Recommendations for thermal cutting of XABO® 1100

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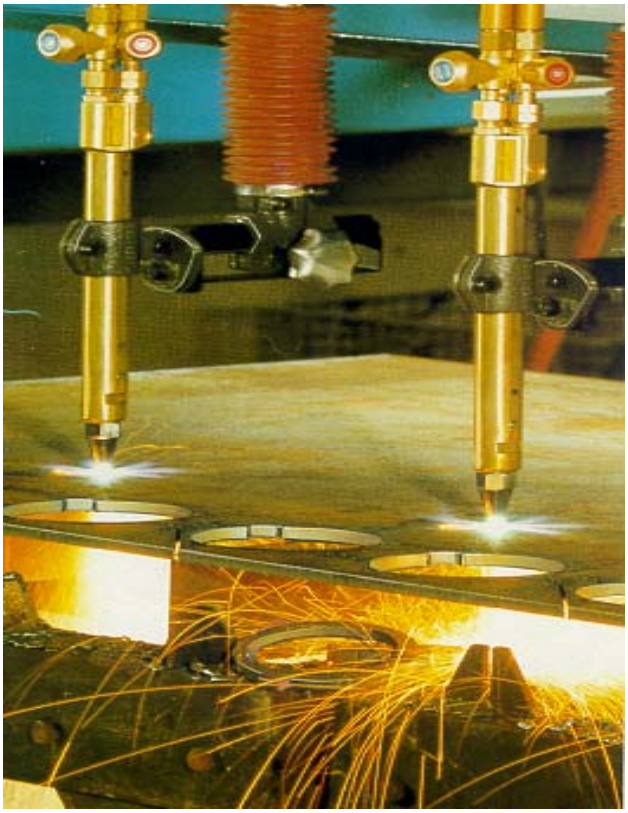
XABO® 1100 is a low-alloyed structural steels supplied in the quenched and tempered condition and usually employed as-delivered in the subsequent fabrication processes. The steel is delivered with minimum yield strength of 1100 N/mm^2. Details of its chemical composition and mechanical properties are provided in TKS material specification 247.

Thermal cutting is generally one of the first operational steps during processing. If a high quality cut is required, the plate surface in the region of the cut should be free of scale or rust. The following thermal cutting processes are commonly used, e.g. for weld seam preparation:



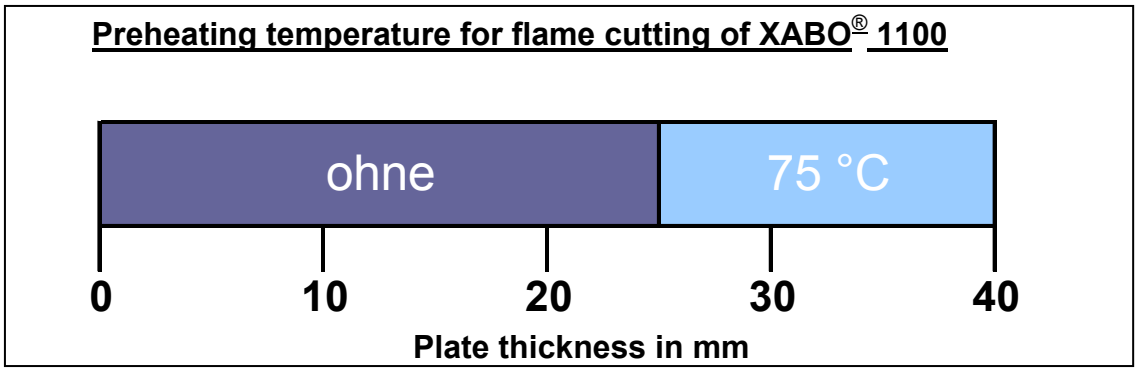
- Oxy-acetylene flame cutting
- Plasma cutting
- Laser beam cutting

The plasma and the laser beam cutting process are increasingly employed especially for thin plates. Usually it is not necessary to preheat the plate in the cutting zone. Today, the upper limit for economical cutting is 40 mm plate thickness for the plasma process and about 20 mm for laser beam cutting. The advantages compared with oxy-acetylene flame cutting are:

- Higher cutting speed
- smaller heat affected zones
- Less distortion of the component

Because of low equipment cost and its universal applicability, oxy-acetylene flame cutting is still the most commonly applied process today. However, certain requirements must be observed for safe processing. During thermal cutting, very high temperatures occur near the cut edges, resulting in material changes due to rapid subsequent cooling. These changes can result in excessive hardening and possibly affect the formability. In order to avoid cracks it is recommended to preheat the material for oxy-acetylene flame cutting from a certain plate thickness (transition plate thickness), which is around 30 mm for XABO® 1100. The following figure shows recommended preheating temperatures. The

cutting zone should be preheated over a width of at least 100 mm. The recommended preheating temperature should be checked at the bottom side of the plate.



For material temperatures below +5 °C the cutting area should be preheated luke-warm regardless of plate thickness. If the cut edges will be cold-formed as part of further processing, e.g. by cold bending or press-brake bending, or subsequently loaded in the direction of the thickness, it is recommended to preheat an approximately 100 mm wide zone to about 150 °C in the cut area for plates thicker than 20 mm. With high loading in the through-thickness direction it is additionally recommended to remove the excessively hardened area mechanically.

Cutting speeds usually employed for flame cutting of XABO® 1100 are shown in the following table.

	Heating gas	Plate thickness in mm						
		5	10	15	20	25	30	40
Cutting speed in-	Acetylene [1]	600	580	520	470	420	410	370
mm/min	Propane [2]	600	550	490	440	400	380	340

Messer-Griesheim cutting nozzle: [1] Vadura 1210 A [2] Gricut 1270 PY

The specified cutting speeds are effortlessly achieved using up-to-date high-performance cutting nozzles, provided that oxygen pressures up to 12 bar are available.

Prior to further processing, the flame cut surfaces should be visually inspected or tested by the dye penetrant method for separations and other negative effects on subsequent usage such as burr.