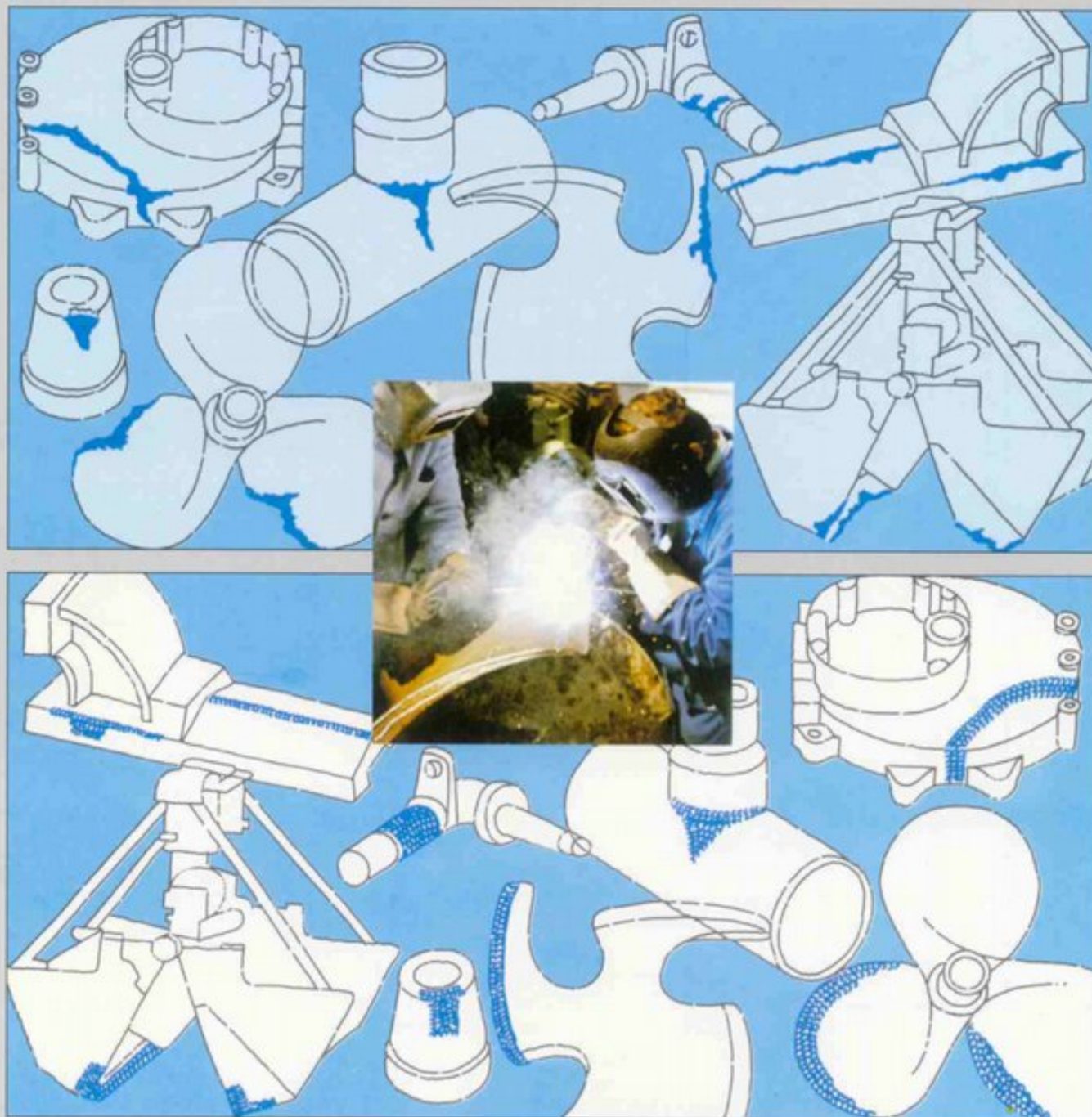


# MAINTENANCE & REPAIR WELDING

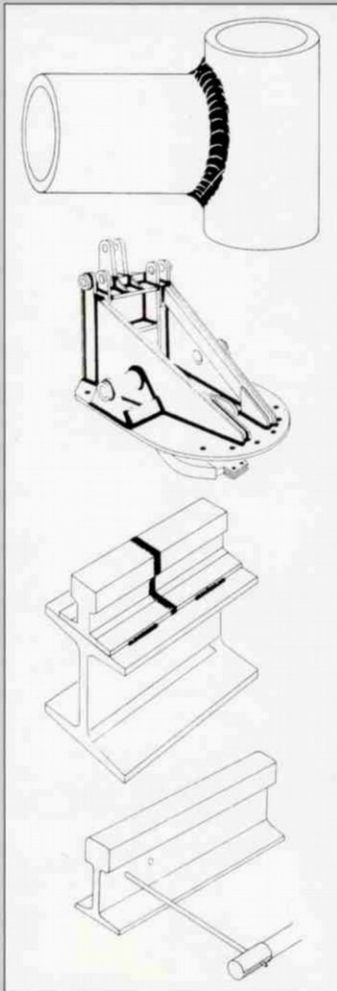
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**GRI-TEC<sup>TM</sup>**







**GRICON 33**

AWS: E 6013 EN499: E42 0 RC 12

Universal rutile coated stick electrode for new construction and repair welding of steel up to a tensile strength minimum 510 N/mm<sup>2</sup> (steel grades S275-S355). Simple to weld in all positions including vertical down, on AC and DC-. Suitable for low OCV transformers. Very suitable for tack welding; little spatter and easy slag removal.

GMAW  
FCAW  
FCAW-SS  
DC-/AC

Other processes:

**LNM 26**  
**Outersh. 71E-H**  
**Innersh. NR-203MP**

Approvals:

TÜV, DB,  
LRS, BV, DNV,  
ABS, GL, UDT



**GRICON 15**

AWS: E 7018-1 EN499: E460 5 B 32

Basic thick coated stick electrode for very low hydrogen weld metal, suitable for constructions operating from -40 to +350°C. For butt welding of general structural steels, shipbuilding steels boiler steels and pipe steel grades up to X60. Very smooth welding characteristics.

