International Standard ISO 4964

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION•МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ•ORGANISATION INTERNATIONALE DE NORMALISATION

Steel — Hardness conversions

Aciers — Conversions de dureté

First edition — 1984-11-01

UDC 669.14 : 620.178.152.22/.42 **Ref. No. ISO 4964-1984 (E)**

Descriptors : steels, hardness tests, Brinell hardness, Vickers hardness, Rockwell hardness, conversion of units.

Price based on 7 pages

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 4964 was prepared by Technical Committee ISO/TC 17, *Steel*.

Printed in Switzerland

INTERNATIONAL STANDARD ISO 4964-1984 (E)

Steel — Hardness conversions

0 Introduction

This International Standard makes comparisons between the Vickers test and the Brinell and Rockwell tests. The Vickers and Brinell tests (see ISO 6506, and ISO 6507/1 and ISO 6507/2) are similar in that they both have a hardness scale based on force per unit area whereas the Rockwell test (see ISO/R 80) is based on measurement of depth of indentation after recovery.

Whilst conversions dealing with hardness can never be mathematically exact and are therefore only approximate, it is nevertheless of considerable value to be able to compare different hardness scales in a general way.

The shape of the indenter and hence the distribution of strain will vary between the test methods, and the hardness determined by the three test methods will correspond to different degrees of work hardening. Thus the experimental correlation between hardnesses will vary from one steel to another.

Additionally, there are known causes of anomalous values in hardness testing which include :

a) variations in the finish of lower surface of hardness test specimen;

b) differences in the shape of the spherical type of diamond indenters;

c) variation of hardness due to non-homogeneity of the steel.

1 Scope

This International Standard specifies conversion bands for hardness scales for steel. It compares hardness values for the following standard methods :

Vickers/Brinell (steel ball)	HV-HBS
Vickers/Brinell (hardmetal ball)	HV-HBW
Vickers/Rockwell scale A	HV-HRA
Vickers/Rockwell scale B	HV-HRB
Vickers/Rockwell scale C	HV-HRC
Vickers/Rockwell scale D	HV-HRD

2 Field of application

2.1 The conversion bands specified in this International Standard only apply to non-alloy and low-alloy steels for products of homogeneous structure and of thickness equal to or greater than the figure given in the relevant test standard.

2.2 In cases of dispute only the hardness value obtained from the hardness test specified in the product standard should be used.

2.3 Converted hardness values shall not be used as a basis for rejection of the steel.

2.4 The conversion values specified in this International Standard shall only be used, for example, if suitable apparatus is not available or if the necessary samples cannot be taken from the test piece.

3 References

ISO/R 80, *Rockwell hardness test (*B *and* C *scales) for steel.*

ISO 6506, *Metallic materials — Hardness test — Brinell test.*

ISO 6507, *Metallic materials — Hardness test — Vickers test —*

Part 1 : HV 5 *to* HV 100.

Part 2 : HV 0,2 *to less than* HV 5.

4 Conversion bands

Figures 1 to 6 give the limit lines for the containment of the accepted values for the following hardness conversion bands :

HV-HBS	figure 1
HV-HBW	figure 2
HV-HRA	figure 3
HV-HRB	figure 4
HV-HRC	figure 5
HV-HRD	figure 6

