
INTERNATIONAL STANDARD



965/III

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

**ISO general purpose metric screw threads — Tolerances —
Deviations for constructional threads**

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Descriptors : fasteners, screw threads, threads, screws, nuts (fasteners), dimensional tolerances, designation.

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FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO Member Bodies). The work of developing International Standards is carried out through ISO Technical Committees. Every Member Body interested in a subject for which a Technical Committee has been set up 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.

Prior to 1972, the results of the work of the Technical Committees were published as ISO Recommendations; these documents are now in the process of being transformed into International Standards. As part of this process, International Standard ISO 965/III replaces ISO Recommendation R 965/III-1969 drawn up by Technical Committee ISO/TC 1, *Screw threads*.

The Member Bodies of the following countries approved the Recommendation :

Argentina	France	Romania
Australia	Germany	South Africa, Rep. of
Austria	Greece	Spain
Belgium	India	Sweden
Brazil	Israel	Switzerland
Canada	Italy	Turkey
Chile	Japan	United Kingdom
Czechoslovakia	Korea, Rep. of	U.S.A.
Denmark	Netherlands	Yugoslavia
Egypt, Arab Rep. of	New Zealand	
Finland	Norway	

No Member Body expressed disapproval of the Recommendation.

This International Standard is one of a number of ISO publications determining tolerances for ISO metric screw threads. The complete set is made up as follows :

ISO 965/I, *ISO general purpose metric screw threads – Tolerances – Principles and basic data.*

ISO 965/II, *ISO general purpose metric screw threads – Tolerances – Limits of sizes for commercial bolt and nut threads – Medium quality.*

ISO 965/III, *ISO general purpose metric screw threads – Tolerances – Deviations for constructional threads.*

ISO/R 1501, *ISO miniature screw threads.*

ISO general purpose metric screw threads – Tolerances – Deviations for constructional threads

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies deviations for pitch and crest diameters for ISO general purpose metric screw threads conforming to ISO 261, *ISO general purpose metric screw threads – General plan*.

The deviations specified are derived from the fundamental deviations and tolerances specified in ISO 965/I.

2 DESIGNATION

Tolerances are designated by the relevant tolerance class as found under the heading "Tolerance class" in the tables.

Examples :

M6–6H
M6–5g6g

A fit between threaded parts is indicated by the nut thread tolerance designation followed by the bolt thread tolerance designation separated by a stroke.

Example :

M6–6H/5g6g

3 REMARKS

For nut threads as well as bolt threads, the actual root contour shall not in any point transgress the basic profile.

The tabulated values for the minor diameter of the bolt thread are calculated on the basis of an $H/6$ truncation and are to be used for stress calculations, etc.

For coated threads, the tolerances apply to the parts *before* coating, unless otherwise stated. After coating, the actual thread profile shall not in any point transgress the maximum material limits for position H or h respectively.