GMAW  
FCAW  
FCAW-SS  
DC-/AC

**LNM 26**  
**Outersh. 71E-H**  
**Innersh. NR-203NIC**

Approvals:

TÜV, DB, UDT  
LRS, BV, DNV, ABS, GL



**GRIDUCT 1**

AWS: E 9018-G EN499: E55 5 1NiMo B32 H5

Basic coated stick electrode for welding high strength steel constructions with steel grades S460-S620 and pipe lines API 5L X60-X80. Also suitable for welding cast steel grades such as GS 60 and grade C45 (Preheating in such cases required). The weld shows high impact toughness, typically down to -40°C.

GMAW  
FCAW  
FCAW-SS  
DC-/AC

**LNM Ni1**  
**Outersh. 81Ni1-H**  
**Innersh. NR-450-H**

Approvals:

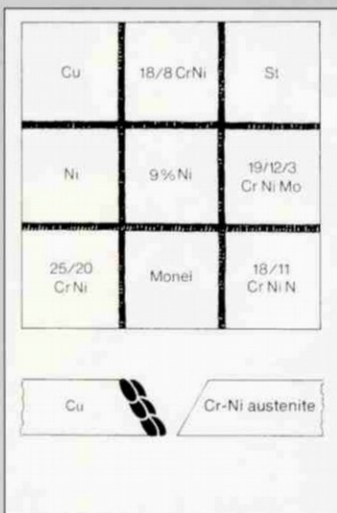
TÜV, DB, UDT



**GRICON 53**

Coated stick electrode for arc gouging and cutting of almost all materials. Suitable for bevel preparation and removal of welded attachments. Materials include mild, low alloy and high alloy steel, grey cast iron as well as aluminium and copper alloys. Arc cutting can be executed in all positions except vertical up. The electrode requires high current and arc voltage.