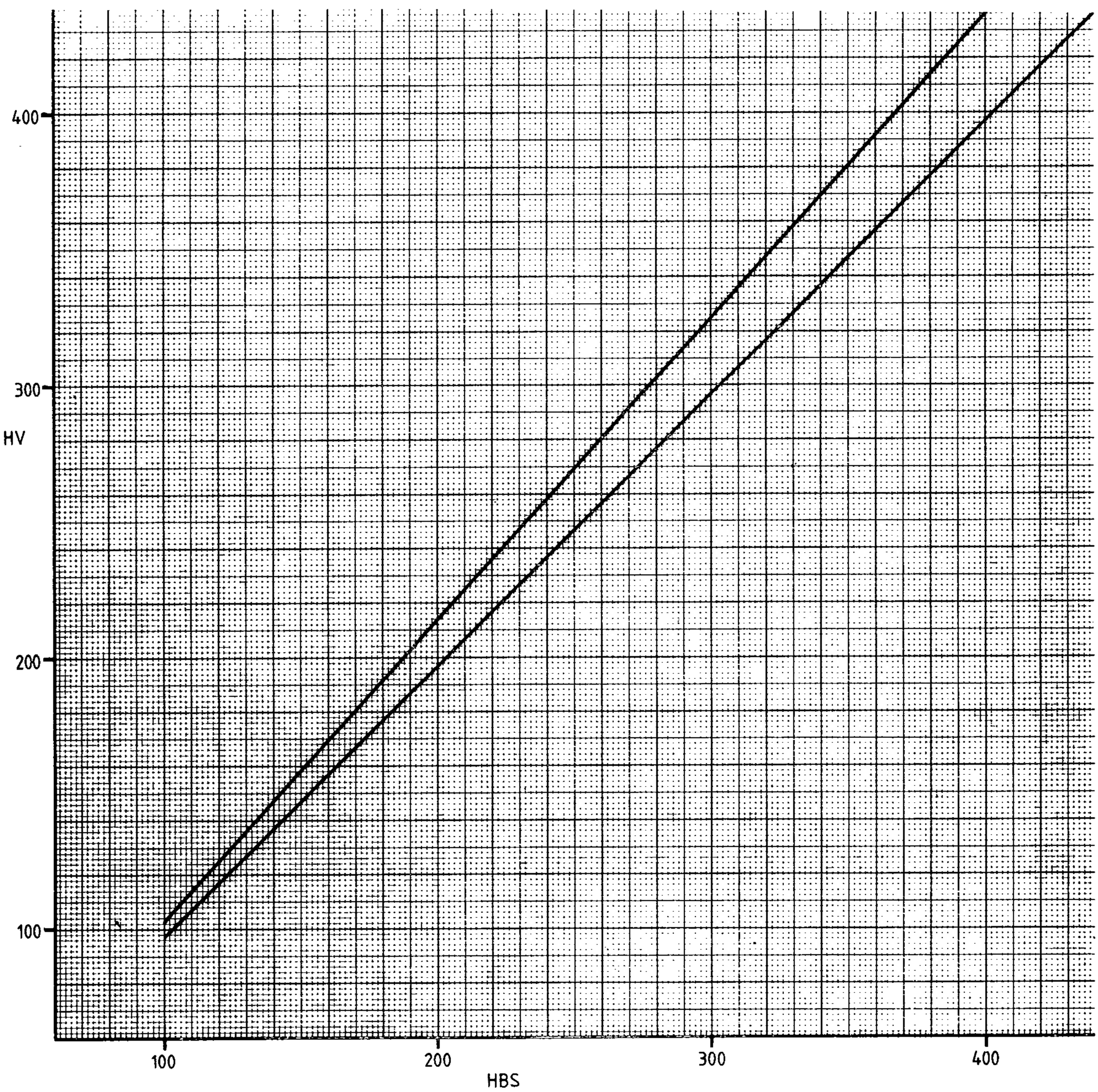

Figure 1 — Limit lines for the containment of accepted values for HV-HBS (steel ball)