4 DEVIATIONS

ES, es = upper deviation
EI, ei = lower deviation

Basic major diameter		Pitch	Nut thread				Bolt thread						
over	up to and incl.		Tolerance class	Pitch diameter		Minor diameter		Tolerance class	Major diameter		Pitch diameter		Minor diameter (for stress calculations, etc.)
				<i>ES</i>	<i>EI</i>	<i>ES</i>	<i>EI</i>		<i>es</i>	<i>ei</i>	<i>es</i>	<i>ei</i>	
mm	mm			mm	μm	μm	μm		μm	μm	μm	μm	
0,99	1,4	0,2	-	-	-	-	3h4h	0	-36	0	-24	-29	
			4H	+40	0	+38	0	4h	0	-36	0	-30	-29
			5G	-	-	-	-	5g6g	-17	-73	-17	-55	-46
			5H	-	-	-	-	5h4h	0	-36	0	-38	-29
			-	-	-	-	-	5h6h	0	-56	0	-38	-29
			-	-	-	-	-	6e	-	-	-	-	-
			6G	-	-	-	-	6g	-17	-73	-17	-65	-46
			6H	-	-	-	-	6h	0	-56	0	-48	-29
			-	-	-	-	-	7e6e	-	-	-	-	-
			7G	-	-	-	-	7g6g	-	-	-	-	-
			7H	-	-	-	-	7h6h	-	-	-	-	-
			8G	-	-	-	-	8g	-	-	-	-	-
		8H	-	-	-	-	9g8g	-	-	-	-	-	
		0,25	-	-	-	-	3h4h	0	-42	0	-26	-36	
			4H	+45	0	+45	0	4h	0	-42	0	-34	-36
			5G	+74	+18	+74	+18	5g6g	-18	-85	-18	-60	-54
			5H	+56	0	+56	0	5h4h	0	-42	0	-42	-36
			-	-	-	-	-	5h6h	0	-67	0	-42	-36
			-	-	-	-	-	6e	-	-	-	-	-
			6G	-	-	-	-	6g	-18	-85	-18	-71	-54
			6H	-	-	-	-	6h	0	-67	0	-53	-36
			-	-	-	-	-	7e6e	-	-	-	-	-
			7G	-	-	-	-	7g6g	-	-	-	-	-
			7H	-	-	-	-	7h6h	-	-	-	-	-
			8G	-	-	-	-	8g	-	-	-	-	-
		8H	-	-	-	-	9g8g	-	-	-	-	-	
		0,3	-	-	-	-	3h4h	0	-48	0	-28	-43	
			4H	+48	0	+53	0	4h	0	-48	0	-36	-43
			5G	+78	+18	+85	+18	5g6g	-18	-93	-18	-63	-61
			5H	+60	0	+67	0	5h4h	0	-48	0	-45	-43
			-	-	-	-	-	5h6h	0	-75	0	-45	-43
			-	-	-	-	-	6e	-	-	-	-	-
			6G	+93	+18	+103	+18	6g	-18	-93	-18	-74	-61
			6H	+75	0	+85	0	6h	0	-75	0	-56	-43
			-	-	-	-	-	7e6e	-	-	-	-	-
			7G	-	-	-	-	7g6g	-	-	-	-	-
7H	-		-	-	-	7h6h	-	-	-	-	-		
8G	-		-	-	-	8g	-	-	-	-	-		
8H	-	-	-	-	9g8g	-	-	-	-	-			

