British Standard

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BRITISH STANDARD

BS EN
12814-8:2001

Testing of welded joints of thermoplastics semi-finished products —

Part 8: Requirements

The European Standard EN 12814-8:2001 has the status of a British Standard

ICS 25.160.40

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The UK participation in its preparation was entrusted to Technical Committee PRI/80, Welding of plastics, which has the responsibility to:

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— present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;

— monitor related international and European developments and promulgate them in the UK.

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This British Standard, having been prepared under the direction of the Sector Policy and Strategy Committee for Materials and Chemicals, was published under the authority of the Standards Policy and Strategy Committee on 15 November 2001

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EUROPEAN STANDARD

NORME EUROPÉENNE

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September 2001

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English version

Testing of welded joints of thermoplastics semi-finished products - Part 8: Requirements

Essai des assemblages soudés sur produits semi-finis en thermoplastiques - Partie 8: Exigences

Prüfen von Schweißverbindungen aus thermoplastischen Kunststoffen - Teil 8: Anforderungen

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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 249 "Plastics", the secretariat of which is held by IBN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by March 2002, and conflicting national standards shall be withdrawn at the latest by March 2002.

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Introduction

This document is not complete but contains all available information known at the time of writing.

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1 Scope

This European Standard provides the requirements for the tests made on welded thermoplastics semi-finished products.

The selection of the appropriate test method(s) should be made in accordance with the particular type and application of welded product.

The test results depend on the conditions of manufacture for the test specimen and on the test conditions. They can therefore only be related to the behaviour of the product or can only be used for designing a structure, if the test conditions can be related to the service conditions.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 12814-1, *Testing of welded joints of thermoplastics semi-finished products – Part 1 : Bend test.*

EN 12814-2, *Testing of welded joints of thermoplastics semi-finished products – Part 2 : Tensile test.*

EN 12814-3, *Testing of welded joints of thermoplastics semi-finished products – Part 3 : Tensile creep test.*

EN 12814-4, *Testing of welded joints of thermoplastics semi-finished products – Part 4 : Peel test.*

EN 12814-5, *Testing of welded joints of thermoplastics semi-finished products – Part 5 : Macroscopic examination.*

EN 12814-6, *Testing of welded joints of thermoplastics semi-finished products – Part 6 : Low temperature tensile test.*

prEN 12814-7, *Testing of welded joints of thermoplastics semi-finished products – Part 7 : Tensile test with waisted test specimens.*

3 Symbols and abbreviations

HT Heated tool welding

HG Hot gas welding

EX Extrusion welding (continuous)

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4 Materials and properties

This standard is applicable to the thermoplastic materials listed in Table 1.

Table 1 — Materials and symbols

Symbol	Material
PE	Polyethylene
PP [a]	Polypropylene
PP-B	Polypropylene block copolymer
PP-H	Polypropylene homopolymer
PP-R	Polypropylene random copolymer
PVC-C	Polyvinyl chloride chlorinated
PVC-U [b]	Polyvinyl chloride unplasticised
PVC-NI	Polyvinyl chloride normal impact
PVC-RI	Polyvinyl chloride raised impact
PVDF	Polyvinylidene fluoride
[a] PP includes PP-B, PP-H and PP-R.	
[b] PVC-U includes PVC-NI and PVC-RI.	

5 Destructive test methods

The dimensions and the methods for sampling and preparing test specimens, together with the conditions for carrying out destructive tests are given in the standards shown in Table 2.

Table 2 — Destructive test methods for welded joints

Test method	Standard
Bend test	EN 12814-1
Tensile test	EN 12814-2
Tensile creep test	EN 12814-3
Peel test	EN 12814-4
Macroscopic examination	EN 12814-5
Low temperature tensile test	EN 12814-6
Tensile test with waisted test specimen	prEN 12814-7

6 Requirements

The semi-finished products used for the welded joints shall comply with the relevant standards.

The welded joints shall meet the requirements specified hereafter.

6.1 Bend test

6.1.1 Bend angle

The individual measure value of the bend angle shall be greater than or equal to the values given in Figures 1 to 6.

For PVC-C, the requirements shall be agreed between the contracting parties.