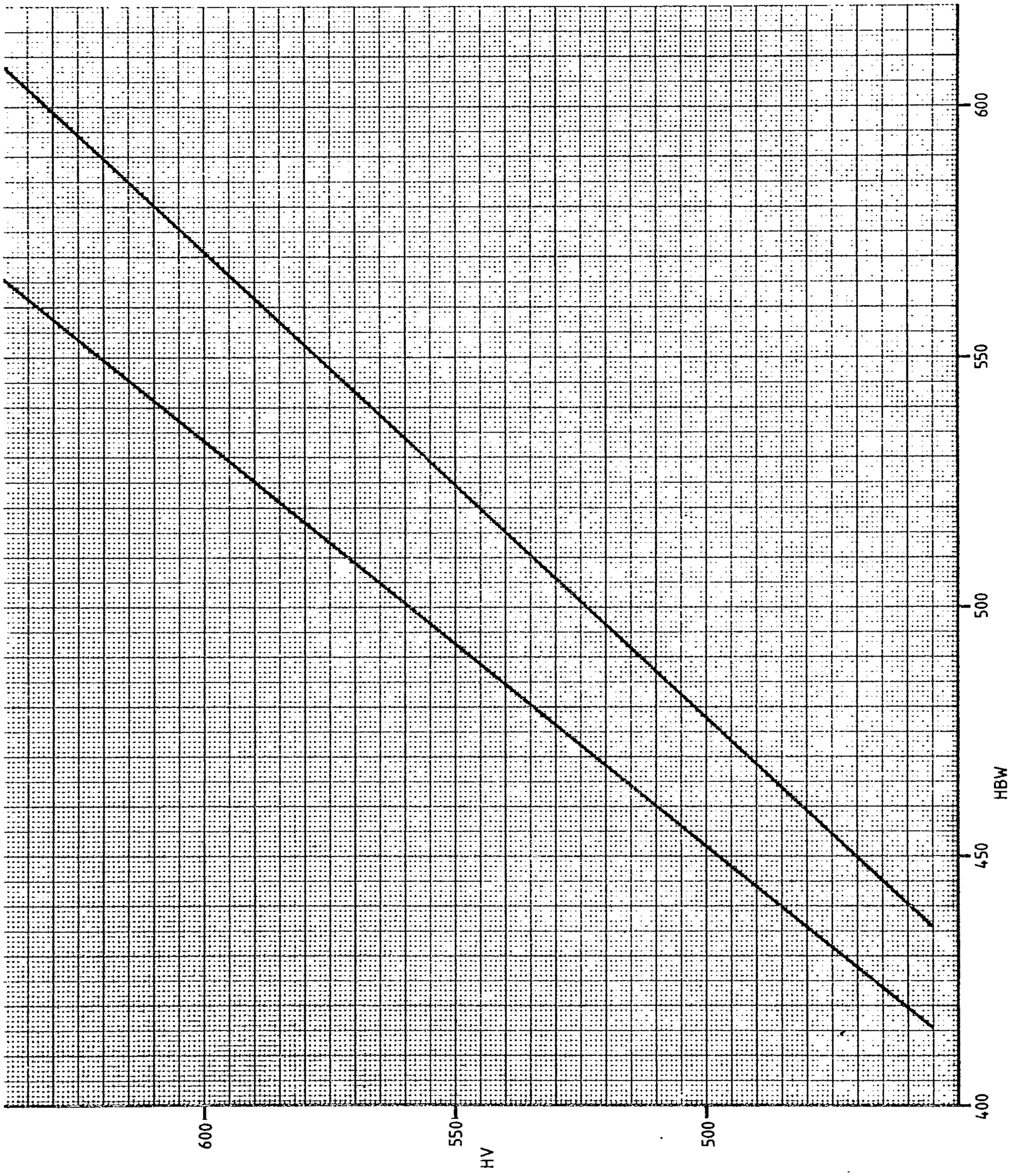

Figure 2 — Limit lines for the containment of accepted values for HV-HBW (hardmetal ball)