ES, es = upper deviation
EI, ei = lower deviation

Basic major diameter		Pitch	Nut thread				Bolt thread							
over	up to and incl.		Tolerance class	Pitch diameter		Minor diameter		Tolerance class	Major diameter		Pitch diameter		Minor diameter (for stress calculations, etc.)	
				<i>ES</i>	<i>EI</i>	<i>ES</i>	<i>EI</i>		<i>es</i>	<i>ei</i>	<i>es</i>	<i>ei</i>		
				μm	μm	μm	μm		μm	μm	μm	μm		μm
mm	mm	mm												
1,4	2,8	0,2	-	-	-	-	3h4h	0	- 36	0	- 25	-29		
			4H	+ 42	0	+ 38	0	4h	0	- 36	0	- 32	-29	
			5G	-	-	-	-	5g6g	-17	- 73	- 17	- 57	-46	
			5H	-	-	-	-	5h4h	0	- 36	0	- 40	-29	
			-	-	-	-	5h6h	0	- 56	0	- 40	-29		
			-	-	-	-	6c	-	-	-	-	-		
			6G	-	-	-	6g	-17	- 73	-17	- 67	-45		
			6H	-	-	-	6h	0	- 56	0	- 50	-29		
			-	-	-	-	7e6e	-	-	-	-	-		
			7G	-	-	-	7g6g	-	-	-	-	-		
			7H	-	-	-	7h6h	-	-	-	-	-		
			8G	-	-	-	8g	-	-	-	-	-		
		8H	-	-	-	9g8g	-	-	-	-	-			
		-	-	0,25	-	-	-	-	3h4h	0	- 42	0	- 28	-33
		4H	+ 48		0	+ 45	0	4h	0	- 42	0	- 36	-33	
		5G	+ 78		+18	+ 74	+18	5g6g	-18	- 85	-18	- 63	-54	
		5H	+ 60		0	+ 56	0	5h4h	0	- 42	0	- 45	-33	
		-	-		-	-	5h6h	0	- 67	0	- 45	-33		
		-	-		-	-	6e	-	-	-	-	-		
		6G	-		-	-	6g	-18	- 85	-18	- 74	-54		
		6H	-		-	-	6h	0	- 67	0	- 56	-33		
		-	-		-	-	7e6e	-	-	-	-	-		
		7G	-		-	-	7g6g	-	-	-	-	-		
		7H	-		-	-	7h6h	-	-	-	-	-		
		8G	-		-	-	8g	-	-	-	-	-		
		8H	-	-	-	9g8g	-	-	-	-	-			
		-	-	0,35	-	-	-	-	3h4h	0	- 53	0	- 32	-51
		4H	+ 53		0	+ 63	0	4h	0	- 53	0	- 40	-51	
		5G	+ 86		+19	+ 99	+19	5g6g	-19	-104	-19	- 69	-70	
		5H	+ 67		0	+ 80	0	5h4h	0	- 53	0	- 50	-51	
		-	-		-	-	5h6h	0	- 85	0	- 50	-51		
		-	-		-	-	6e	-	-	-	-	-		
		6G	+104		+19	+119	+19	6g	-19	-104	-19	- 82	-70	
		6H	+ 85		0	+100	0	6h	0	- 85	0	- 63	-51	
		-	-		-	-	7e6e	-	-	-	-	-		
		7G	-		-	-	7g6g	-19	-104	-19	- 99	-70		
		7H	-		-	-	7h6h	0	- 85	0	- 80	-51		
		8G	-		-	-	8g	-	-	-	-	-		
		8H	-	-	-	9g8g	-	-	-	-	-			
		-	-	0,4	-	-	-	-	3h4h	0	- 60	0	- 34	-58
		4H	+ 56		0	+ 71	0	4h	0	- 60	0	- 42	-58	
		5G	+ 90		+19	+109	+19	5g6g	-19	-114	-19	- 72	-77	
		5H	+ 71		0	+ 90	0	5h4h	0	- 60	0	- 53	-58	
		-	-		-	-	5h6h	0	- 95	0	- 53	-58		
		-	-		-	-	6e	-	-	-	-	-		
		6G	+109		+19	+131	+19	6g	-19	-114	-19	- 86	-77	
		6H	+ 90		0	+112	0	6h	0	- 95	0	- 67	-58	
		-	-	-	-	7e6e	-	-	-	-	-			

