

HANDLING AND STORAGE RECOMMENDATIONS

for Welding Consumables



General Recommendations

Welding consumables can meet promised and expected properties only when treated according to the storage and handling recommendations of the producer.

We recommend to follow the individual and validated technical rules, regulations, recommendations and standards during transport, storage and handling. Mechanical damage and moisture pick up should be avoided.

Böhler Welding filler materials and fluxes will keep their promised performance and properties for two years when always being stored properly under controlled conditions. When this period is exceeded, a visual control and a welding test should be carried out before use, to verify the functionality.

Further information about handling of welding consumables can be retrieved from relevant standards.

- » Welding consumables should be stored in their unopened and undamaged original packaging.
- » The environment must be clean, free of dust and dry.
- » Direct exposure to sunlight has to be avoided.
- » Opened pallets should not be stacked to avoid damage of the individual packaging.
- » Direct contact of the packaging with floor and walls must be avoided.
- » Welding consumables must be stored frost free, suitable measures must be undertaken to avoid temperatures below the dew point.

These recommendations do not release the user from his duty to convince himself of the fault free condition of the welding consumable before use.

Covered Electrodes

Depending on the type of electrode, the base material used and the application, covered electrodes need to be protected against moisture pick up. Electrodes in standard packaging need to be stored in a dry and heated atmosphere in their undamaged original packaging. Recommended storage conditions are 18 - 25 °C and max. 60 % rel. humidity. The storage period should not exceed two years. The storage management should follow the first in first out principle to avoid over aging. covered electrodes in opened or damaged packaging must be stored in a separate, heated room at higher temperatures.

The re-drying time and temperature before use depends on type, kind of packaging and application. Further information is given on the electrode package.

Covered electrodes where no re-drying recommendation is given can be dried at 100 - 120 °C / 1 h. Cellulosic electrodes must not be re-dried.

Electrodes exposed directly to water, oil or grease must not be used.

General recommendations for re-drying of stick electrodes:

Classification EN ISO	Application	Type	Re-drying	Temperature [°C]	Time [h]
2560	Non and low alloyed	A, AR, C, RC, R, RR, RB	no	-	-
		B	yes	250 - 350	2 - 10
18275	High tensile steel	B	yes	300 - 350	2 - 10
3580	Creep resistant steel	R	no	-	-
		B	yes	300 - 350	2 - 10
3581	Stainless steel (soft-) martensitic and heat resistant ferritic steel	R	yes	250 - 300	2 - 10
		B	no	-	-
14172	Ni and Ni-alloys	B, R	yes	300 - 350	2 - 10
		R, B	yes	250 - 300	2 - 10

If the H₂-content in the weld deposit is limited to max. 5 ml / 100 g, re-drying is necessary: 300 to 350 °C / 2 h.

Before re-drying, the electrodes should be removed from their packages with the appropriate care and laid in the preheated (80 - 100 °C) baking oven.

Under no circumstances should the stacked height of the electrodes exceed 40 - 50 mm. The electrodes should stay for at least 2 h in the oven after reaching the required re-drying temperature. Re-dried electrodes can be stored at 100 - 200 °C in a drying cabinet up to four weeks and in a quiver up to 12 hours.

Covered electrodes should be re-dried not more than two times.

Böhler Welding covered electrodes can be stored under these conditions and in their unopened and undamaged standard packaging up to 24 months .

DRY SYSTEM Vacuum Packaging

No re-drying is necessary for covered electrodes in Böhler Welding DRY SYSTEM vacuum packing, provided the packaging is unopened and undamaged. Before opening the pack it is recommended to ensure a temperature balance to avoid condensation.

The electrodes can be used for welding directly off the pack for up to 9 hours after opening.

The BÖHLER Welding DRY SYSTEM offers different packaging sizes matching the average consumption of one shift. Unused electrodes can be stored and re-dried as previously described. The Böhler Welding DRY SYSTEM guarantees simple and safe handling of stick electrodes in workshops and on construction sites. Dry and optimal conditioned electrodes are available at all time.

Electrodes in DRY SYSTEM vacuum packaging can be stored under normal, dry workshop or construction site conditions without time limit.

SAW flux for joining and cladding

Under dry conditions and constant temperatures joining and cladding fluxes can be kept in their unopened original packaging for up to two years. Flux from damaged packages must be used or repacked immediately.

