

ISO 6336-1:2006-09 (E)

Calculation of load capacity of spur and helical gears - Part 1: Basic principles, introduction and general influence factors

Contents		Page
Foreword		vi
Introduction		vii
1	Scope	1
2	Normative references	2
3	Terms, definitions, symbols and abbreviated terms	2
4	Basic principles	12
4.1	Application	12
4.1.1	Scuffing	12
4.1.2	Wear	12
4.1.3	Micropitting	12
4.1.4	Plastic yielding	12
4.1.5	Particular categories	12
4.1.6	Specific applications	12
4.1.7	Safety factors	13
4.1.8	Testing	15
4.1.9	Manufacturing tolerances	15
4.1.10	Implied accuracy	15
4.1.11	Other considerations	15
4.1.12	Influence factors	16
4.1.13	Numerical equations	18
4.1.14	Succession of factors in course of calculation	18
4.1.15	Determination of allowable values of gear deviations	18
4.2	Tangential load, torque and power	18
4.2.1	Nominal tangential load, nominal torque and nominal power	18
4.2.2	Equivalent tangential load, equivalent torque and equivalent power	19
4.2.3	Maximum tangential load, maximum torque and maximum power	19
5	Application factor K_A	19
5.1	Method A -- Factor K_{A-A}	20
5.2	Method B -- Factor K_{A-B}	20
6	Internal dynamic factor K_v	20
6.1	Parameters affecting internal dynamic load and calculations	20
6.1.1	Design	20
6.1.2	Manufacturing	21
6.1.3	Transmission perturbation	21
6.1.4	Dynamic response	21
6.1.5	Resonance	22
6.2	Principles and assumptions	22
6.3	Methods for determination of dynamic factor	22
6.3.1	Method A -- Factor K_{v-A}	22
6.3.2	Method B -- Factor K_{v-B}	23
6.3.3	Method C -- Factor K_{v-C}	23
6.4	Determination of dynamic factor using Method B: K_{v-B}	24
6.4.1	Running speed ranges	24
6.4.2	Determination of resonance running speed (main resonance) of a gear pair 3)	25

6.4.3	Dynamic factor in subcritical range ($N \leq N_S$)	27
6.4.4	Dynamic factor in main resonance range ($N_S < u \leq 1,15$)	30
6.4.5	Dynamic factor in supercritical range ($N > 1,5$)	30
6.4.6	Dynamic factor in intermediate range ($1,15 < N < 1,5$)	30
6.4.7	Resonance speed determination for less common gear designs	31
6.4.8	Calculation of reduced mass of gear pair with external teeth	33
6.5	Determination of dynamic factor using Method C: K_v -C	34
6.5.1	Graphical values of dynamic factor using Method C	35
6.5.2	Determination by calculation of dynamic factor using Method C	39
7	Face load factors K_H and K_F	39
7.1	Gear tooth load distribution	39
7.2	General principles for determination of face load factors K_H and K_F	40
7.2.1	Face load factor for contact stress K_H	40
7.2.2	Face load factor for tooth root stress K_F	40
7.3	Methods for determination of face load factor -- Principles, assumptions	40
7.3.1	Method A -- Factors K_H -A and K_F -A	41
7.3.2	Method B -- Factors K_H -B and K_F -B	41
7.3.3	Method C -- Factors K_H -C and K_F -C	41
7.4	Determination of face load factor using Method B: K_H -B	41
7.4.1	Number of calculation points	41
7.4.2	Definition of K_H	41
7.4.3	Stiffness and elastic deformations	42
7.4.4	Static displacements	45
7.4.5	Assumptions	45
7.4.6	Computer program output	45
7.5	Determination of face load factor using Method C: K_H -C	45
7.5.1	Effective equivalent misalignment F_y	47
7.5.2	Running-in allowance y and running-in factor	47
7.5.3	Mesh misalignment, f_{ma}	59
7.5.4	Component of mesh misalignment caused by case deformation, f_{ca}	61
7.5.5	Component of mesh misalignment caused by shaft displacement, f_{be}	62
7.6	Determination of face load factor for tooth root stress using Method B or C: K_F	63
8	Transverse load factors K_H and K_F	63
8.1	Transverse load distribution	63
8.2	Determination methods for transverse load factors -- Principles and assumptions	63
8.2.1	Method A -- Factors K_H -A and K_F -A	63
8.2.2	Method B -- Factors K_H -B and K_F -B	64
8.3	Determination of transverse load factors using Method B -- K_H -B and K_F -B	64
8.3.1	Determination of transverse load factor by calculation	64
8.3.2	Transverse load factors from graphs	65
8.3.3	Limiting conditions for K_H	65
8.3.4	Limiting conditions for K_F	65
8.3.5	Running-in allowance y	66
9	Tooth stiffness parameters c and c	70
9.1	Stiffness influences	70
9.2	Determination methods for tooth stiffness parameters -- Principles and assumptions	70
9.2.1	Method A -- Tooth stiffness parameters c_A and c -A	70
9.2.2	Method B -- Tooth stiffness parameters c_B and c -B	71
9.3	Determination of tooth stiffness parameters c and c according to Method B	71
9.3.1	Single stiffness, c	72
9.3.2	Mesh stiffness, c	74
Annex A (normative)	Additional methods for determination of f_{sh} and f_{ma}	76
Annex B (informative)	Guide values for crowning and end relief of teeth of cylindrical gears	79
Annex C (informative)	Guide values for K_H -C for crowned teeth of cylindrical gears	82
Annex D (informative)	Derivations and explanatory notes	85
Annex E (informative)	Analytical determination of load distribution	89
Bibliography	109