ES, es = upper deviation
EI, ei = lower deviation

Basic major diameter		Pitch	Nut thread				Bolt thread						
over	up to and incl.		Tolerance class	Pitch diameter		Minor diameter		Tolerance class	Major diameter		Pitch diameter		Minor diameter (for stress calculations, etc.)
				<i>ES</i>	<i>EI</i>	<i>ES</i>	<i>EI</i>		<i>es</i>	<i>ei</i>	<i>es</i>	<i>ei</i>	
				μm	μm	μm	μm		μm	μm	μm	μm	
1,4	2,8	0,4	7G	-	-	-	-	7g6g	-19	-114	-19	-104	- 77
			7H	-	-	-	-	7h6h	0	- 95	0	- 85	- 58
			8G	-	-	-	-	8g	-	-	-	-	-
			8H	-	-	-	-	9g8g	-	-	-	-	-
		0,45	-	-	-	-	-	3h4h	0	- 63	0	- 36	- 65
			4H	+ 60	0	+ 80	0	4h	0	- 63	0	- 45	- 65
			5G	+ 95	+20	+120	+20	5g6g	-20	-120	-20	- 76	- 85
			5H	+ 75	0	+100	0	5h4h	0	- 63	0	- 56	- 65
			-	-	-	-	-	5h6h	0	-100	0	- 56	- 65
			-	-	-	-	-	6e	-	-	-	-	-
			6G	+115	+20	+145	+20	6g	-20	-120	-20	- 91	- 85
			6H	+ 95	0	+125	0	6h	0	-100	0	- 71	- 65
			-	-	-	-	-	7e6e	-	-	-	-	-
			7G	-	-	-	-	7g6g	-20	-120	-20	-110	- 85
			7H	-	-	-	-	7h6h	0	-100	0	- 90	- 85
			8G	-	-	-	-	8g	-	-	-	-	-
			8H	-	-	-	-	9g8g	-	-	-	-	-
2,8	5,6	0,35	-	-	-	-	-	3h4h	0	- 53	0	- 34	- 51
			4H	+ 56	0	+ 63	0	4h	0	- 53	0	- 42	- 51
			5G	+ 90	+19	+ 99	+19	5g6g	-19	-104	-19	- 72	- 70
			5H	+ 71	0	+ 80	0	5h4h	0	- 53	0	- 53	- 51
			-	-	-	-	-	5h6h	0	- 85	0	- 53	- 51
			-	-	-	-	-	6e	-	-	-	-	-
			6G	+109	+19	+119	+19	6g	-19	-104	-19	- 86	- 70
			6H	+ 90	0	+100	0	6h	0	- 85	0	- 67	- 51
			-	-	-	-	-	7e6e	-	-	-	-	-
			7G	-	-	-	-	7g6g	-19	-104	-19	-104	- 70
			7H	-	-	-	-	7h6h	0	- 85	0	- 85	- 51
			8G	-	-	-	-	8g	-	-	-	-	-
			8H	-	-	-	-	9g8g	-	-	-	-	-
		0,5	-	-	-	-	-	3h4h	0	- 67	0	- 38	- 72
			4H	+ 63	0	+ 90	0	4h	0	- 67	0	- 48	- 72
			5G	+100	+20	+132	+20	5g6g	-20	-126	-20	- 80	- 92
			5H	+ 80	0	+112	0	5h4h	0	- 67	0	- 60	- 72
			-	-	-	-	-	5h6h	0	-105	0	- 60	- 72
			-	-	-	-	-	6e	-50	-156	-50	-125	-122
			6G	+120	+20	+160	+20	6g	-20	-126	-20	- 95	- 92
			6H	+100	0	+140	0	6h	0	-105	0	- 75	- 72
			-	-	-	-	-	7e6e	-50	-156	-50	-145	-122
			7G	+145	+20	+200	+20	7g6g	-20	-126	-20	-115	- 92
			7H	+125	0	+180	0	7h6h	0	-106	0	- 95	- 72
			8G	-	-	-	-	8g	-	-	-	-	-
			8H	-	-	-	-	9g8g	-	-	-	-	-

