SECTION 1-41

EFFECT OF HOLES ON NETT ULTIMATE STRENGTH

CONTENTS

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EFFECT OF HOLES ON NETT ULTIMATE STRENGTH

1. INTRODUCTION

Aluminium alloys when subjected to an ultimate tensile load develop a nett ultimate stress which varies according to the presence of holes.

Analysis of tests on various aluminium alloys has enabled general groupings to be made depending on material form and heat treatment.

The data presented in this section, therefore, has the following categories :-

1. Copper based aluminium alloy sheet and plate, naturally aged.
2. Copper and zinc based aluminium alloy sheet and plate, precipitation treated.
3. Copper based aluminium alloy extruded bar, naturally aged.
4. Copper and zinc based aluminium alloy extruded bar, precipitation treated.

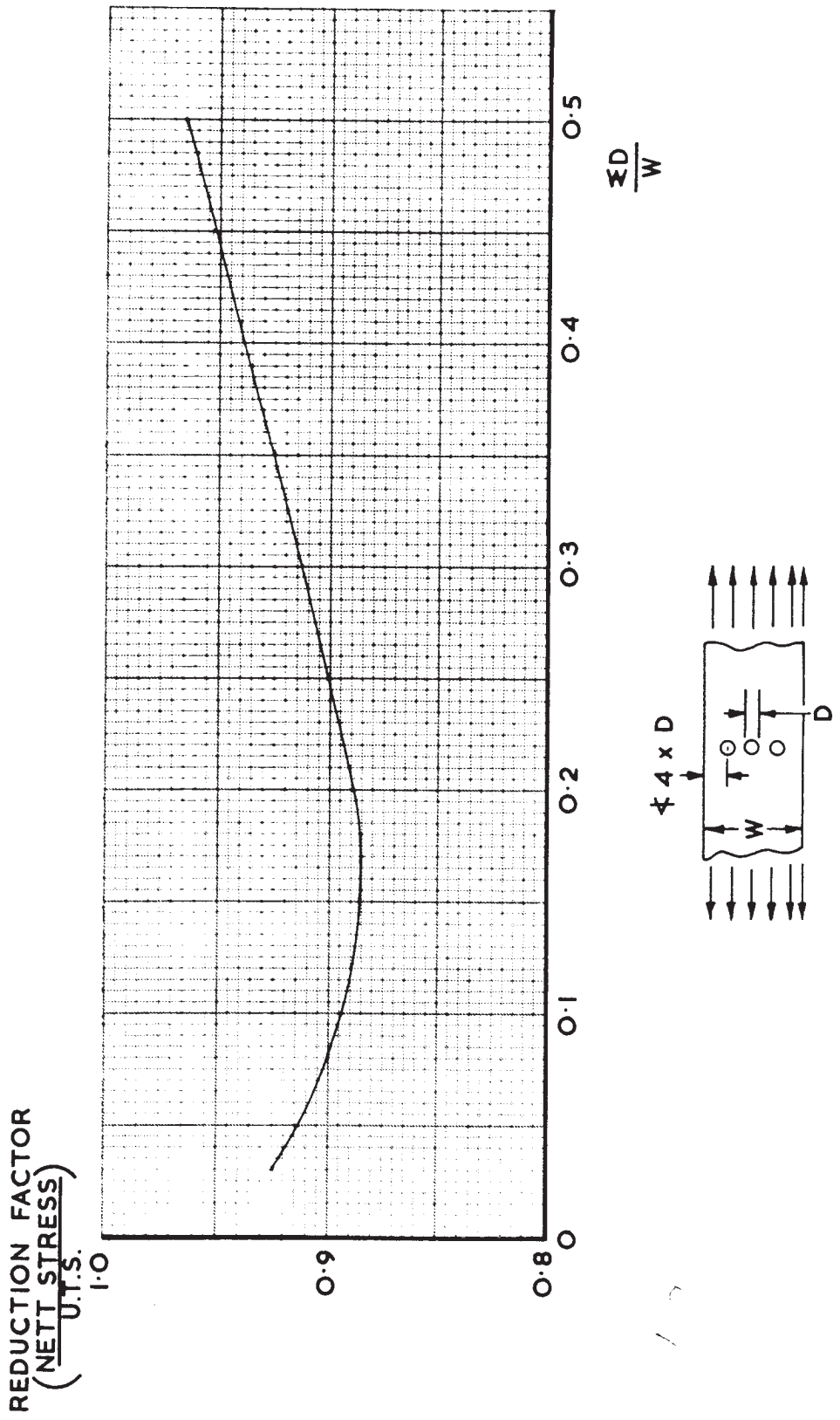
The reduction factors, presented in Fig. 1-4, to be applied to ultimate tensile strength (see Section 5 of this volume) are applicable to unfilled holes. Spot check tests have indicated that they can also be applied to loaded holes.