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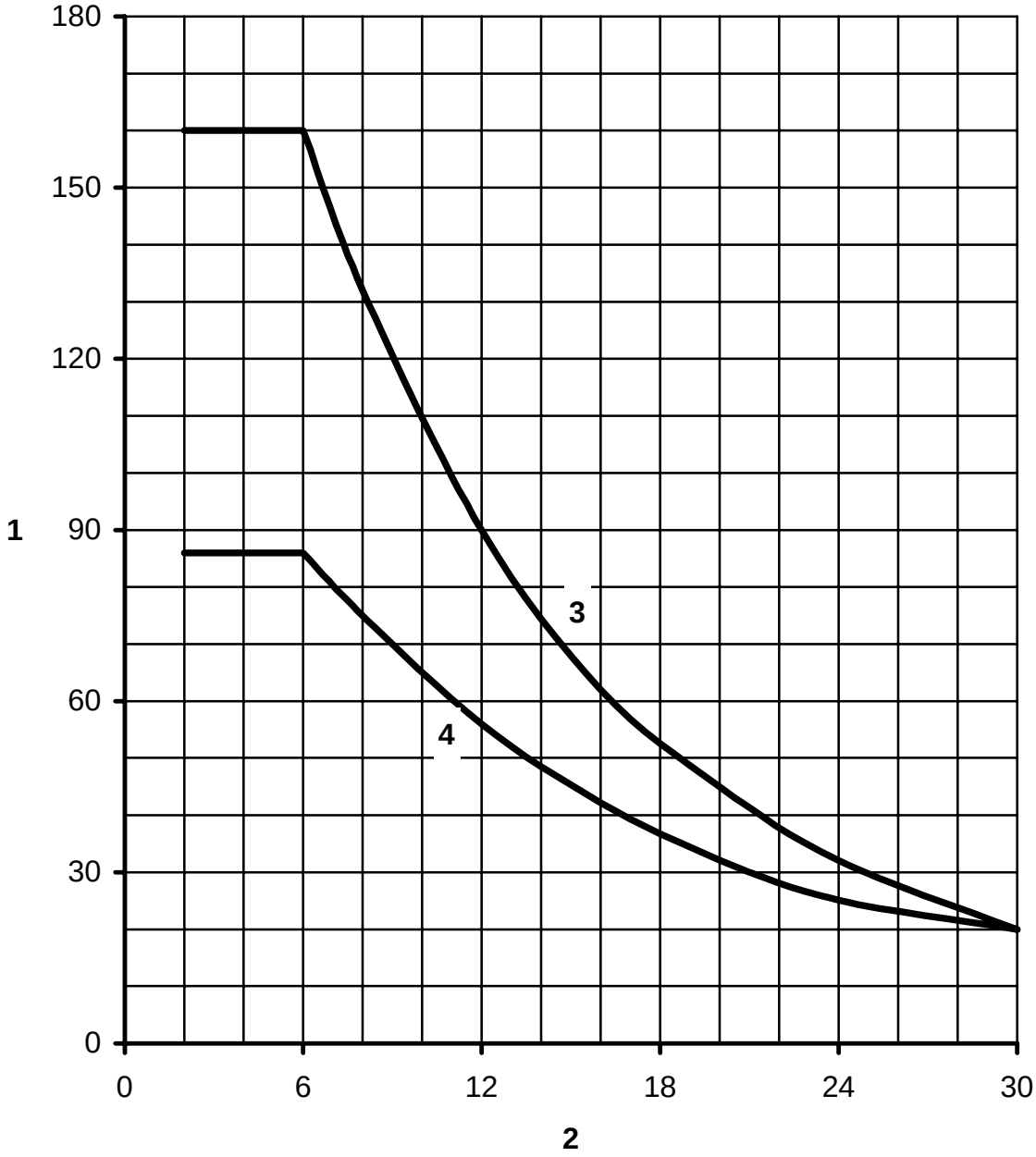

Key

1 Bend angle in °
2 Test specimen thickness in mm
3 HT
4 EX, HG

Figure 1 — Minimum bend angle for PE (density ≥ 0,94)

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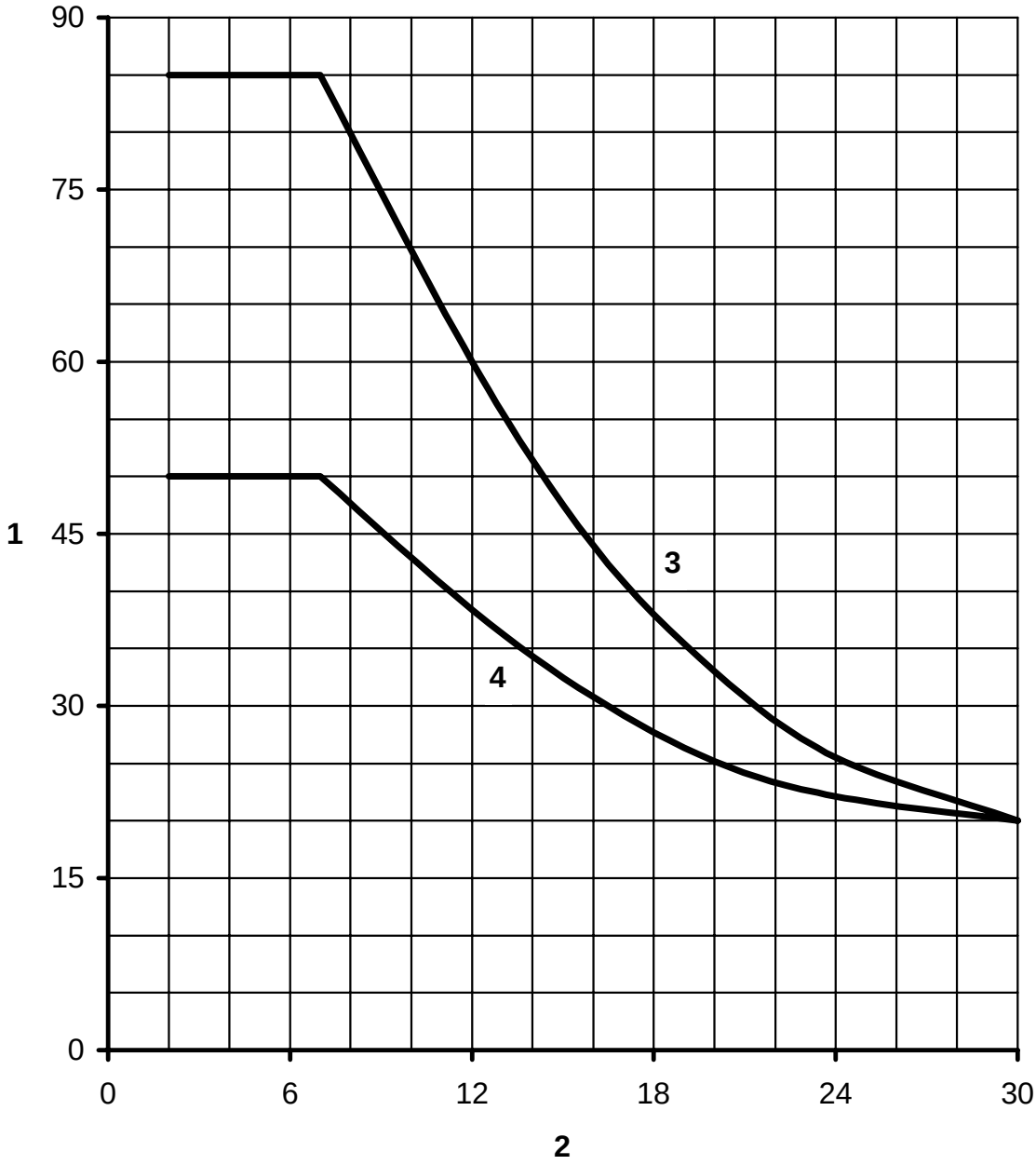