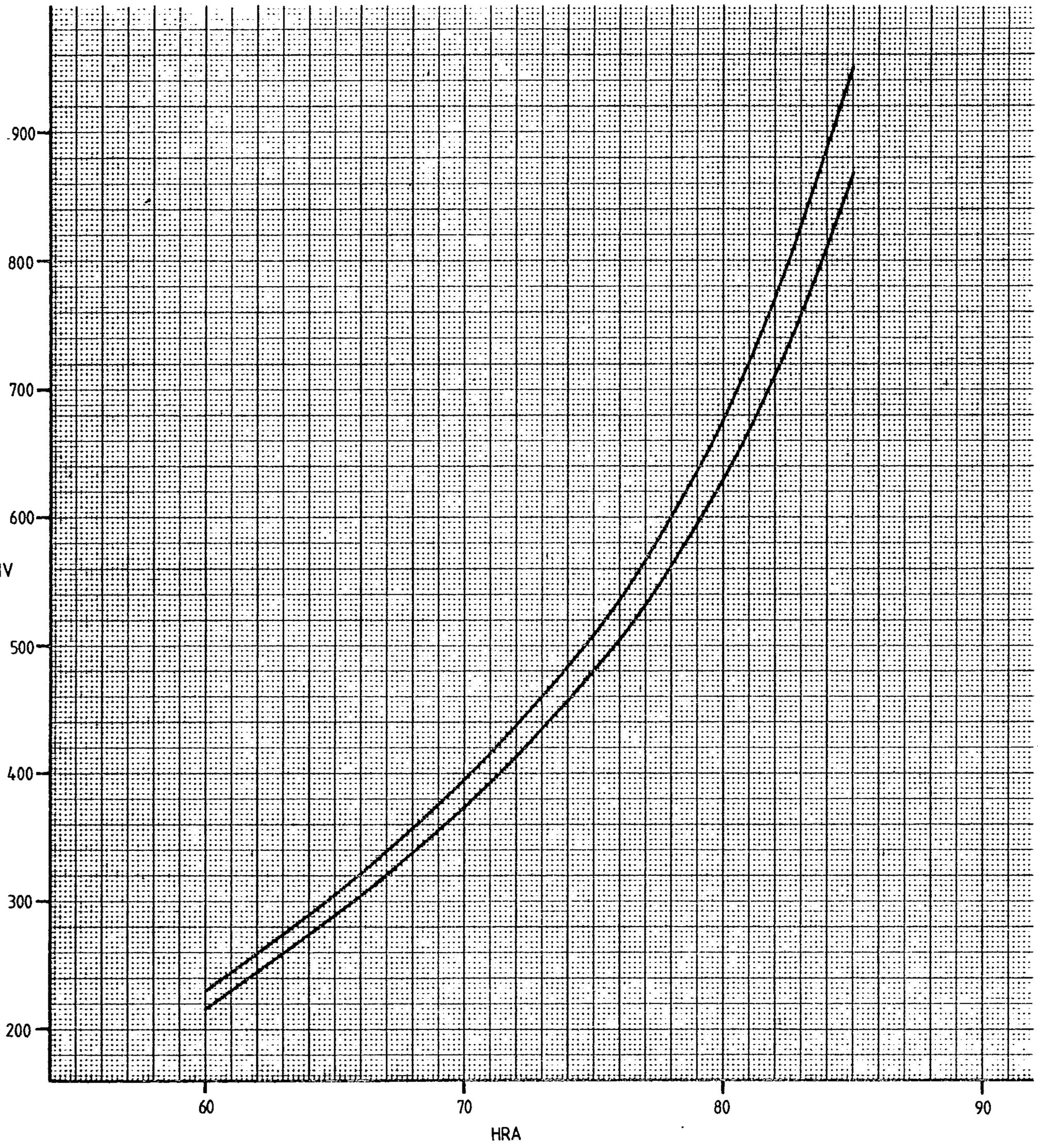

Figure 3 — Limit lines for the containment of accepted values for HV-HRA