For sheet and plate the factor is independent of load direction with respect to grain flow.

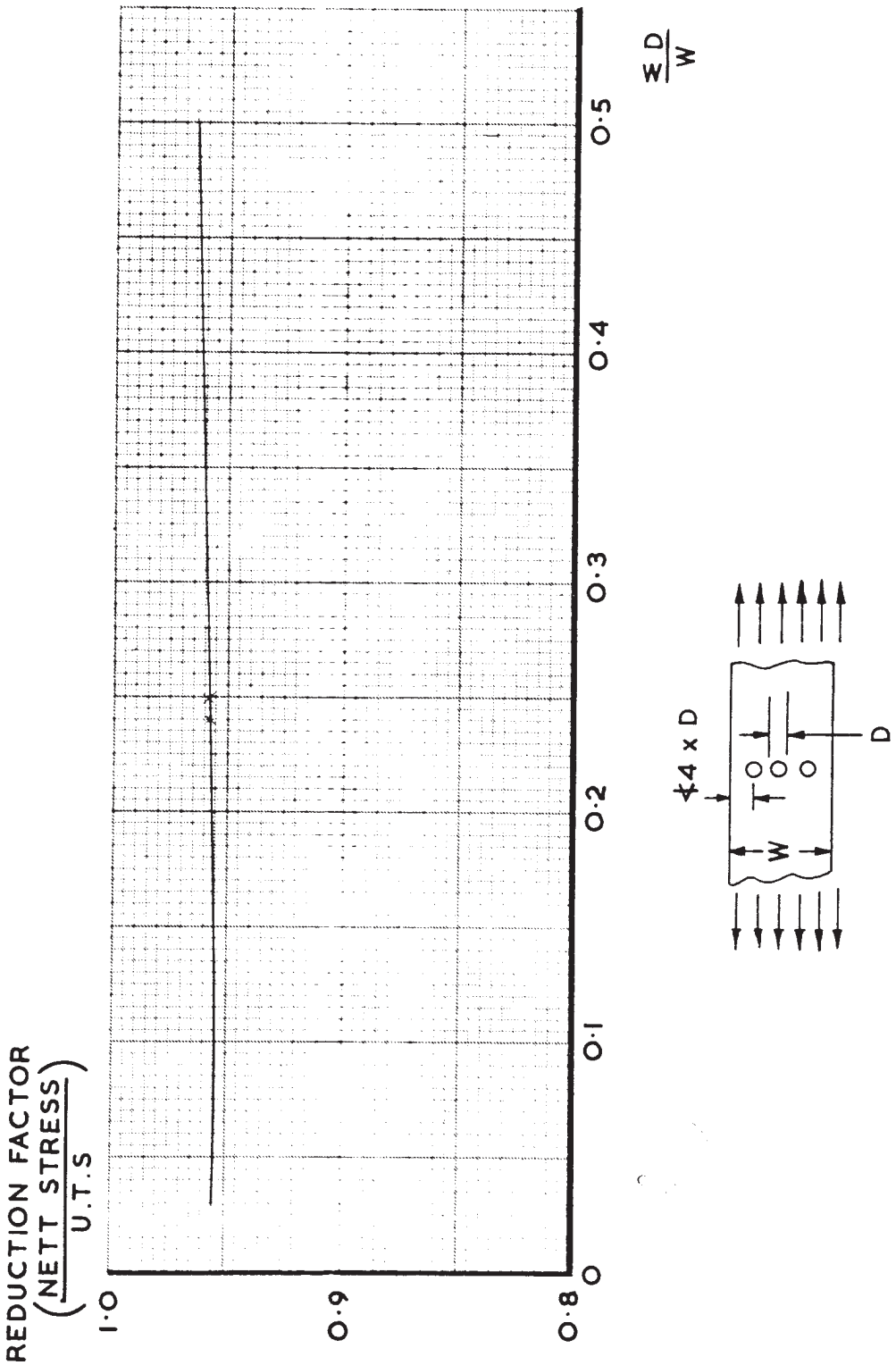
For extruded bar, in the naturally aged condition, the factor given is for bars loaded in the direction of the longitudinal grain. Tests on 2024-T3 extruded bar suggests that when loaded in the transverse direction the factors will be approximately 10% higher than when loaded in the longitudinal direction.

