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Development of High-Quality Narrow Gap Submerged Arc Welding Consumables for Cr-Mo Steel

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Synopsis :
In a narrow gap arc welding process with a single-pass-per-layer technique, the toughness of weld metal greatly depends on that of as-dendrite structure. The increase in carbon content and V-addition have beneficial effects on improving the as-dendrite structure toughness by refining the bainitic lath sub-structure and increasing fine carbo-nitrides which have precipitated uniformly within the γ-grains after PWHT. Two types of narrow gap SAW consumables, i.e., the high C-V system for excellent-toughness Cr-Mo steels and high C-V-Ti system for enhanced-strength Cr-Mo steels have been developed on the basis of the above-mentioned metallurgical findings. The realization of a narrow-gap tandem SAW process was confirmed by a production scale mock-up test using the newly developed consumables.

The body can be viewed from the next page.

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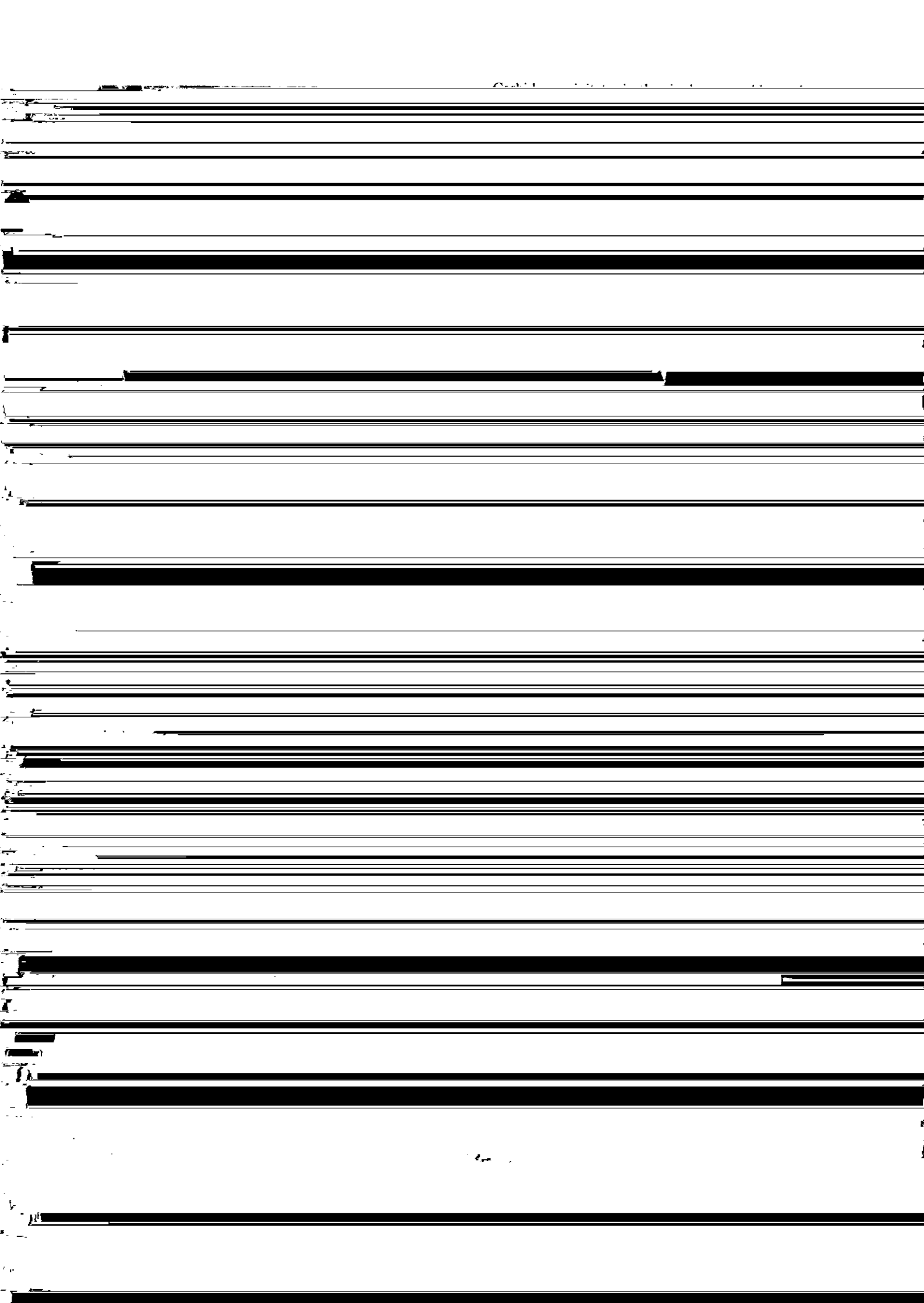
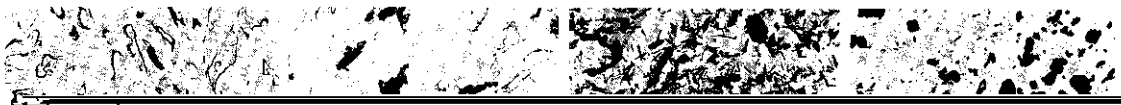
Synopsis:

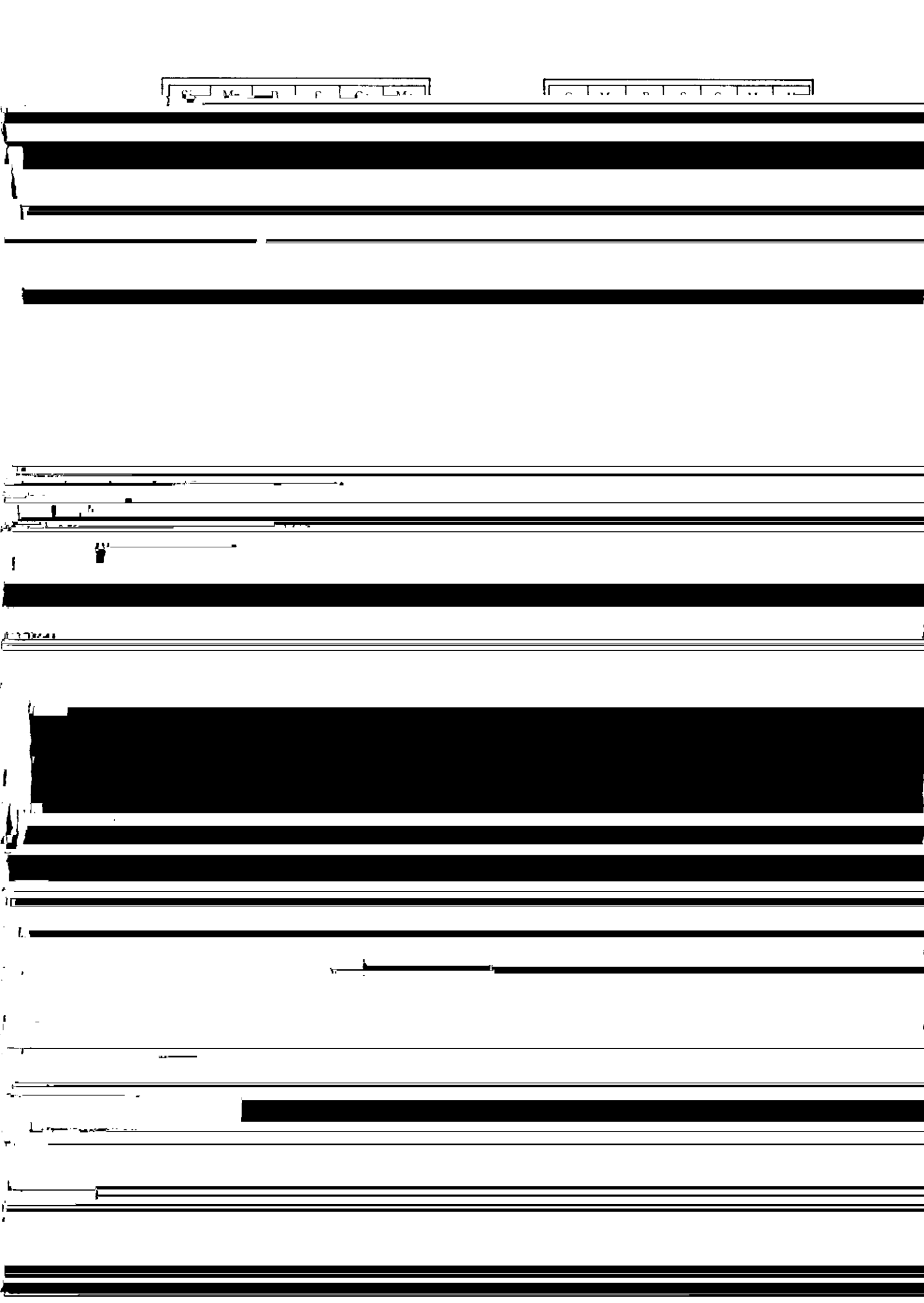
In a narrow gap arc welding process with a single-pass-

