ABRASERVICE
UK

DURETAL 45

— **Duretal 45** is a mild steel plate which has been overlaid by bulk welding, sometimes known as cast welding, using an electric arc welding process. The plate is clad with a layer of chromium carbide alloy consisting of very hard carbides in a matrix of iron. It is especially suitable in applications of high stress severe abrasion combined with moderate impact and heat resistance. The plate can be cut, formed, rolled and welded into most shapes.

Properties

— **Type of alloy:**
Iron based + High Chromium iron

— **Microstructure:**
Hyper-Eutectic with Mn7 Cr3 primary chromium carbides in an austenitic eutectic matrix.

— **Cracks:**
Cracks are present in large numbers and are evenly distributed in the overlay generally at right angles to the direction of welding. The cracks do not penetrate into the base plate.

— **Abrasion resistance:**
Excellent. This product offers a wear life of 6 to 8 times longer than that of a typical through hardened 400 Brinell plate.

— **Temperature resistance:**
Will retain hardness and wear resistance up to 450 °C (840 °F).

— **Machining:**
Not possible except by grinding or electro erosion.

— **Cutting:**
Only possible by plasma, laser and water jet high pressure with added abrasives.

Minimum characteristics

— **Typical chemical composition of finish product**
(indicative minimum value %):

	C	Mn	Cr	Others	Fe
Single Layer	4.5	2.2	32	1	Balance
Second Layer	4.3	2.1	31	1	Balance

— Hardness is obtained between 60 and 62 HRc;
This is an average value taken on the prepared ground surface of the overlay.

— Chemical analysis is measured using Optical Emission Spectroscopy.

— The normal matrix will contain a chromium carbide volume percentage of between 35 and 40 %.

←Typical Microstructure of **Duretal 45**

— **Plate sizes and thicknesses:**

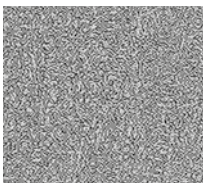
Sheet sizes (mm)	Overlay (mm)	Mild Steel (mm)
3000 x 1500	3	3
3000 x 1500	3	5
3000 x 1500	4	6
3000 x 1500	6	6
3000 x 1500	5	8
3000 x 1500	6	8
3000 x 1500	7	8
3000 x 1500	8	10
3000 x 1500	9	10
3000 x 1500	7	12
3000 x 1500	5	20
3000 x 1500	10	20

Clad area: min. 2950 x 1400 mm
max. 2980 x 1450 mm

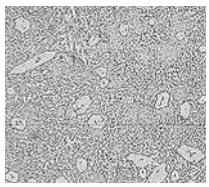
Quality considerations and appearance

— In order to evaluate the quality level of an overlay alloy cast welded product it is fundamental to proceed as follows:

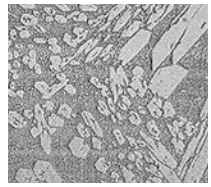
1 - Observe the correlation between the matrix chemical analysis. **Duretal 45** will be near to the figure shown in the 3rd column.



% carbon: 3.0
% chromium: 17.0
Hardness:
52 / 54 HRC



% carbon: 4.0
% chromium: 26.0
Hardness:
54 / 56 HRC

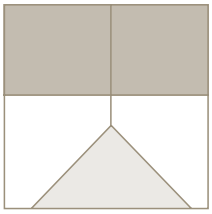


% carbon: 5.0
% chromium: 32.0
Hardness:
62 / 64 HRC

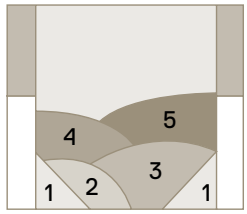
2 - Focus on the detail in the dilution area particularly with thick hardfacing layers. If the dilution is approaching 2 mm and the maximum thickness possible to deposit in one layer is technically 7 mm the base metal could be weakened with excess dilution. The weld overlay will also not have the wear resistance required.

3 - Consider the surface profile and roughness. An irregular surface suggests that the matrix is not homogenous and the plates would be difficult to fabricate.

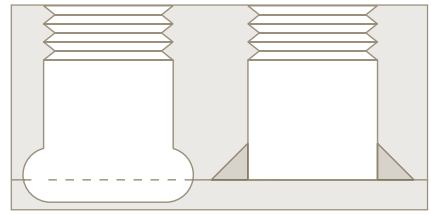
Methods of fixing



— Butt welding



— Plug welding



— Stud welding

— Other methods include edge welding and use of countersunk fixing holes using inserts or plasma cut flared holes.

General note

— For any technical queries, please refer to Abraservice UK.

Contact

A. Arley Road, Saltley, Birmingham B8 1BB, United Kingdom
T. +44 121 326 3100
F. +44 121 326 3105
E. a.uk@abraservice.com
W. uk.abraservice.com