For extruded bar in the precipitation treated condition it may be assumed that the factors are independent of grain direction.

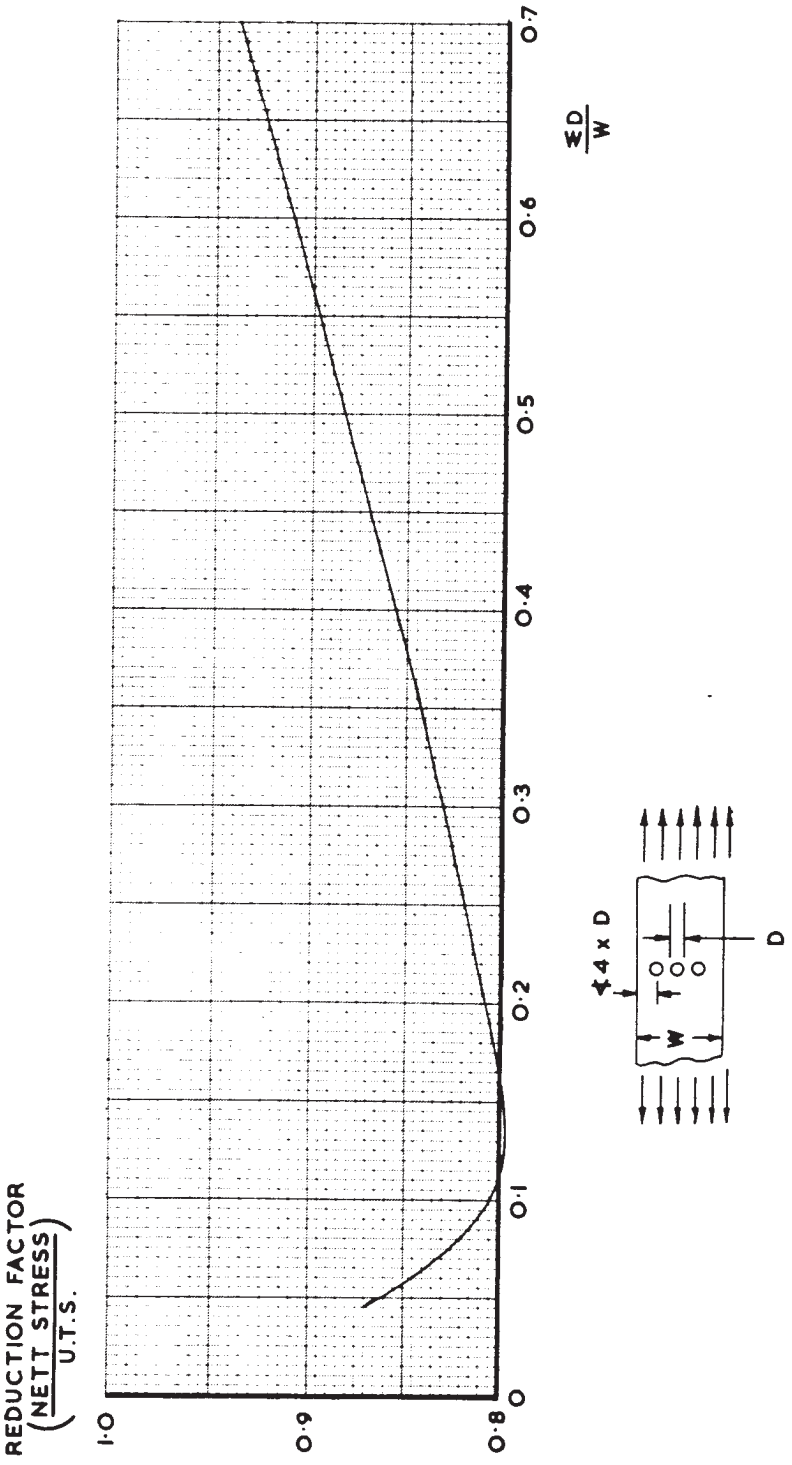
Test specimens used to establish reduction factors all had holes symmetrically positioned with a minimum edge distance of 4 x D for multi-hole specimens.



