

## Safe 500R

### Shooting Range Protection Steel

**Safe 500R** is a ballistic protection steel dedicated to shooting range application offering through optimized chemical composition and careful controlled heating, rolling and heat treatment sequences together with an optimal combination of weldability and ballistic protection performance.

### Properties

### Chemical composition - Ladle analysis - Max weight %

| C    | S     | P                | Si  | Mn  | Ni  |
|------|-------|------------------|-----|-----|-----|
| 0.28 | 0.003 | 0.025            | 0.6 | 1,5 | 0,8 |
| Cr   | B     | CE <sup>1)</sup> |     |     |     |
| 1    | 0.002 | 0.45             |     |     |     |

1) Carbon equivalence per ASTM A6/A6M, i.e. :  
 $CE = C + [Mn/6] + [(Cr + Mo + V)/5] + [(Ni + Cu)/15]$

### Mechanical Properties (in both directions)

|                | Hardness | YS   | UTS  | Elongation | Charpy KV <sup>2)</sup> @-40°C<br>standard 10 x 10 specimen <sup>3)</sup> |        |
|----------------|----------|------|------|------------|---------------------------------------------------------------------------|--------|
|                | HBW      | MPa  | MPa  | 5d (%)     | J                                                                         | ft.lbs |
| Typical Values | 520*     | 1300 | 1570 | 11         | 18                                                                        | 13     |

\* Minimum guaranteed value : 477 HBW

2) Average of 3 tests. Single value min 70% of specified average.

3) For nominal thicknesses under 11mm, sub-size specimens are used. The specified minimum value is then proportional to the specimen cross section.

Brinell hardness test according to relevant standard (EN ISO 65061 / ASTM E10/E110), on each plate and in two places, one at each end of a diagonal, on a milled surface 0,5 to 1mm below plate surface.

### In service conditions

### Cutting

**Safe 500R** can be cut either by abrasive waterjet, laser or plasma. Preheating at 100°C is recommended for thickness above 10mm or when plate temperature is below 10°C.

## In service conditions

### Bending

**Safe 500R** offers ability to cold forming but as other protection steels must be used with caution. The elastic energy stored during forming may lead to rupture or shifting. The most important parameter when bending are the use of a correct punch radius. Please contact us if you need assistance.

#### General recommendations :

- Minimal recommended temperature: 15°C
- Ensure that there are no obvious defects, especially on edges. Ideally, plate edges in the bending area should be ground smooth and rounded prior to operation.
- Die edges must remain clean, smooth, and ideally lubricated (CRC SP 350).
- Perform preliminary trials on prototypes and form the first pieces with low speed

| Grade     | Thickness<br>mm (inch)  | Mandrel Radius |    | Width of the die                       |
|-----------|-------------------------|----------------|----|----------------------------------------|
|           |                         | //             | ⊥  |                                        |
| Safe 500R | 8 - 20 (0.315" - 0.47") | 8t             | 6t | Die width > 2 x radius + 3 x thickness |

### Welding

**Safe 500R** can be welded using common welding processes. Like other protection steels, cold cracking may happen in the heat affected zone of a weld. It is recommended to weld at minimum Room Temperature using low hydrogen welding methods and consumables (HD ≤ 5 ml/100 g). Austenitic consumables must be used.

The recommended stainless austenitic consumables are of type AWS 307.

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## Delivery conditions

**Safe 500R** is water quenched and tempered at low temperature ( $\leq 200^{\circ}\text{C}$ ) with a surface quality according to EN 10163 class A - subclass 1. Shot blasting and weldable primer application can be performed upon request.

| Quarto plates                                                                                                                        |                              |
|--------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| Thickness                                                                                                                            | 8,0 - 20 mm (0.315" - 0.78") |
| Tolerances                                                                                                                           | - 0 / + 0.8 mm               |
| Width                                                                                                                                | 2500 - 3000 mm (98" - 118")  |
| Length                                                                                                                               | 3000 - 6000 mm (118" - 236") |
| Shape, length and width tolerances as per EN 10051<br>Maximum flatness deviation is 6 mm/ 2 m (when measured according to EN 10029). |                              |

### Your contact

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*Technical data and information are to the best of our knowledge at the time of editing. Therefore, we suggest that information be verified at time of enquiry or order. Furthermore, in service, real conditions are specific for each application. The data presented here are only for the purpose of description, and considered as guarantees when written formal approval has been delivered by our company.*