ES, es = upper deviation
EI, ei = lower deviation

Basic major diameter		Pitch	Nut thread				Bolt thread							
over	up to and incl.		Tolerance class	Pitch diameter		Minor diameter		Tolerance class	Major diameter		Pitch diameter		Minor diameter (for stress calculations, etc.)	
				ES	EI	ES	EI		es	ei	es	ei		
				μm	μm	μm	μm		μm	μm	μm	μm		μm
mm	mm	mm												
2,8	5,6	0,6	-	-	-	-	3h4h	0	- 80	0	- 42	- 87		
			4H	+ 71	0	+100	0	4h	0	- 80	0	- 53	- 87	
			5G	+111	+21	+146	+21	5g6g	-21	-146	-21	- 86	-108	
			5H	+ 90	0	+125	0	5h4h	0	- 80	0	- 67	- 87	
			-	-	-	-	-	5h6h	0	-125	0	- 67	- 87	
			-	-	-	-	-	6e	-53	-178	-53	-138	-140	
			6G	+133	+21	+181	+21	6g	-21	-146	-21	-106	-108	
			6H	+112	0	+160	0	6h	0	-125	0	- 85	- 87	
			-	-	-	-	-	7e6e	-53	-178	-53	-159	-140	
			7G	+161	+21	+221	+21	7g6g	-21	-146	-21	-127	-108	
			7H	+140	0	+200	0	7h6h	0	-125	0	-106	- 87	
			8G	-	-	-	-	8g	-	-	-	-	-	
		8H	-	-	-	-	9g8g	-	-	-	-	-		
		-	-	0,7	-	-	-	-	3h4h	0	- 90	0	- 45	-101
		4H	+ 75		0	+112	0	4h	0	- 90	0	- 56	-101	
		5G	+117		+22	+162	+22	5g6g	-22	-162	-22	- 93	-123	
		5H	+ 95		0	+140	0	5h4h	0	- 90	0	- 71	-101	
		-	-		-	-	-	5h6h	0	-140	0	- 71	-101	
		-	-		-	-	-	6e	-56	-196	-56	-146	-157	
		6G	+140		+22	+202	+22	6g	-22	-162	-22	-112	-123	
		6H	+118		0	+180	0	6h	0	-140	0	- 90	-101	
		-	-		-	-	-	7e6e	-56	-196	-56	-168	-157	
		7G	+172		+22	+246	+22	7g6g	-22	-162	-22	-134	-123	
		7H	+150		0	+224	0	7h6h	0	-140	0	-112	-101	
		8G	-		-	-	-	8g	-	-	-	-	-	
		8H	-	-	-	-	9g8g	-	-	-	-	-		
		-	-	0,75	-	-	-	-	3h4h	0	- 90	0	- 45	-108
		4H	+ 75		0	+118	-	4h	0	- 90	0	- 56	-108	
		5G	+117		+22	+172	+22	5g6g	-22	-162	-22	- 93	-130	
		5H	+ 95		0	+150	0	5h4h	0	- 90	0	- 71	-108	
		-	-		-	-	-	5h6h	0	-140	0	- 71	-108	
		-	-		-	-	-	6e	-56	-196	-56	-146	-164	
		6G	+140		+22	+212	+22	6g	-22	-162	-22	-112	-130	
		6H	+118		0	+190	0	6h	0	-140	0	- 90	-108	
		-	-		-	-	-	7e6e	-56	-196	-56	-168	-164	
		7G	+172		+22	+258	+22	7g6g	-22	-162	-22	-134	-130	
		7H	+150		0	+235	0	7h6h	0	-140	0	-112	-108	
		8G	-		-	-	-	8g	-	-	-	-	-	
		8H	-	-	-	-	9g8g	-	-	-	-	-		
		-	-	0,8	-	-	-	-	3h4h	0	- 95	0	- 48	-116
		4H	+ 80		0	+125	0	4h	0	- 95	0	- 60	-116	
		5G	+124		+24	+184	+24	5g6g	-24	-174	-24	- 99	-140	
		5H	+100		0	+160	0	5h4h	0	- 95	0	- 75	-116	
		-	-		-	-	-	5h6h	0	-150	0	- 75	-116	
		-	-		-	-	-	6e	-60	-210	-60	-155	-176	
		6G	+149	+24	+224	+24	6g	-24	-174	-24	-119	-140		
		6H	+125	0	+200	0	6h	0	-150	0	- 95	-116		