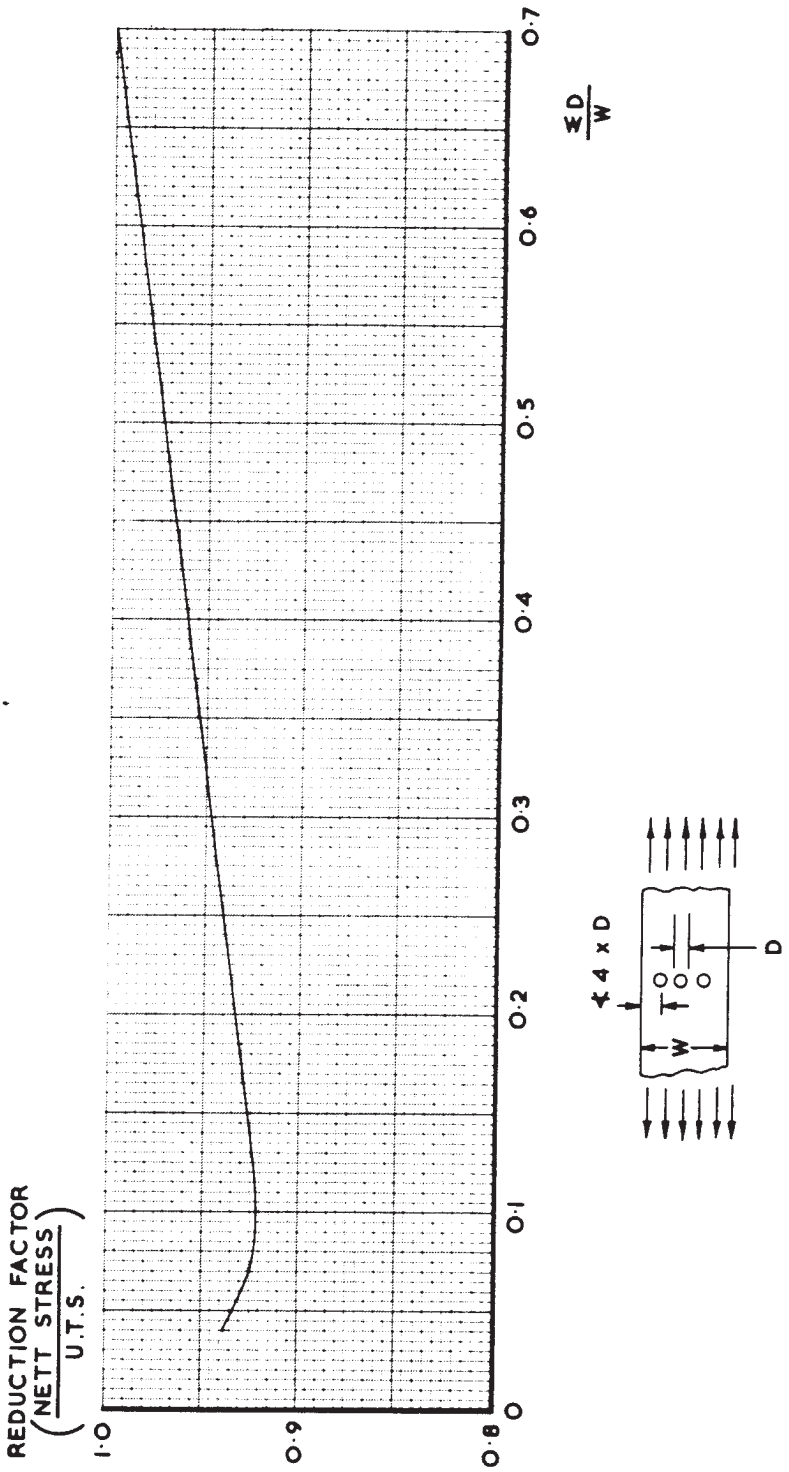
Copper based aluminium alloy sheet and plate, naturally aged
(BS. L. 89; S. 07. 1009; DTD 5010; DTD 5030; DTD 5090; DTD 5100)
Fig. 1



Copper and zinc based aluminium alloy sheet and plate, precipitation treated
(BS. 2L. 73; BS. L. 90; BS. L. 88; S. 07. 1101; S. 07. 1202;
DTD 5070A; DTD 5020A; DTD 5050; DTD 5060A)
Fig. 2



Copper based aluminium alloy extruded bar, naturally aged
(BS. L. 64; S. 07. 1003)
Fig. 3



Copper and zinc based aluminium alloy extruded bar precipitation treated
(BS. L. 65; DTD 5014; DTD 5074)
Fig. 4