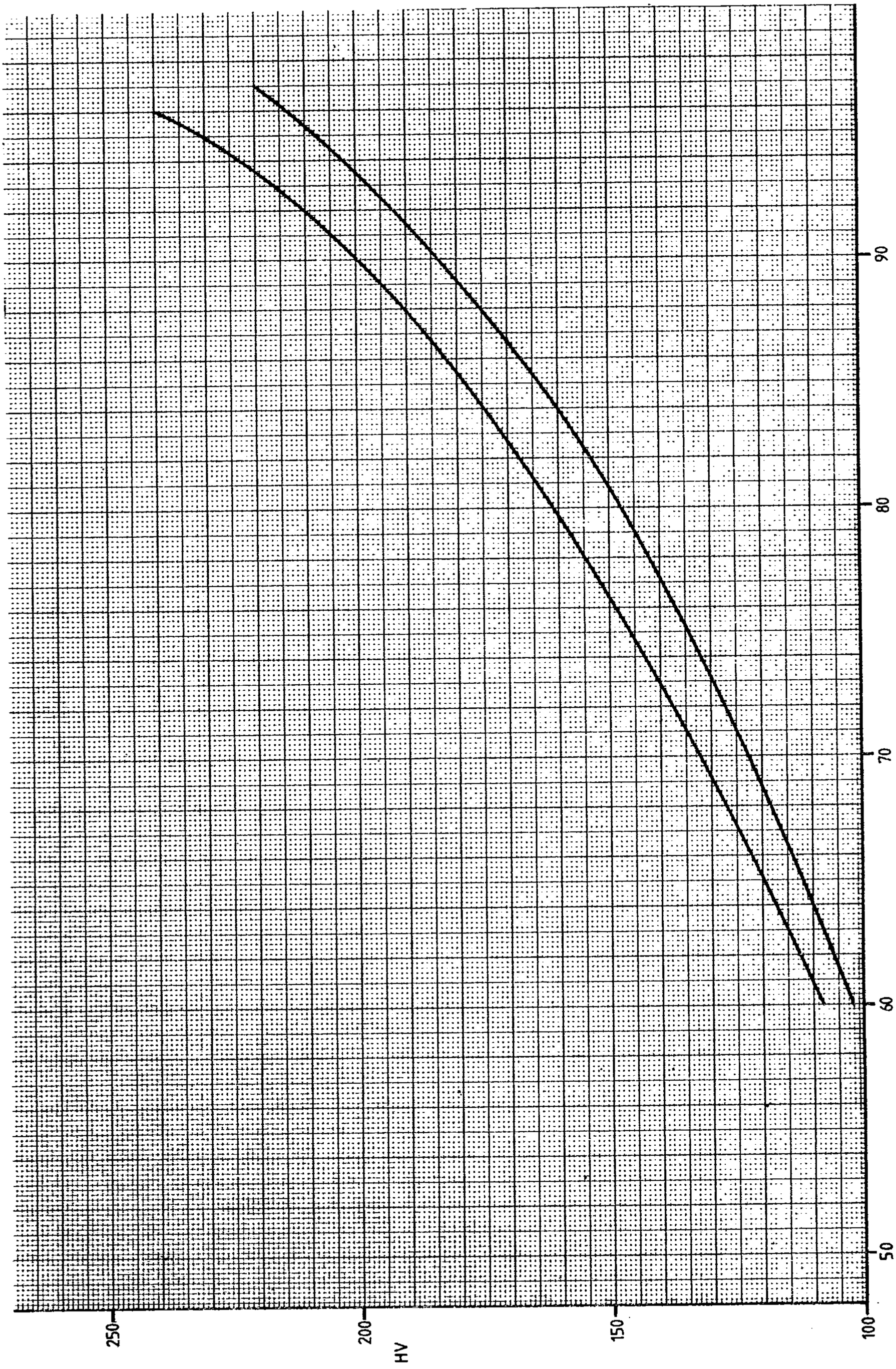

Figure 4 — Limit lines for the containment of accepted values for HV-HRB

