

Specification for

Rotary form relieved gear cutters —

Part 2: Metric module

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The Government departments and scientific and industrial organizations marked with an asterisk in the above list, together with the following, were directly represented on the committee entrusted with the preparation of this British Standard:

Gauge and Toolmakers' Association	Navy and Vickers Gearing Research Association
Milling Cutter and Reamers' Association	
National Federation of Engineers' Tool Manufacturers	North East Coast Institution of Engineering and Shipbuilders

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Foreword

This British Standard has been prepared under the authority of the Mechanical Engineering Standards Committee and is based upon a draft submitted by the Milling Cutter and Reamer Association. It forms part of a series of standards for gear forming tools. Part 1:1954 of this standard deals with DP cutters and it will be retained in parallel with Part 2 as it is considered DP cutters will be required for repair work for some years to come.

The composite basic rack tooth profile adopted (Figure 2) is designed to avoid undercutting in gears having a small number of teeth, and it provides also suitable tip relief in the teeth cut.

A tooth profile diagram with table of dimensions for unit module cutters is provided for the setting out of the respective profiles of the full range of cutters used for standard uncorrected gears with no backlash ranging from a 12 tooth pinion to a rack.

Dimensions for bores, keys and keyways are selected from BS 122-3 and ISO 240.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 8, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

This Part of BS 2518 specifies certain dimensions for rotary form relieved gear cutters for milling spur and helical gears within the range 1 to 25 metric module.

Such cutters are deemed satisfactory for cutting gears intended to mesh together under conditions of service which are not critical.

NOTE It is not recommended that cutters designed in accordance with this standard be used for milling gears intended to mesh with generated gears. Where, however, it is found necessary to do this, a reduction in chordal thickness of the gear teeth is essential. (See Appendix A.)

2 References

The titles of the publications referred to in this standard are given on the inside back cover.

3 Definitions

For the purposes of this Part of BS 2518 the following definitions apply.

rotary form relieved gear cutter

a circular milling cutter having on its periphery teeth of such a form that it will cut out a single tooth space in a gear

form relief

the provision of a cutting clearance between the cutter teeth and the work. (See Figure 1 and Appendix B.)

the terms used in describing parts of rotary form relieved gear cutters are illustrated in Figure 1. General terms and notation relating to gears are given in BS 2519

4 Gear tooth form

Cutters shall be designed to cut gears corresponding to the 20° composite basic rack tooth profile shown in Figure 2.

It should be noted that the form of teeth obtained with any cutter is strictly correct only when the number of teeth of the gear is the smallest specified for the cutter.

A tooth profile layout diagram (Figure 3) for standard 20° pressure angle cutters is included to enable the profile of each cutter in the standard group to be accurately set out. The dimensions in Table 3 are calculated for unit module cutters. For any other module, the dimensions have to be multiplied by the corresponding value of the module.

5 Cutter groups

In accordance with rotary gear cutter practice, the standard group for any given pitch shall consist of eight cutters, numbered one to eight inclusive, for milling gears having the numbers of teeth specified in Table 1.

For helical gears, the *virtual* number of teeth, calculated as $z \sec^3 \beta$ should be used to select a cutter number, z being the actual number of teeth and β the helix angle of the gear.

6 Cutter dimensions

6.1 The cutter profiles shall be set out using the co-ordinates and radii in Table 3 multiplied by the module.

6.2 The tooth thickness s at depth $\bar{h}_a$ shall be as specified in Table 3, multiplied by the module. The tolerances on the tooth thickness shall be as specified in Table 4.

6.3 The diameters, bores and widths shall be as specified in Table 2.

6.4 The number of cutting teeth and the amount of cutting relief shall be at the discretion of the manufacturer.

7 Cutter keyways

Dimensions of keyways shall be as specified in Table 5.

8 Arbors and keys

Arbors and keys shall conform to the dimensions given in Table 6.

9 Marking

Cutters shall be marked with the following information where applicable. For convenience the symbols should be used.

a) Normal module	xm_n
b) Normal pressure angle at reference cylinder	$20^\circ \alpha_n$
c) Cutter number	$N^\circ x$
d) Range of teeth	$xz \text{ to } x_2z$
e) Cutting depth	$x \text{ mm CD}$
f) The number of this British Standard, i.e. BS 2518-2.	

The maker's identification mark or number, and material, may also be added if desired.