Key

1 Bend angle in °
2 Test specimen thickness in mm
3 HT
4 EX, HG

Figure 2 — Minimum bend angle for PP-B and PP-H

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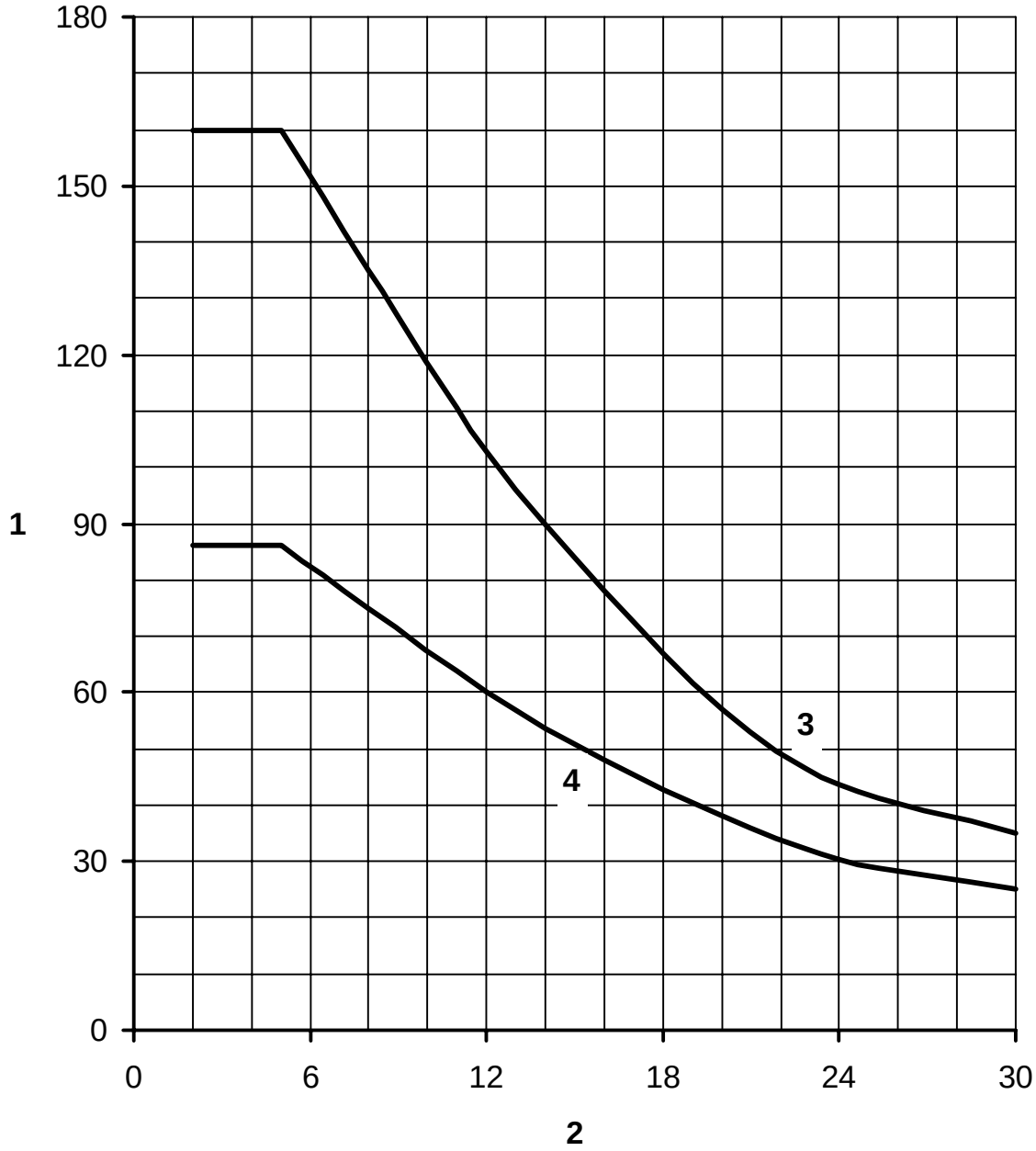