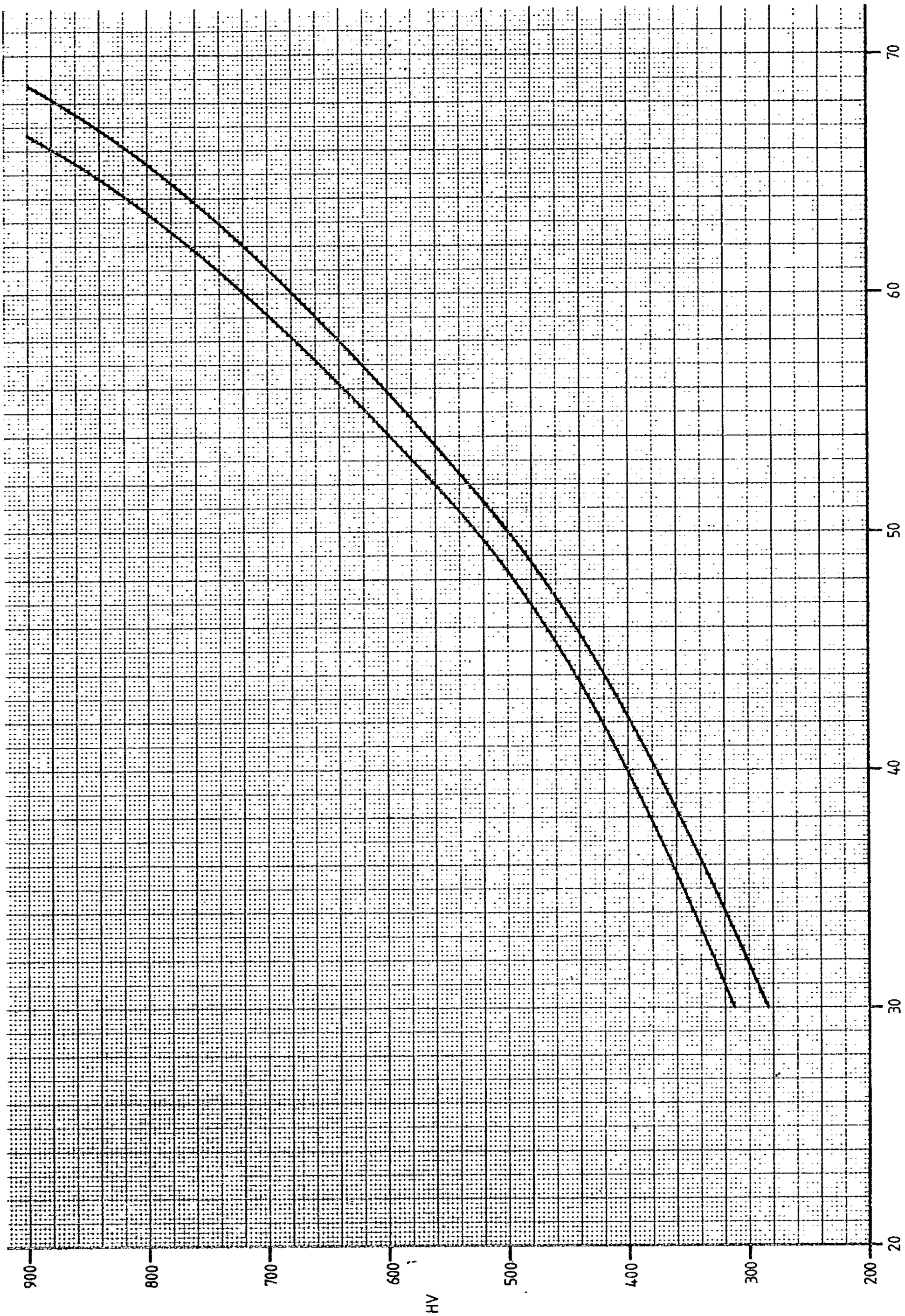

Figure 5 — Limit lines for the containment of accepted values for HV-HRC