Fluoride basic fluxes in standard packaging need to be re-dried before use to avoid the risk of hydrogen induced cracking. Detailed information about temperature and duration are given on the flux packaging.

General recommendations for re-drying of agglomerated fluxes:

Typ	Re-drying	Temperature [°C]	Time [h]
FB	yes	300 – 350	2 – 10
AB	yes	300 – 350	2 – 10
AR	yes	150 – 200	2 – 10

The construction of the re-drying oven should avoid local over heating by means of a dry blend screw and ensure good ventilation. When applying static drying the height of the flux is restricted to 50 mm. The flux may be re-dried several times, but a total duration of 10 hours must not be exceeded. After re-drying unused flux can be stored up to 30 days at a temperature of 150 °C.

When using flux extraction and circulation systems, the use of dried air must be ensured. During welding at increased temperatures and high humidity, it is recommended to keep the flux at a temperature of 110 - 150 °C.

Cored wires

For the storage of cored wires the general recommendations for the storage of welding consumables should be followed. Recommended storage conditions are max. 60 %rel. humidity at 18 - 25 °C. Temperature fluctuations below the dew point are to be avoided. At storage temperatures below 10 °C there is a risk of condense water forming on the wire surface when being opened and unpacked in heated environment. This can lead to porosity and gas marks at the beginning of the weldment. Only acclimatised wires should be used.

DRY SYSTEM Vacuum Packaging

Flux delivered in Böhler Welding DRY SYSTEM packaging can be stored up to two years and can be used right away from the DRY SYSTEM Bag – 25 kg or the DRY SYSTEM BigBag without re-drying. The particular characteristics of the packaging reliably prevents moisture pick up during transport and storage.

Welding flux from metal drums can also be used without re-drying.

After finishing welding, used spools should be removed from the welding machine and stored in the original packaging.

Böhler Welding cored wires can be stored under these conditions and in their unopened and undamaged original packaging up to 24 months .

Solid Wires and TIG-Rods

For the storage of solid wires and rods, the mentioned general recommendations for the storage of welding consumables are to be considered. Recommended storage conditions are max. 60 % rel. humidity at 15 - 25 °C. Temperature fluctuations below the due point are to be avoided. At storage temperatures below 10 °C there is a risk of condense water forming on the wire surface when being opened and unpacked in heated environment.

This can lead to porosity and gas marks at the beginning of the weldment. Only acclimatised wires should be used. Incorrect handling and storage of solid wires can lead to visible damage of wire and spools, like kinks, bendings or rust forming.

Böhler Welding solid wires and rods can be stored under these conditions and in their unopened and undamaged original packaging up to 24 months .

Aluminum wires and rods

Aluminum welding wires must be stored in a dry room with relatively constant temperature in their unopened and undamaged original packaging. High humidity, air flow and quick temperature changes must be avoided. The individual packs should be stored in a way that avoids damage of welding wire or rods. Storing in racks is to be preferred to stacking. Aluminum wires and rods can be stored up to two years under these conditions if the original packaging is unopened and not damaged.

During transport and storage of aluminum alloys, conditions leading to condensation of air humidity on the surface must be avoided. With this the risk of hydrogen diffusing into the oxide skin as main source for porosity during welding can be minimized. The maximum tolerable temperature difference between the storage and the welding area where no surface condensation occurs is determined by the dew point interval [Δt] as a function of the relative humidity [LR].

Opened material must be stored in the closed original packaging and be kept away from contamination, contact with other metals, temperature and humidity changes. Under these conditions the material can be stored up to one year. Aluminum welding consumables should be stored in their unopened original packaging in the welding area for 24 hours to enable a temperature relieve and avoid condensation.

How to read the table:

Aluminum wire is stored at 50 % rel. humidity, $\Delta t = 10 - 13$ °C. If the storage temperature is 25 °C, the surface condensation starts at a temperature of 12 - 15 °C (in the welding area = risk of porosity).

LR [%]	20	25	30	35	40	45	50	55
Δt [°C]	24 - 27	21 - 23	18 - 21	16 - 19	13 - 17	12 - 14	10 - 13	9 - 12
LR [%]	60	65	70	75	80	85	90	95
Δt [°C]	7 - 9	6 - 8	5 - 6	4 - 5	3 - 4	2 - 3	2	1

LR – Relative Humidity / Δt – Dew Point Interval