DC-/AC



**GRINI 7**

AWS: ENiCrFe-3 EN: -

Stick electrode with a special basic covering, designed for welding NiCr-alloys, 3.5-5-9% Ni-alloyed cryogenic steel grades as well as joining dissimilar metals.

High toughness weld metal with application in a temperature range of -269 to +900°C. A well directed stable arc provides sound welding in all positions. The weld appearance is smooth. The weld metal has a high resistance to hot cracking.

SMAW\*  
GMAW  
GTAW

**GRINI 207**  
**LNM NiCro 70/15**  
**LNT NiCro 70/15**

DC-

Approvals:

TÜV, UDT



**GRINI 5**

AWS: ENiCu-7 EN: -

Stick electrode for welding of NiCu-alloys and joints between different materials, for example steel and NiCu-alloys. The weld deposit has a low C-content, allowing application between -196°C and +425°C. Typical strength is 500N/mm<sup>2</sup>.

GMAW  
GTAW

**LNM NiCu 70/30**  
**LNT NiCu 70/30**

DC+

Approvals:

TÜV, UDT



SMAW: shielded metal arc welding (covered electrodes)

GMAW: gas metal arc welding

GTAW: gas tungsten arc welding

FCAW: gas shielded flux cored arc welding

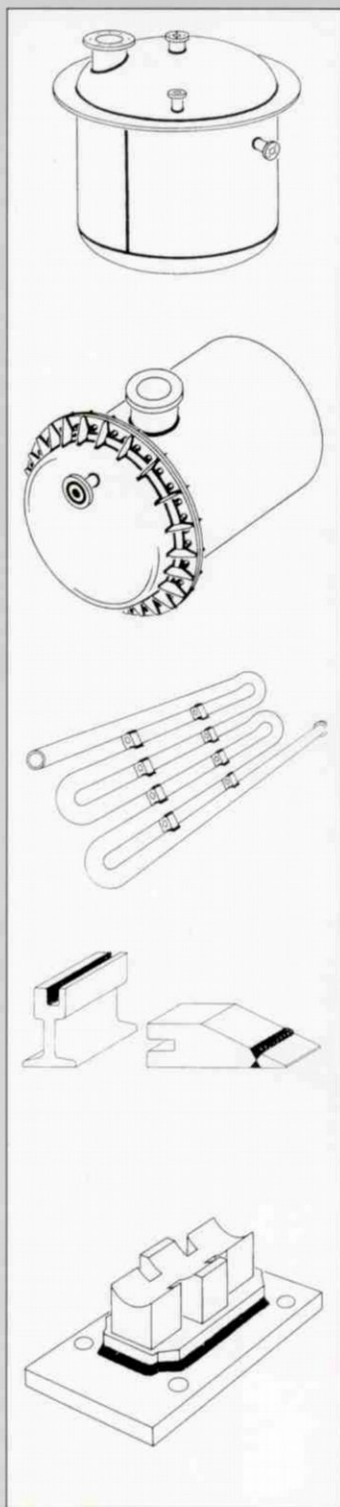
FCAW-SS: self shielded flux cored arc welding

\*: similar electrodes

AC: alternating current

DC+: direct current, electrode positive

DC-: direct current, electrode negative


**GRINOX 202**

AWS: E 308L-166 EN: E 19 9 L R 32

Rutile coated electrode for welding corrosion resistant CrNi-steel. The weld deposit consists of a low C CrNi-austenitic steel, suitable for all position butt welding of CrNi-steel such as AISI 304L. The welds are highly resistant to hot cracking, have a smooth appearance and can be polished.

Service temperature range: -120°C to +800°C.