Key

1 Bend angle in °
2 Test specimen thickness in mm
3 HT
4 EX, HG

Figure 3 — Minimum bend angle for PP-R

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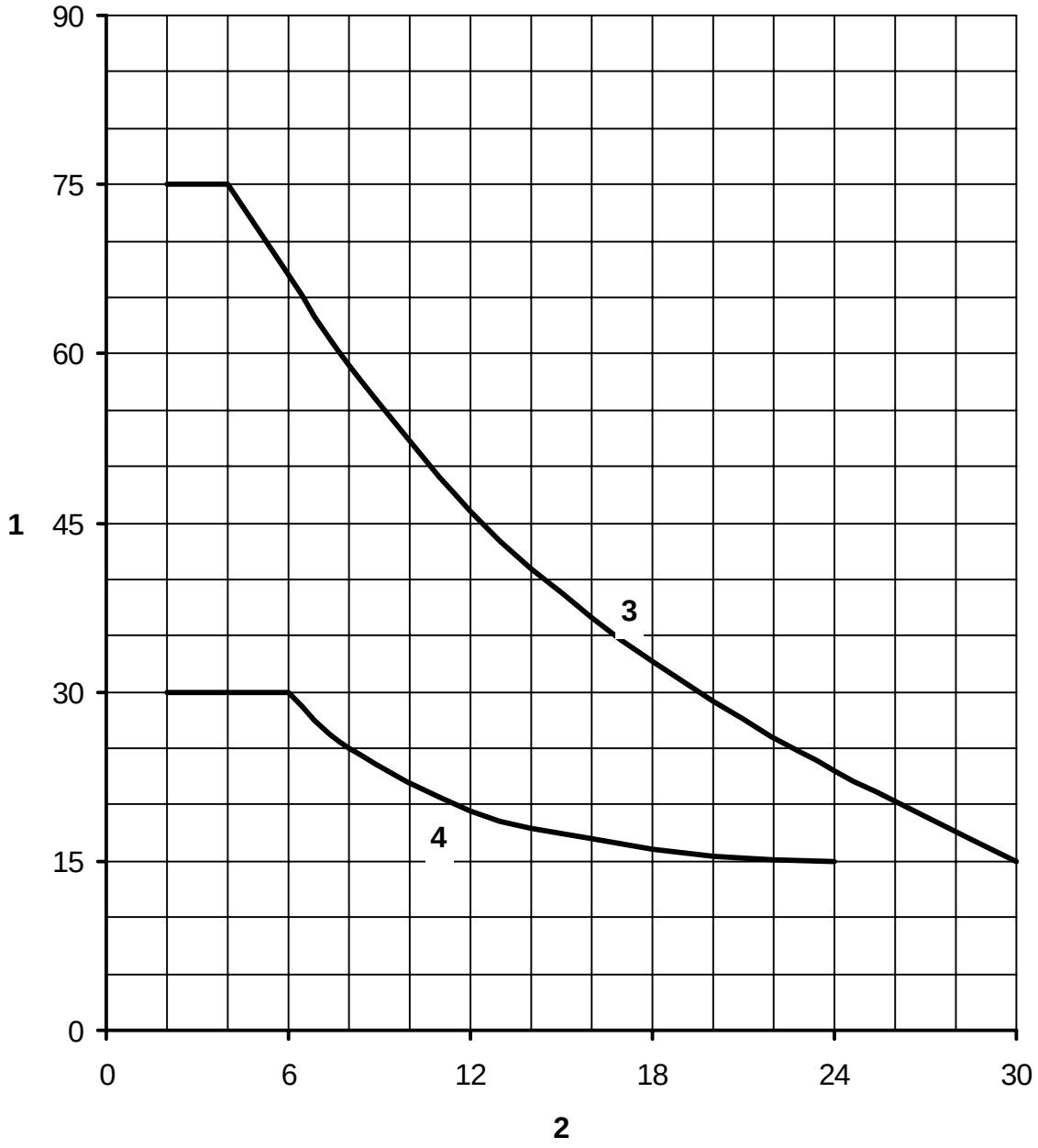

Key

1 Bend angle in °
2 Test specimen thickness in mm
3 HT
4 HG

Figure 4 — Minimum bend angle for PVC-NI

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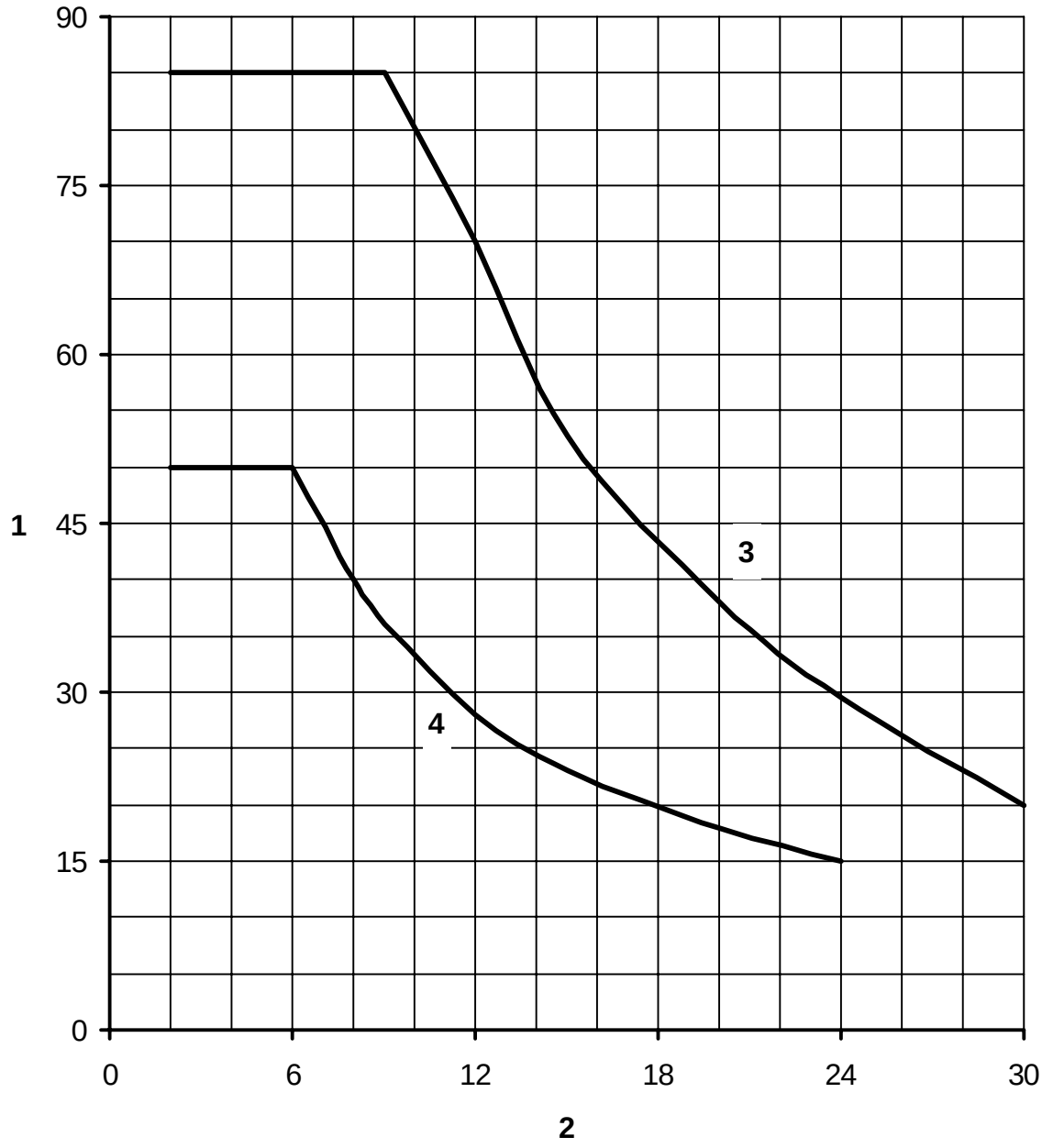