ES, es = upper deviation
EI, ei = lower deviation

Basic major diameter		Pitch	Nut thread				Bolt thread								
over	up to and incl.		Tolerance class	Pitch diameter		Minor diameter		Tolerance class	Major diameter		Pitch diameter		Minor diameter (for stress calculations, etc.)		
				ES	EI	ES	EI		es	ei	es	ei			
mm	mm			mm	μm	μm	μm		μm	μm	μm	μm		μm	
2,8	5,6	0,8	-	-	-	-	-	7e6e	-60	-210	-60	-178	-176		
			7G	+184	+24	+274	+24	7g6g	-24	-174	-24	-142	-140		
			7H	+160	0	+250	0	7h6h	0	-150	0	-118	-116		
			8G	+224	+24	+339	+24	8g	-24	-260	-24	-174	-140		
			8H	+200	0	+315	0	9g8g	-24	-260	-24	-214	-140		
5,6	11,2	0,75	-	-	-	-	-	3h4h	0	-90	0	-50	-103		
			4H	+85	0	+118	0	4h	0	-90	0	-63	-103		
			5G	+128	+22	+172	+22	5g6g	-22	-162	-22	-102	-130		
			5H	+106	0	+150	0	5h4h	0	-90	0	-80	-103		
			-	-	-	-	-	5h6h	0	-140	0	-80	-103		
			-	-	-	-	-	6e	-56	-196	-56	-156	-164		
			6G	+154	+22	+212	+22	6g	-22	-162	-22	-122	-130		
			6H	+132	0	+190	0	6h	0	-140	0	-100	-108		
			-	-	-	-	-	7e6e	-56	-196	-56	-181	-164		
			7G	+192	+22	+258	+22	7g6g	-22	-162	-22	-147	-130		
			7H	+170	0	+236	0	7h6h	0	-140	0	-125	-108		
			8G	-	-	-	-	8g	-	-	-	-	-		
			8H	-	-	-	-	9g8g	-	-	-	-	-		
		1	1	1	-	-	-	-	-	3h4h	0	-112	0	-56	-144
					4H	+95	0	+150	0	4h	0	-112	0	-71	-144
					5G	+144	+26	+216	+26	5g6g	-26	-206	-26	-116	-170
					5H	+118	0	+190	0	5h4h	0	-112	0	-90	-144
					-	-	-	-	-	5h6h	0	-180	0	-90	-144
					-	-	-	-	-	6e	-60	-240	-60	-172	-204
					6G	+176	+26	+262	+26	6g	-26	-206	-26	-138	-170
					6H	+150	0	+236	0	6h	0	-180	0	-112	-144
					-	-	-	-	-	7e6e	-60	-240	-60	-200	-204
					7G	+216	+26	+326	+26	7g6g	-26	-206	-26	-166	-170
					7H	+190	0	+300	0	7h6h	0	-180	0	-140	-144
					8G	+262	+26	+401	+26	8g	-26	-306	-26	-206	-170
					8H	+236	0	+375	0	9g8g	-26	-306	-26	-250	-170
					1,25	1,25	1,25	-	-	-	-	-	3h4h	0	-132
4H	+100	0	+170	0				4h	0	-132	0	-75	-180		
5G	+153	+28	+240	+28				5g6g	-28	-240	-28	-123	-208		
5H	+125	0	+212	0				5h4h	0	-132	0	-95	-180		
-	-	-	-	-				5h6h	0	-212	0	-95	-180		
-	-	-	-	-				6e	-63	-275	-63	-181	-243		
6G	+188	+28	+293	+28				6g	-28	-240	-28	-146	-208		
6H	+160	0	+265	0				6h	0	-212	0	-118	-180		
-	-	-	-	-				7e6e	-63	-275	-63	-213	-243		
7G	+228	+28	+363	+28				7g6g	-28	-240	-28	-178	-208		
7H	+200	0	+335	0				7h6h	0	-212	0	-150	-180		
8G	+278	+28	+453	+28				8g	-28	-363	-28	-218	-208		
8H	+250	0	+425	0				9g8g	-28	-363	-28	-264	-208		