SMAW*	GRINOX 502 (rutile)
	GRINOX 1 (basic)
GMAW	LNM 304LSi
GTAW	LNT 304LSi

DC+/AC Approvals:  
TÜV, DB, UDT, BV


**GRINOX 210**

AWS: E 3016-16 EN: E 19 12 3 R 32

Rutile coated electrode for welding corrosion resistant CrNi-steel. The weld deposit consists of a low C 2.8% Mo-alloyed CrNi steel. The electrode is applied for butt welding of Mo-alloyed stainless steels (viz. AISI 316L) and is also suitable for cladding of mild and low alloyed steel (use buffer layer on the ferritic steel).

Applicable temperature range: -120°C to +400°C.

SMAW*	GRINOX 510 (rutile)
	GRINOX 9 (basic)
GMAW	LNM 316LSi
GTAWD	LNT 316LSi

DC+/AC Approvals:  
TÜV, DB, UDT, LRS, BV, DNV, ABS, GL


**GRITHERM 46**

AWS: E 3016-16 EN: E 25 20 R 12

Rutile coated electrode for welding high temperature resistant CrNi-steels (viz. AISI 310). The weld deposit is fully austenitic and is oxidation resistant up to 1200°C. The electrode should be used with stringer bead technique; do not overheat the workpiece.

SMAW*	GRITHERM 47 (basic)
GMAW	LNM 310
GTAW	LNT 310

DC+/AC


**GRINOX 126**

AWS: E 307-16 EN: E 18 8 Mn R 53

High efficiency (160%) rutile coated electrode for butt welding of dissimilar metals and cladding. The weld metal is a 6% Mn alloyed austenitic CrNi-steel with a service temperature up to 300°C (dissimilar joints); also oxidation resistant up to 850°C.

SMAW*	GRINOX 25 (DC+)
	GRINOX 26 (AC)
GMAW	LNM 307
GTAW	LNT 307

DC+/AC Approvals:  
TÜV, DB, UDT


**GRINOX 29**

AWS: E 312-16 EN: E 29 9 R 12

Rutile coated stick electrode for welding dissimilar metals and cladding. The weld metal deposit has a high buffer capacity due to the high ferrite content. In butt welding of difficult weldable steel a high resistance to cold and hot cracking is experienced. The weld metal has a high strength level ( $\sigma_{ts} > 700 \text{ N/mm}^2$ ) and a relatively low linear expansion coefficient. After work hardening the hardness HB 220 increases to HB 440.

DC+/AC Approvals:  
DB, UDT



AWS:  
EN:

1G  
PA

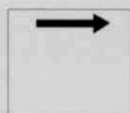
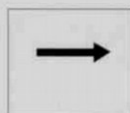
2G  
PC

4G, 4F  
PD

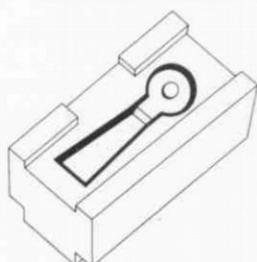
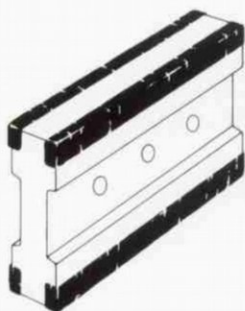
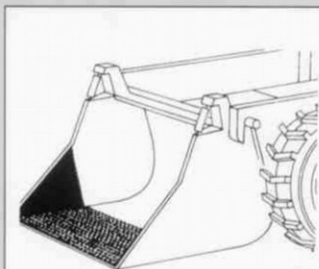
2F  
PB

3Gu, 3Fu  
PF

3Gd, 3Fd  
PG







### GRIDUR 46

DIN: E6-UM-60-GP

martensitic+rest austenite  
0.5%C-9%Cr

High efficiency electrode (180%) for the relatively ductile hardfacing of construction steel, cast steel grades and high Mn wear resistant steel. Applications include: earth moving and agriculture sliding components such as rollers, shovel boom heels, cable shaves, ditcher teeths, conveyor screws. Hardness up to HRc 58 Metal/metal wear; light abrasion. Apply an intermediate (buffer) layer with GRINOX 126 on material sensitive for cracking.