Key

1 Bend angle in °
2 Test specimen thickness in mm
3 HT
4 HG

Figure 5 — Minimum bend angle for PVC-RI

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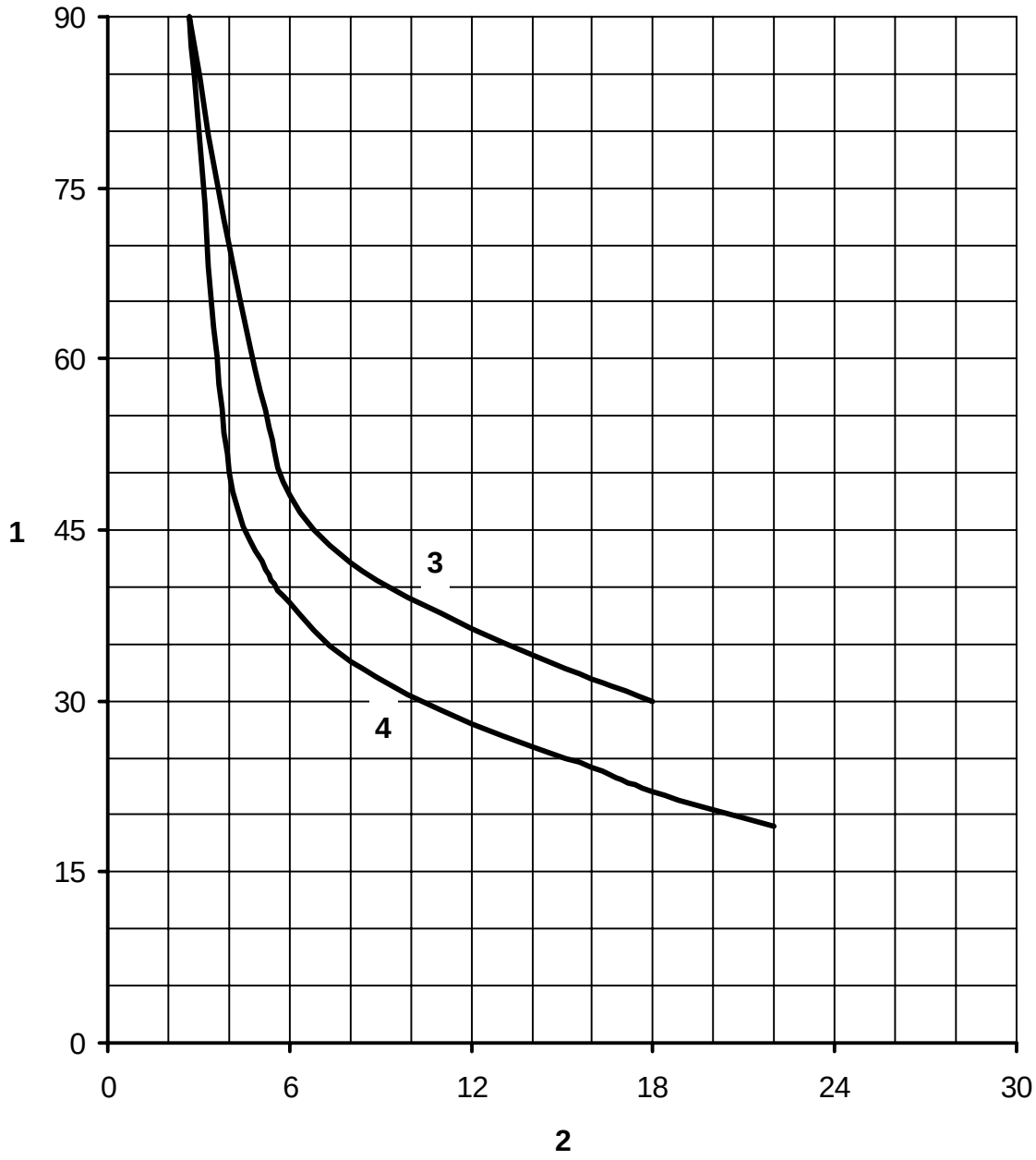

Key

1 Bend angle in °
2 Test specimen thickness in mm
3 HG
4 HT

Figure 6 — Minimum bend angle for PVDF

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6.1.2 Displacement

The individual measured values of the ram displacement shall be greater than or equal to the values given in Figures 7 to 10.

For PP-B, PP-H, PVC-C and PVC-RI, the requirements shall be agreed between the contracting parties.

