines.

cellulosic-covered – E 42 2 C 25

Rutile-cellulosic-covered stick electrodes (RC)

In addition to rutile, the covering of these stick electrodes has larger cellulose proportions. Therefore, stick electrodes of this type can also be used for welding in the vertical-down position.

rutile-cellulosic-covered – E 42 0 RC 11



Rutile-covered stick electrodes (R)

Stick electrodes of this type result in the transfer of coarser droplets than the thick-rutile-covered stick electrodes. They are thus suitable for the welding of thin sheets. Stick electrodes of the rutile type are suitable for all welding positions, except the vertical down position.

Thick-rutile-covered stick electrodes (RR)

In the case of stick electrodes of this type, the ratio of the covering to the core wire diameter is min. 1.6 : 1. One characteristic is the high rutile content of the covering which results in good restarting and finely rippled, uniform welds.

thick-rutile-covered – E 42 0 RR 12

Acid-covered stick electrodes (A)

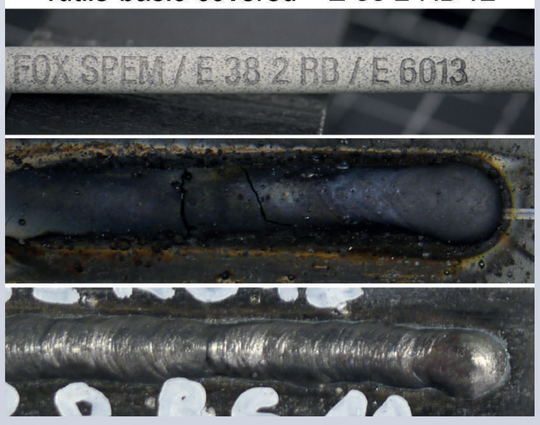
The covering of this stick electrode type which is uncommon at present is characterized by high iron oxide proportions and, because of the high oxygen potential, by deoxidizing substances (ferromanganese). In the case of a thick covering, the acid slag causes the particularly fine transfer of droplets as well as flat and smooth welds. Acid-covered stick electrodes are suitable for welding out of position to a limited extent only and are more sensitive to the occurrence of solidification cracks than other covering types.

acid-covered – E 35 0 A 12

Rutile-basic-covered stick electrodes (RB)

High rutile proportions and raised basic proportions are characteristic of the covering of this type. These stick electrodes which have a thick covering in most cases have not only good mechanical properties of the weld metal but also good welding properties in all welding positions, apart from the vertical-down position.

rutile-basic-covered – E 38 2 RB 12



Rutile-acid-covered stick electrodes (RA)

The welding behavior of stick electrodes of this mixed type is comparable with that of acid-covered stick electrodes. Their covering consists of rutile and iron oxide. These stick electrodes which have a thick covering in most cases can therefore be utilized for welding in all positions, except the vertical-down position.

The figures show from above to below: type of covering and designation of the electrode according to ISO 2560-A; producers stamp on the electrode covering; weld covered with the slag; weld surface after slag removal.