DC+/-AC



### GRIDUR 18

DIN: E6-UM-200-CKPRZ

near eutectic with Cr carbides  
3%C-33%Cr

Rutile coated high efficiency (170%) electrode for depositing a very hard abrasion resistant surface in max. 2 layers. On build-up layers, welded with GRIDUR 7. Base materials include structural steel, steel castings and high Mn wear resistant steel. Applications include: metal to earth wear on bucket teeths, scrapers, blades, paddles, hammers, crusher rolls. Hardness HRc 49-59

DC+/-AC



### GRIDUR 36

DIN: E4-UM-60(65)-S

martensitic (tool)steel  
0.9%C-4%Cr-8%Mo-V,W

Basic coated stick electrode for rebuilding of dies and cutting edges of tool steels by hardfacing. Applications: new and rebuilding of punch dies, shear blades, trimmers and forging dies. Resist moderate forces and impact. The hardfacing, after cooling and also hardening & temper treatment can only be dressed by grinding. The deposit can be machined after annealing at 800-850°C. HRc 58-62

DC+/-AC



### GRIDUR 44

WC in a Ni,Cu,B matrix

Graphite coated electrode with tubular core wire, providing tungstencarbide particles in the weld deposit. Highest wear resistance in rock drilling and ceramic industries. Applications include: rock cutting devices such as drill heads and screw sides, strippers. Use low current. No surface dressing is possible. Build-up layers with GRINOX 29, GRINOX 126 or GRIDUR 7

DC+/-AC



### GRIDUR 65

DIN: E10-UM-65-GRZ

primary carbides in eutectic matrix  
5%C-21%Cr-Nb,Mo,W

Basic graphite coated high efficiency (240%) electrode, providing hardfacing deposits with special primary carbides for highest abrasion resistance, caused by sand, minerals, ore, coal cement or slags. Remains abrasion resistant at high temperatures. Application in installations for breaking cokes and slag at high temperatures. HRc 65

DC+/-AC



### GRIDUR 34

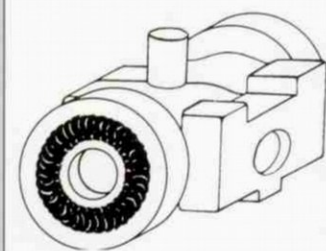
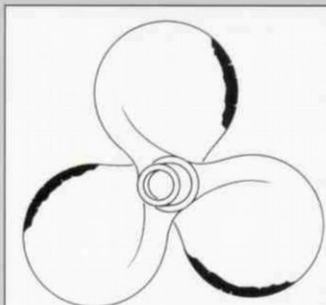
DIN: E23-UM-200-CKPTZ

0.08%C-16%Cr-17%Mo-W Ni-alloy

Rutile coated high efficiency (170%) stick electrode for welding of high corrosion resistant surfacings, working at high temperatures. Welding of new and rebuilding of worn tools working at high temperatures such as hot shears, hot punch dies. Can be machined. Buffer layers to be welded with GRINOX 29. HRc 43

DC+/-AC




**GRICU 1**

AWS: (E Cu) DIN: EL-CuMn2

Basic 2%Mn alloyed Cu-stick electrode for welding commercial pure Cu and for cladding material with a high Cu-alloyed surface.

Work pieces with a wall thickness of less than 3-4 mm do not require preheating, with heavier wall thicknesses preheating with a minimum of 400°C is often necessary.

Applicable for welding injection lances, conductor bars, tubes etc. Weld metal strength approx. 250 N/mm².

DC+

Approvals:

DB, UDT


**GRICU 8**

AWS: (E CuMnNiAl) DIN: CuMn14Al

Basic stick electrode on the basis of Al-bronze, with 2%Mn alloyed for porosity free welding of Mo and Ni containing aluminium bronzes. Also suitable for hot crack free cladding of mild and low alloyed steel as well as cast iron. Cladding of slide valves, valve seats, ship shaft and propellers, stirrers.