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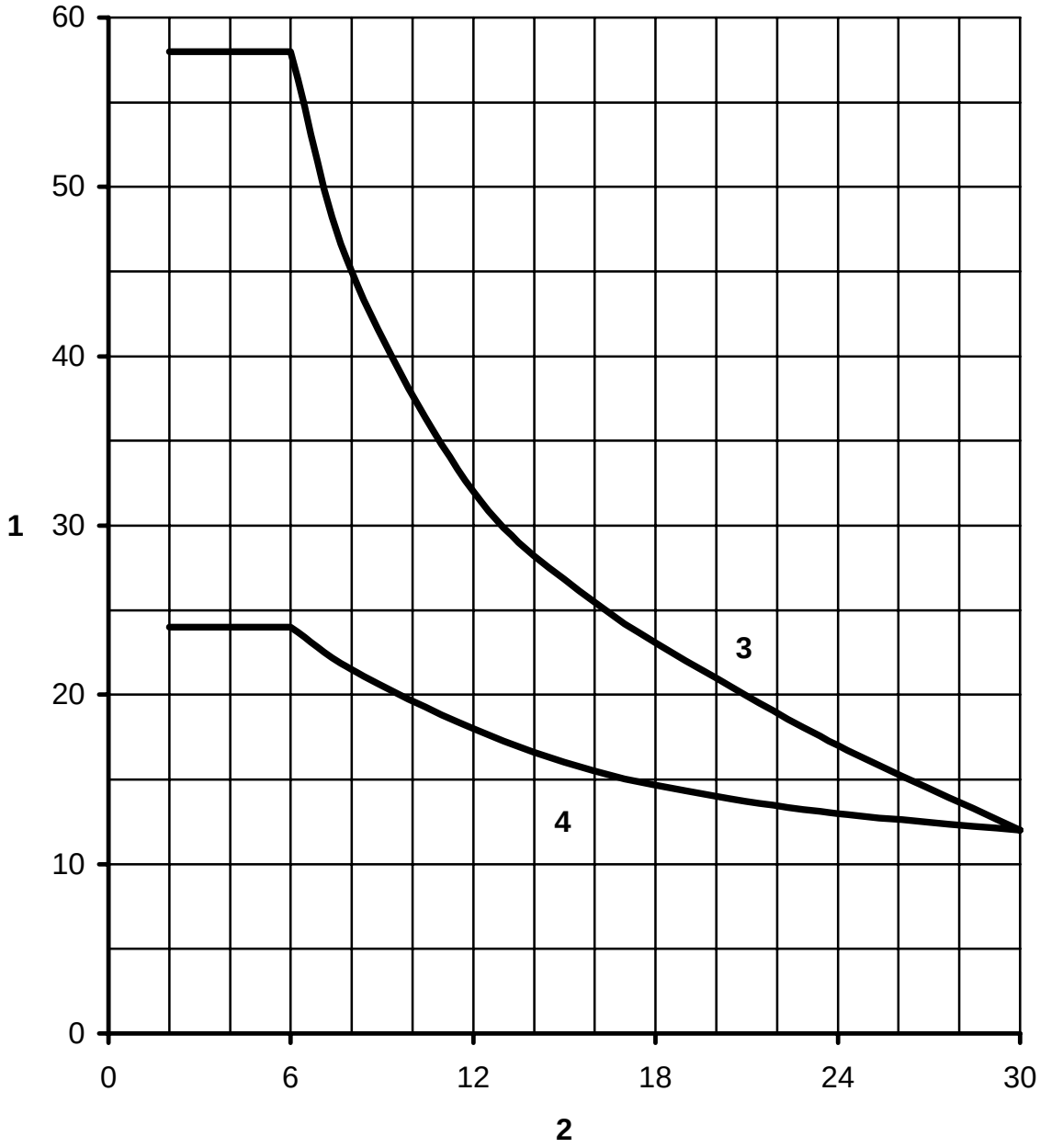

Key

1 Ram displacement in mm
2 Test specimen thickness in mm
3 HT
4 EX, HG

Figure 7 — Minimum ram displacement for PE (density ≥ 0,94)

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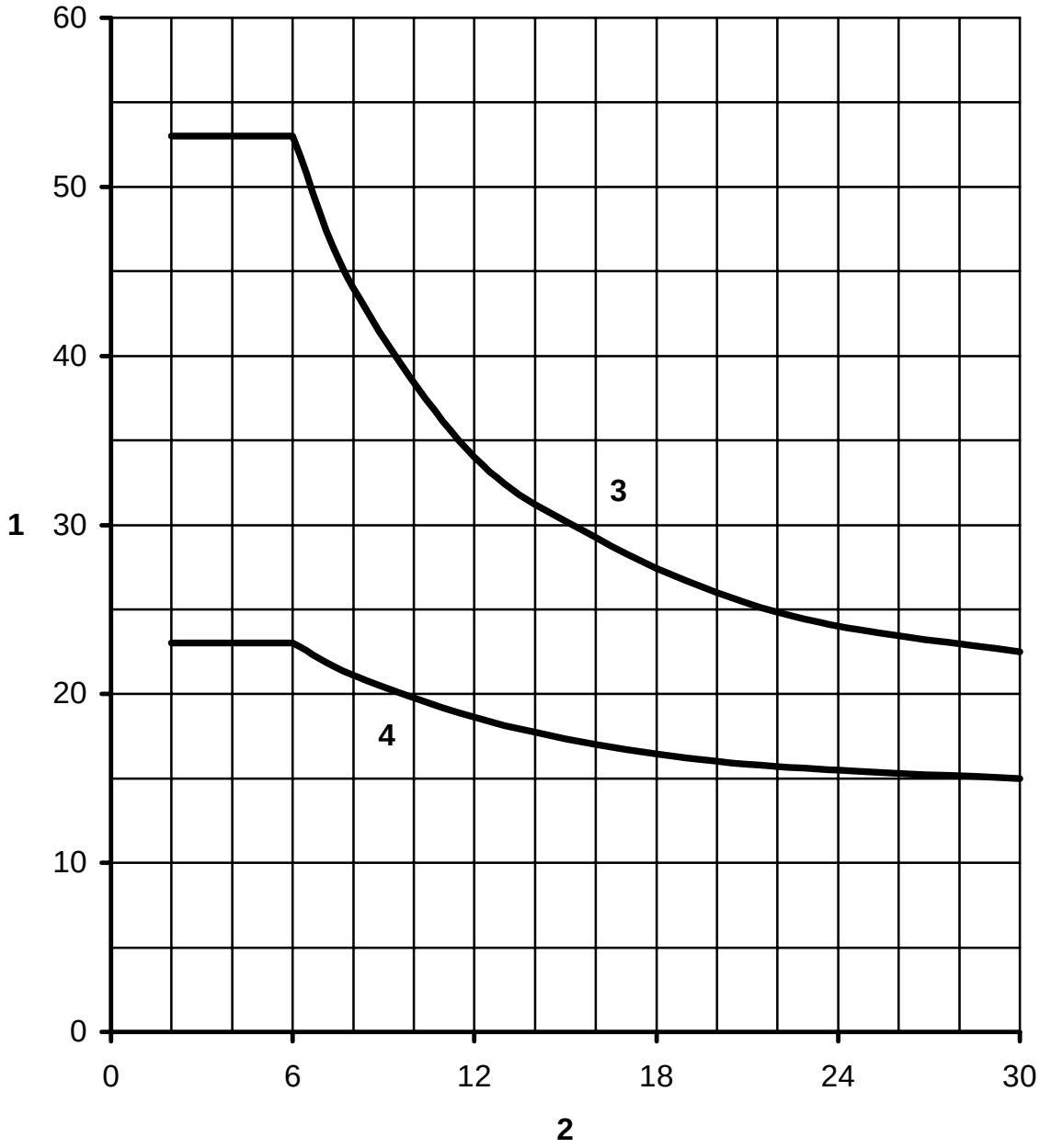

