The design of gusset plates is normally carried out on the bases of the technical beam theory or other assumptions proved safe by experience. This design procedure has proved its usefulness by the length of life and use of existing structures, and is to some extend justified in simple loading cases. A different approach is taken in the paper where upper and lower bounds are derived for the yield load assuming a perfect plastic material and Tresca's yield condition. Their theoretical results are supported by a few numbers of tests. The paper deals mainly with the case of a single member welded into a cut out in a gusset plate, but also the case with two members is addressed. A FEM-analysis of a gusset plate with two members is reported and compared to the theoretical results.

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