C	Si	Mn	P	S	Cr	Mo
0.09	0.23	0.63	0.006	0.006	2.30	1.0

20







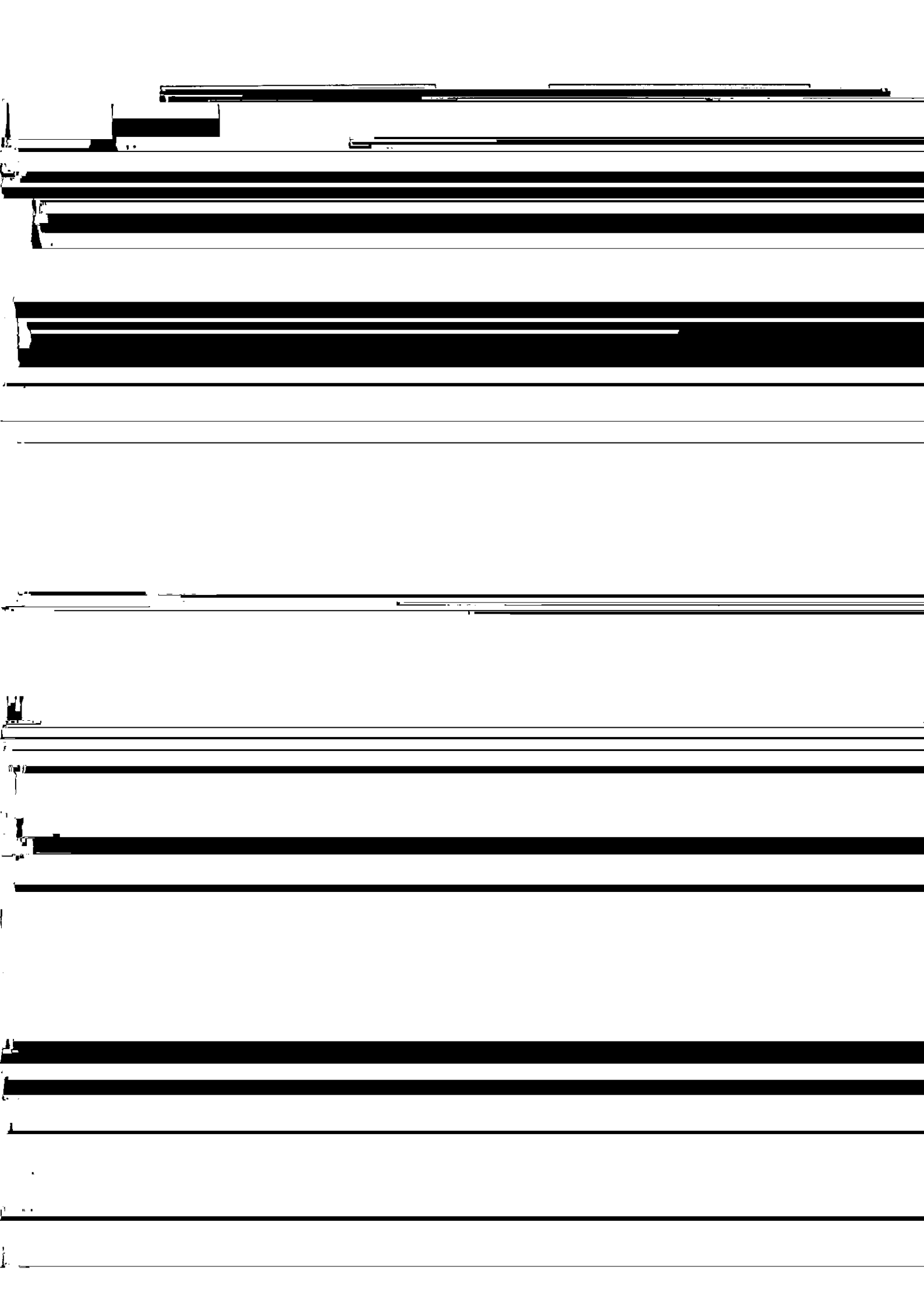


Table 2 Optimum chemistry of high-quality weld metal

Application	Welding consumables		Chemical compositions (wt %)						
	Flux	Wire	C	Si	Mn	Cr	Mo	V	Ti

Table 4 Chemical compositions of weld metal

Table 9 Comparison of welding efficiency between conventional and [redacted] SAW

[redacted]

Narrow gap SAW