Key

1 Ram displacement in mm
2 Test specimen thickness in mm
3 HT
4 EX, HG

Figure 8 — Minimum ram displacement for PP-R

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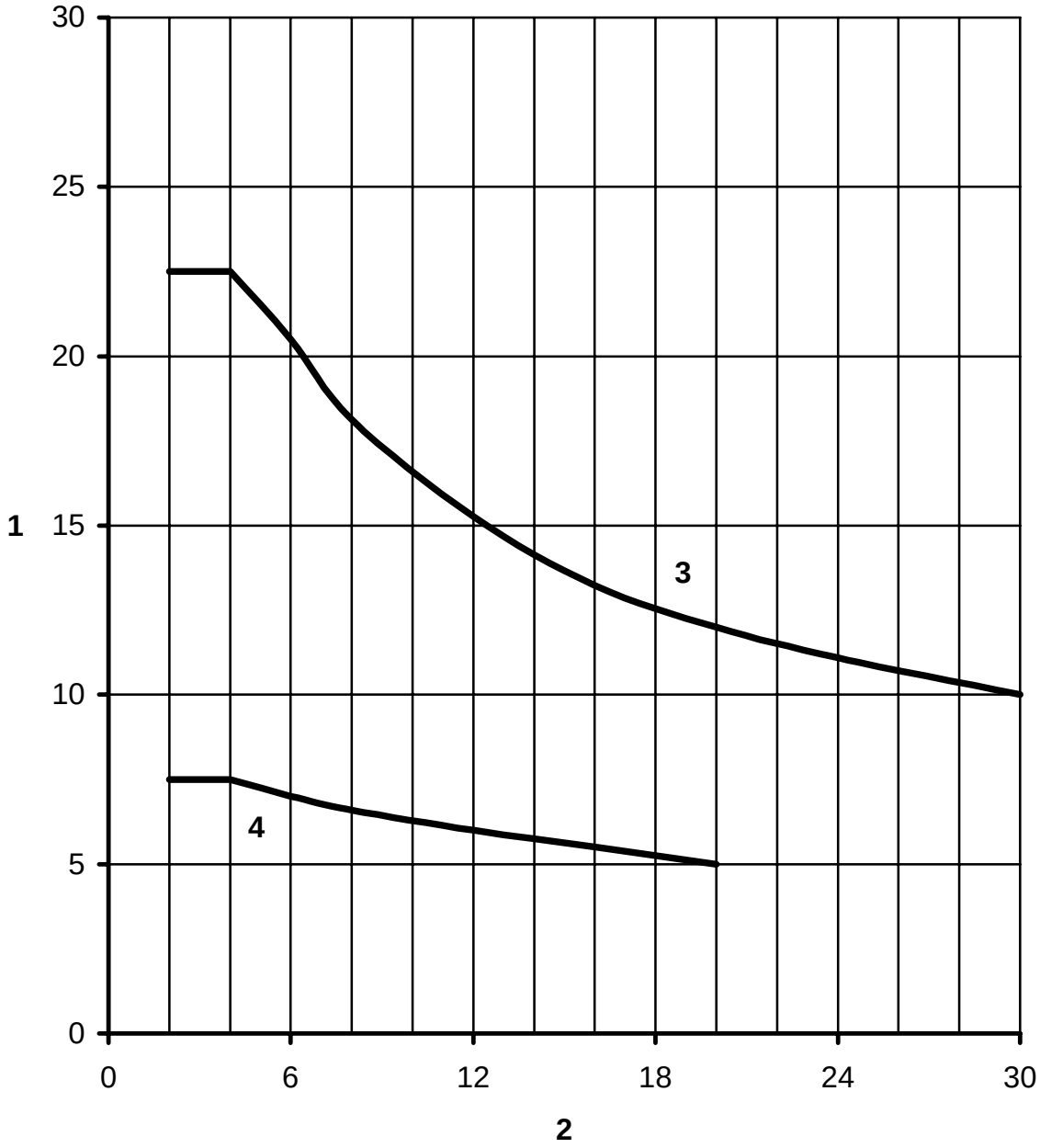