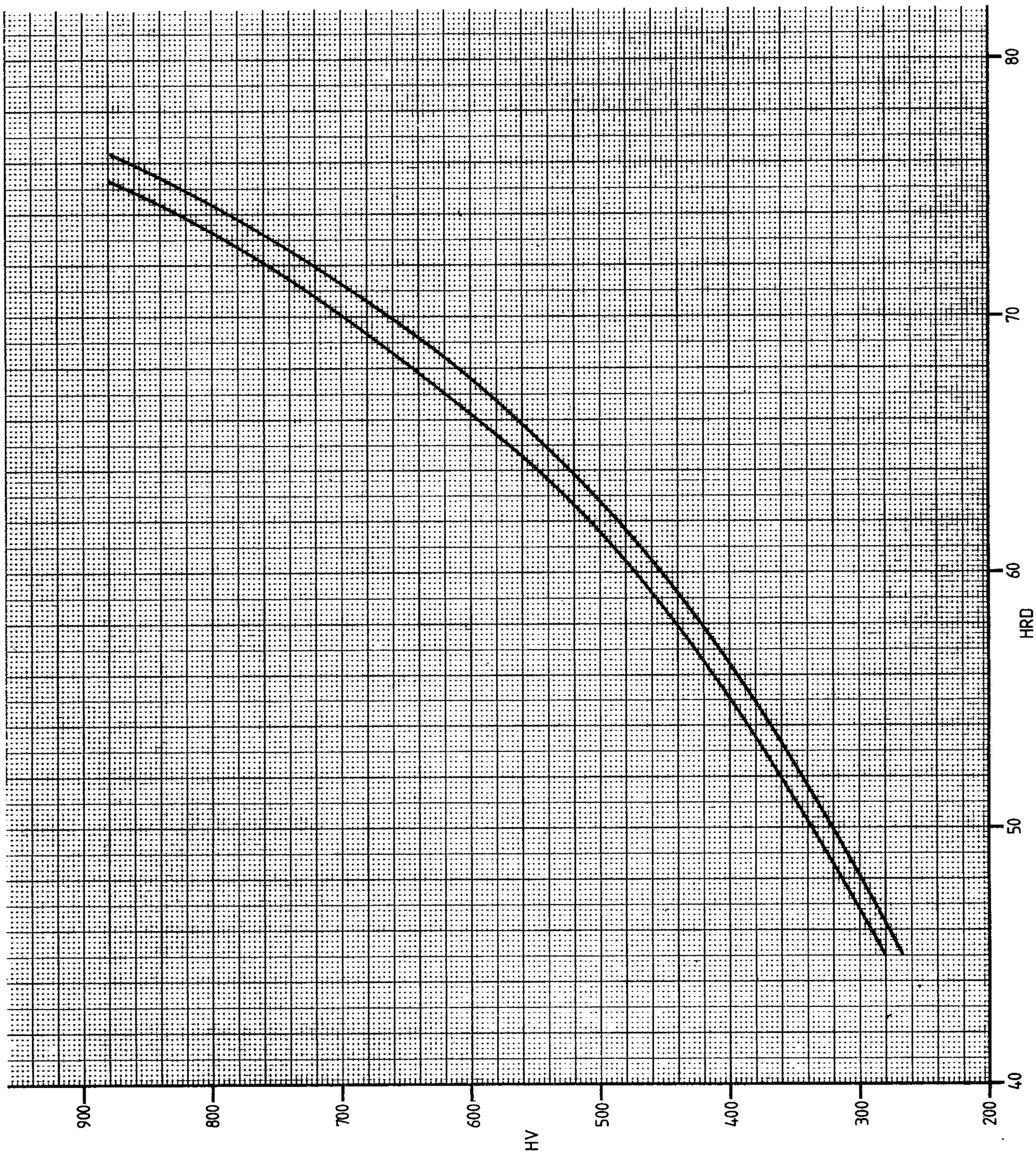

Figure 6 — Limit lines for the containment of accepted values for HV-HRD