Spur and helical gears

Description	Symbol	Unit	Equation for spur gears	Equation for helical gears
Normal module	m_n			
Transverse module	m_t		$= m_n$	$= m_n / \cos \beta$
Axial module	m_x		-	$= m_n / \sin \beta$
Normal Pressure Angle	α_n	degrees	20°	20°
Transverse Pressure Angle	α_t	degrees	$= \alpha_n$	$= tan^{-1} (\tan \alpha_n / \cos \beta)$
Helix angle	β	degrees	0°	15° ou 45°
Lead angle	λ	degrees	-	90-β
Number of teeth	Z			
Profile shift coefficient	x		0 as standard	0 as standard
Addendum	h_a	mm	$1.m_n$	$1.m_n$
Dedendum	h_f	mm	$1.25m_n$	$1.25m_n$
Tooth depth	h	mm	$2.25m_n$	$2.25m_n$
Gear ratio	R		$= Z_2 / Z_1$	$= Z_2 / Z_1$
Centre distance	a	mm	$= (d_1+d_2) / 2$	$= (d_1+d_2) / 2$
Pitch circle diameter	d	mm	$= Z.m_n$	$= Z.m_n=(Z.m_n) / \cos \beta$
Tip diameter	d_a	mm	$= d + (2m_n.x) + (2m_n)$	$= d + (2m_n.x) + (2m_n)$
Root diameter	d_r	mm	$= d_a - (2.h)$	$= d_a - (2.h)$
Normal pitch	p_n	mm	$= \pi.m_n$	$= \pi.m_n$
Transverse pitch	p_t		-	$= \pi.m_t=(\pi.m_n) / \cos \beta$
Axial pitch	p_x		-	$= \pi.m_t=(\pi.m_n) / \sin \beta$
Normal tooth thickness in pitch circle	s_n	mm	$= (p_n/2) + 2m_n.x.\tan \alpha_t$	$= (p_n/2) + 2m_n.x.\tan \alpha_n$
Transversal tooth thickness in pitch circle	s_t	mm	-	$= (p_t/2) + 2m_n.x.\tan \alpha_t$

When working with a pair of gears the subscripts 1 & 2 denote the input (drive) and the output (driven) gear.
Tip diameter is the theoretical diameter of the gear without tooth thickness tolerance applied.
For s_n & s_t when à x=0, this is the theoretical tooth thickness. Actual tooth thickness will be less.
The subscript e is for upper allowance values and i for lower allowance values.
A 15° right handed helical gear must be used with a 15° left handed helical gear.
A 45° right handed helical gear must be used with a 45° left handed helical gear.

Precision parallel helical gears have a helix angle of 15° and are not compatible with the standard range SH which has a helix angle of 17°45'.