Key

1 Ram displacement in mm
2 Test specimen thickness in mm
3 HT
4 HG

Figure 9 — Minimum ram displacement for PVC-NI

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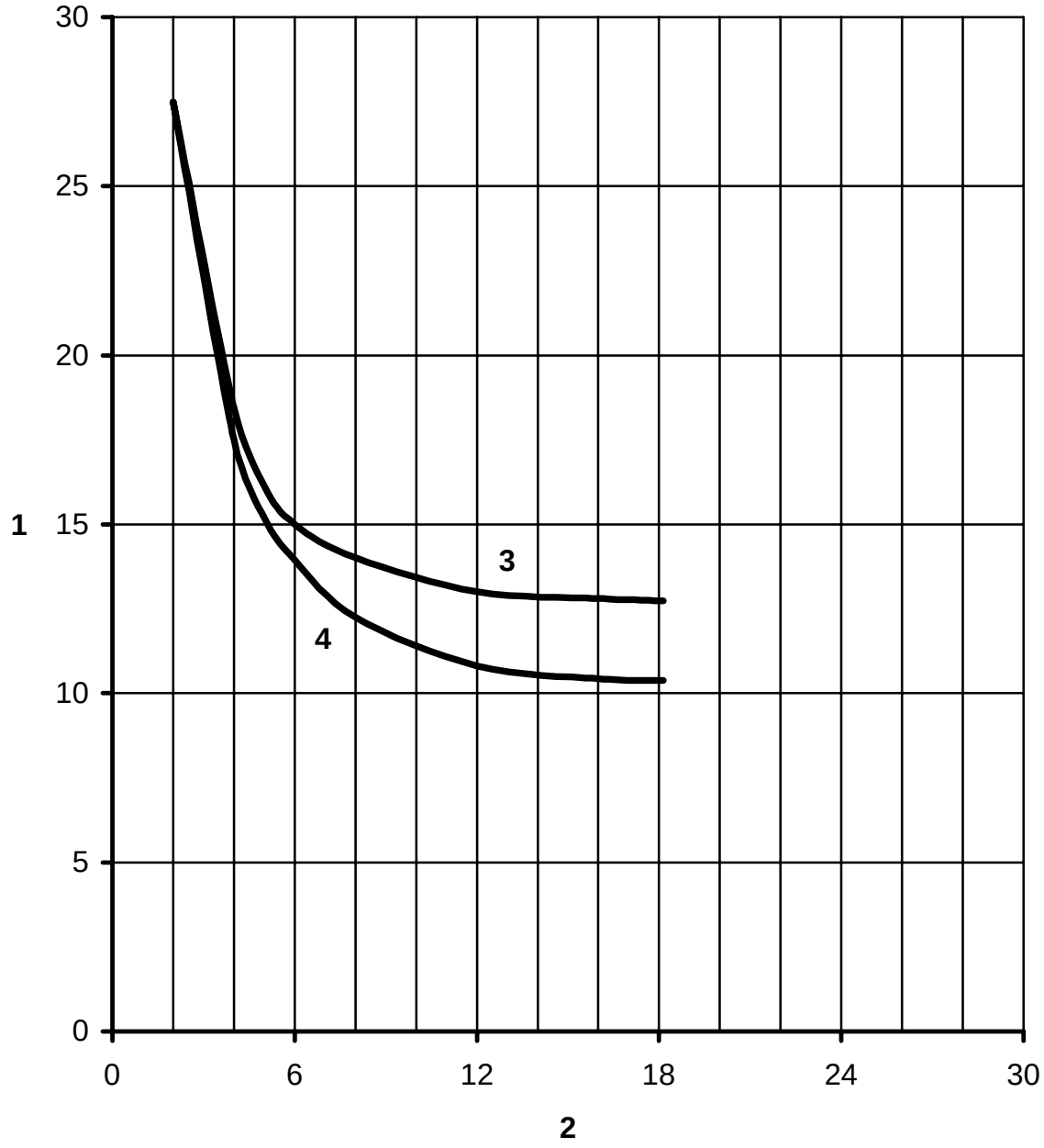

Key

1 Ram displacement in mm
2 Test specimen thickness in mm
3 HG
4 HT

Figure 10 — Minimum ram displacement for PVDF

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6.2 Tensile test

The calculated value of the short-term tensile welding factor f_s shall be greater than or equal to the values given in Table 3.

Table 3 — Requirements for the short-term tensile welding factor f_s

Process	Minimum short-term tensile welding factor f_s				
	PE	PP	PVC-C	PVC-U	PVDF
Heated tool welding	0,9	0,9	0,8	0,9	0,9
Extrusion welding (continuous)	0,8	0,8	a	a	a
Hot-gas welding	0,8	0,8	0,7	0,8	0,8
a Requirements to be agreed between the contracting parties.					

6.3 Tensile creep test

The calculated value of the long-term tensile welding factor f_l shall be greater than or equal to the values given in Table 4.

Table 4 — Requirements for the long term tensile welding factor f_l

Process	Minimum long term tensile welding factor f_l				
	PE	PP	PVC-C	PVC-U	PVDF
Heated tool welding	0,8	0,8	0,6	0,6	0,6
Extrusion welding (continuous)	0,6	0,6	a	a	a
Hot-gas welding	0,4	0,4	0,4	0,4	0,4
a Requirements to be agreed between the contracting parties.					

6.4 Peel tests

The T-Peel test requirements shall be agreed between the contracting parties.

For the decohesion test, rupture in the brittle mode shall not exceed 25 % of the length of the fusion interface for PE. For other materials, the requirements shall be agreed between the contracting parties.

For the crush test, the length of fracture in the fusion plane parallel to the pipe axis, L_d, shall not be greater than the distance between the first two turns of wire of an electrofusion fitting.

For heated tool socket welds any resulting fracture shall not occur between the pipe and fitting.

6.5 Macroscopic examination

Macroscopic examination requirements are given by the relevant application standards.

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6.6 Low temperature tensile test

The calculated value of the low temperature tensile welding factor f_t shall be greater than or equal to the values given in Table 5.

Table 5 — Requirements for the low temperature tensile welding factor f_t

Minimum low temperature tensile welding factor f_t				
PE	**PP** [a]	**PVC-C**	**PVC-U**	**PVDF** [a]
[b]	0,9	[b]	[b]	0,8

[a] Butt welding by heated tool and infrared.

[b] Requirements to be agreed between the contracting parties.

6.7 Tensile test with waisted test specimen

For PE, the fracture mode shall be ductile.

For other materials, the requirements shall be agreed between the contracting parties.

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