

# Uddeholm Laser Welding Rods

## GENERAL

The filler rods Uddeholm Nimax Laser Weld, Uddeholm Stavax Laser Weld and Uddeholm Dievar Laser Weld are specially composed as to be compatible with the corresponding Uddeholm steel grades and give a weld metal almost identical in composition. The rods are suitable for Laser welding as well as for Micro-Tig welding.

Laser welding is suitable when small deposits are preferred. Small indentations, minor build ups, pores, edges or corners etc.

In comparison to TIG-welding the heat affected zone (HAZ) will be very thin. Typically 0.1–0.2 mm (0.004–0.008 inch) depending on filler rod dimension and power used. Because of the small deposits the stresses can be kept at a low level.

The fast cooling rate increase the risk of developing small cracks in the weld when high alloyed hardenable filler material is used. Adjusting the welding parameters can improve the result.

## HEAT TREATMENT

Preheating is normally not applicable for this welding method due to the design of the welding equipment.

Generally a post treatment operation is recommended after welding in tool steel. The small welds and the minor influence of the base material does not make post treatment critical when laser welding. However it could be preferable in some cases for hardness adjustment.

This information is based on our present state of knowledge and is intended to provide general notes on our products and their uses. It should not therefore be construed as a warranty of specific properties of the products described or a warranty for fitness for a particular purpose.

Classified according to EU Directive 1999/45/EC For further information see our "Material Safety Data Sheets".

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## LASER WELDING

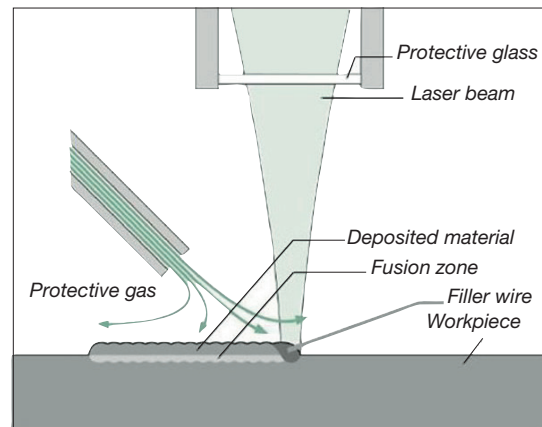
### CLEANING

It is essential to keep the rod and the weld area clean prior to welding. Because of the fast solidification of the melted spot any contamination will "freeze" in the weld and cause a bad result especially if the weld will be polished.

### LASER PRINCIPLE

High power laser light is generated and focused through a lens to the welding spot. As filler material a thin wire with a diameter between 0.1–0.6 (0.004–0.024 inch) mm is primarily used. The wire is guided to the area to be welded where the laser beam melt it together with the base material. The molten material solidifies living behind a small raised area.

The welder continues spot by spot and line by line. Argon gas shields the process from oxidation.



## COMMON REASONS FOR WELDING PROBLEM

- Lack of fusion
  - contamination
  - not enough power
  - unfavourable shape of the welding bead
  - build up procedure
- Pores
  - contamination of the rod or surface
  - too fast welding (Hz) and less time (ms) for the spot
  - bad gas shielding
- Cracks
  - high cooling rate in combination with high alloyed material
  - welding parameters
- Heavy oxidation
  - bad gas shielding.

## POWER SOURCE

For deposition welding normally a pulsed solid state laser of Nd: YAG type is used.

A typical performance could be:

Nominal output	150–200 W
Max pulse output	10–12 kW
Pulse time	0.5–20 ms
Frequency	0.5–20 Hz
Spot diameter	0.5–2.0 mm (0.1–0.5 mm) 0.020–0.080 inch (0.004–0.0020 inch)

To get optimal result it is essential that the laser equipment is in good condition.

Example of circumstances that is of importance for the performance:

- condition of the laser flash lamp
- condition of the lens protection glass
- efficiency of the laser cooling
- focusing of the welding area

## PRODUCT PROGRAM

### UDDEHOLM NIMAX LASER WELD

Diameter, mm inch	0.2 0.008	0.3 0.012	0.4 0.016	0.5 0.020	0.6 0.024
Length	333 mm (13 inch)				
Hardness as welded	36–40 HRC				

### UDDEHOLM STAVAX LASER WELD

Diameter, mm inch	0.2 0.008	0.3 0.012	0.4 0.016	0.5 0.020	0.6 0.024
Length	333 mm (13 inch)				
Hardness as welded	47–55 HRC				

### UDDEHOLM DIEVAR LASER WELD\*

Diameter, mm inch	0.3 0.012	0.4 0.016	0.5 0.020	0.6 0.024
Length	333 mm (13 inch)			
Hardness as welded	49–53 HRC			

\* Uddeholm Dievar laser Weld can also be used for laser welding of other Uddeholm hot work tool steel grades.

For the rod dimension 0.5 mm (0.020 inch) and 0.6 mm (0.024 inch) a power source of 200 W nominal output is recommended.

## AVAILABILITY

The laser welding rods can be ordered from Uddeholm but are also available through our co-partner;

quada V+F® Laserschweißdraht GmbH  
Bachstrasse 19, D-58239 Schwerte, Germany  
[www.quada-office.de](http://www.quada-office.de)



## FURTHER INFORMATION

Please contact your local Uddeholm office for further information on the selection, heat treatment, application and availability of Uddeholm tool steels. For more information, please visit [www.uddeholm.com](http://www.uddeholm.com)