

FLOWCLAD™ is manufactured with high quality materials as a bulk overlay of high chromium, high carbon alloy fused onto a base plate utilising submerged arc welding in a single pass. The result is a smooth, weld-bead-free, non-directional wear resistant plate for use in a variety of material handling applications where sliding abrasion and product hang-up are present.

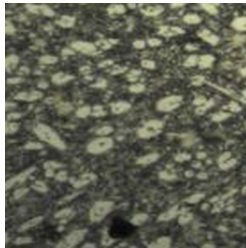
Specification

FLOWCLAD™ overlay is manufactured to ensure compliance with the microstructure, chemistry, hardness and dry abrasion test values for specific customer requirements.

Microstructure: Each FLOWCLAD™ grade has a distinct overlay microstructure:

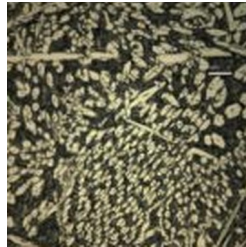
FLOW60

Large primary hexagonal M_7C_3 carbides in a eutectic austenite–carbide matrix, oriented perpendicular to the wear surface.



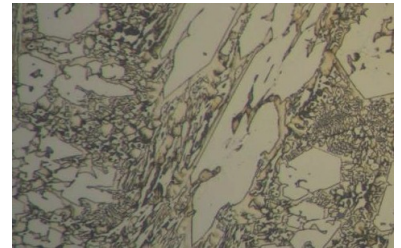
FLOW80

Ultra-refined complex carbide structure — fine primary MC and M_7C_3 carbides in a uniform, high-density distribution.



FLOW6000

Fine primary M_7C_3 carbides and fused tungsten carbides in a eutectic carbide–austenite matrix, WC filling the inter-carbide spacing.



Chemical Composition: A typical deposit consists of the chemistry limits (%) shown below.

Grade	C	Si	Mn	Cr	W	Mo+Nb+Ti+V+W	Bal.
FLOW60	3.5–7.0%	0.5–2.5%	0.5–2.5%	23–35%	–	–	Fe
FLOW80	3.5–6.0%	0.5–2.5%	0.5–2.5%	23–35%	–	2.0–4.0%	Fe
FLOW6000	3.5–7.0%	0.5–2.5%	0.5–2.5%	23–35%	3.0–7.0%	–	Fe

Typical Properties

Property	FLOW60	FLOW80	FLOW6000
Duty	General-purpose sliding abrasion	Severe impact & elevated temperature	Extreme abrasion & high temperature
Surface hardness	HRC 58–62	HRC 58–63	HRC 58–65
Bulk hardness	620–700 HV50	620–680 HV50	>700 HV30
Carbide hardness	1100–1600 HV	1100–1600 HV	1100–1600 HV + WC
Total carbide volume fraction	40–60%	40–65%	>37% incl. dispersed WC
Abrasion resistance (ASTM G65-04 Proc. A)	0.031 g	0.028 g	0.076 g
Temperature range	up to 350 °C	up to 600 °C	up to 595 °C

Plate Characteristics: The overlay surface is smooth and free of weld beads. Fine relief check cracks are evenly dispersed and protrude to the backing plate only; these check cracks assist in thermal expansion and contraction of the plate in service.

Flatness: Within 1 mm over 300 mm and within 5 mm over 1000 mm.

Surface Roughness: Standard smooth finish $Ra < 7 \mu m$; Ultra Polish $Ra < 0.5 \mu m$ (if requested).

Density: *Average is $\sim 7440 \text{ kg/m}^3$. (*Varies depending on proportion of overlay to backing plate.)

Base Plate: The standard base material is mild steel plate of varying thickness, ensuring the finished parts are readily weldable. Alternative base plate grades can be incorporated with the FLOWCLAD™ overlay to meet specific customer requirements.

Cutting

Plate is preferably cut with plasma arc — 200 A is sufficient to cut most available thicknesses. All cutting should be performed from the mild steel side to eliminate carbon contamination of the backing plate. Other suitable methods include arc air / carbon arc, abrasive disc, water jet and abrasive saw.

Machining

Plate can be surface ground using an abrasive grinding disc only.

Cold Forming

Because the FLOWCLAD™ wearing surface is non-directional, plate can be rolled in any direction. A wide-set bottom die with rounded corners and a rounded press tool should always be used. Minimum bending radius is 75 mm for thin overlays and 1000 mm for thicker overlays — please consult your QAME technical expert, as specific methods can be adopted during manufacture to ensure a quality formed product.

Forming plate with the overlay on the outside will place the hardface layer in tension; surface cracks will open up, requiring repair.

Welding

Backing plate side — Use low hydrogen electrode or MIG wire. Weld size must not exceed the thickness of the backing plate. Where the weld would exceed the backing plate thickness, use an ER307 consumable with Argoshield 69 shielding gas.

Hardface side — Use FLOWCLAD™ hardfacing wire.

Attachment Methods

FLOWCLAD™ can be attached using the following methods:

- Plug weld holes
- Countersink, counterbore, taper and tapped holes
- Threaded studs
- Perimeter fillet weld