Preheating is only needed with bigger work pieces. During the cladding of steel, avoid too much base metal dilution by directing the arc on the previously welded passes.

GMAW

GTAW

Approvals:

DB, UDT


**GRICU 12**

DIN: EL-CuSn13

Basic coated 12% Sn alloyed copper electrode for welding tin bronzes, CuZn alloys (brass) and Cu-Sn-Zn- cast alloys.

For joint welds prepare single V bevel with 90° included angle. Workpieces with a wall thickness > 6mm are to be preheated at approx 250°C.

Also suitable for cladding of steel shafts, friction bearings, liners slide valves and bronze fittings.

Tensile strength: 350 N/mm²; Hardness HB approx. 120.

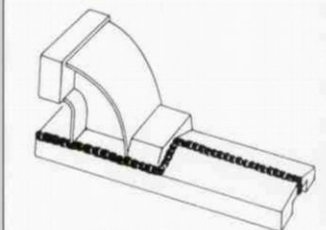
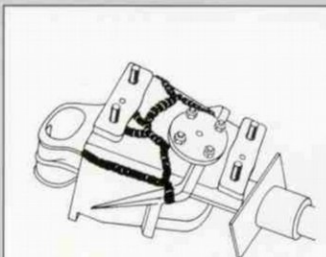
SMAW \*

**GRICU 11**

GMAW

GTAW

DC+


**GRICAST 1**

Basic graphite coated stick electrode with pure Ni core wire for welding grey cast iron as well as white and black temper casts. Universally suitable for repair welding of castings.

Weld with short runs (30-50mm) and immediately peen beads in thoroughly in order to relieve stresses.

Selection of DC-: pulsing arc, high penetration, good fusion  
current type: DC+: high dep.rate, low penetration, high build-up  
AC: lowest heat input, preferable for filling grooves

DC-/AC


**GRICAST 31**

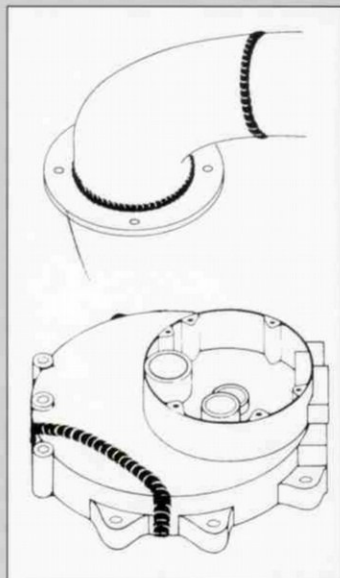
Basic graphite coated electrode with NiFe core wire (bi-metal). for repair welding of globular cast iron, white and black temper cast and austenitic cast iron with globular graphite. Butt welds between steel and globular cast iron.

The bi-metal core wire prevents the electrode from overheating. On AC polarity, the electrode can be used in all positions; on DC+ smooth weld appearance with good penetration is obtained. Hardness HB approx. 180.

DC-/AC





**GRILUMIN 14**

AWS: Al-43 DIN: EL-ALSi5G

Stick electrode with special covering for welding of AlSi-alloys. Welding of AlSi-alloys as such and with joints to other Al alloys. The electrode is to be welded with a short arc with the electrode perpendicular to the work piece. The special electrode coating facilitates the removal of oxide skins and production of porosity free welds.

Thicker workpieces to be preheated to 150-250°C.

GMAW LNM ALSi5  
GTAW LNT ALSi5

DC+

**GRILUMIN 5**

DIN: EL-ALSi12

Stick electrode with special coating for welding of AlSi-cast alloys. The weld metal contains 12% Si.

The electrode is to be welded with a short arc with the electrode perpendicular to the work piece.

Thicker workpieces to be preheated to 150-250°C.

GMAW LNM ALSi12  
GTAW LNT ALSi12

DC+



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