ES, es = upper deviation
EI, ei = lower deviation

Basic major diameter		Pitch	Nut thread				Bolt thread								
over	up to and incl.		Tolerance class	Pitch diameter		Minor diameter		Tolerance class	Major diameter		Pitch diameter		Minor diameter (for stress calculations, etc.)		
				ES	EI	ES	EI		es	ei	es	ei			
mm	mm			μm	μm	μm	μm		μm	μm	μm	μm		μm	
5,6	11,2	1,5	-	-	-	-	3h4h	0	-150	0	-67	-217			
			4H	+112	0	+190	0	4h	0	-150	0	-85	-217		
			5G	+172	+32	+268	+32	5g6g	-32	-268	-32	-138	-249		
			5H	+140	0	+236	0	5h4h	0	-150	0	-106	-217		
			-	-	-	-	5h6h	0	-236	0	-106	-217			
			-	-	-	-	6e	-67	-303	-67	-199	-284			
			6G	+212	+32	+332	+32	6g	-32	-268	-32	-164	-249		
			6H	+180	0	+300	0	6h	0	-236	0	-132	-217		
			-	-	-	-	7e6e	-67	-303	-67	-237	-284			
			7G	+256	+32	+407	+32	7g6g	-32	-268	-32	-202	-249		
			7H	+224	0	+375	0	7h6h	0	-236	0	-170	-217		
			8G	+312	+32	+507	+32	8g	-32	-407	-32	-244	-249		
			8H	+280	0	+475	0	9g8g	-32	-407	-32	-297	-249		
11,2	22,4	1	-	-	-	-	3h4h	0	-112	0	-60	-144			
			4H	+100	0	+150	0	4h	0	-112	0	-75	-144		
			5G	+151	+26	+216	+26	5g6g	-26	-206	-26	-121	-170		
			5H	+125	0	+190	0	5h4h	0	-112	0	-95	-144		
			-	-	-	-	5h6h	0	-180	0	-95	-144			
			-	-	-	-	6e	-60	-240	-60	-178	-204			
			6G	+186	+26	+262	+26	6g	-26	-206	-26	-144	-170		
			6H	+160	0	+236	0	6h	0	-180	0	-118	-144		
			-	-	-	-	7e6e	-60	-240	-60	-210	-204			
			7G	+226	+26	+326	+26	7g6g	-26	-206	-26	-176	-170		
			7H	+200	0	+300	0	7h6h	0	-180	0	-150	-144		
			8G	+276	+26	+401	+26	8g	-26	-306	-26	-216	-170		
		8H	+250	0	+375	0	9g8g	-26	-306	-26	-262	-170			
		1,25	1,25	1,25	-	-	-	-	3h4h	0	-132	0	-67	-180	
					4H	+112	0	+170	0	4h	0	-132	0	-85	-180
					5G	+168	+28	+240	+28	5g6g	-28	-240	-28	-134	-208
					5H	+140	0	+212	0	5h4h	0	-132	0	-106	-180
					-	-	-	-	5h6h	0	-212	0	-106	-180	
					-	-	-	-	6e	-63	-275	-63	-195	-243	
					6G	+208	+28	+293	+28	6g	-28	-240	-28	-134	-208
					6H	+180	0	+265	0	6h	0	-212	0	-132	-180
					-	-	-	-	7e6e	-63	-275	-63	-233	-243	
					7G	+252	+28	+363	+28	7g6g	-28	-240	-28	-198	-208
					7H	+224	0	+335	0	7h6h	0	-212	0	-170	-180
					8G	+308	+28	+453	+28	8g	-28	-363	-28	-240	-208
		8H	+280	0	+425	0	9g8g	-28	-363	-28	-293	-208			
		1,5	1,5	1,5	-	-	-	-	3h4h	0	-150	0	-71	-217	
					4H	+118	0	+190	0	4h	0	-150	0	-90	-217
					5G	+182	+32	+268	+32	5g6g	-32	-268	-32	-144	-249
					5H	+150	0	+236	0	5h4h	0	-150	0	-112	-217
					-	-	-	-	5h6h	0	-236	0	-112	-217	
					-	-	-	-	6e	-67	-303	-67	-207	-284	
					6G	+222	+32	+332	+32	6g	-32	-268	-32	-172	-249
6H	+190	0	+300	0	6h	0	-236	0	-140	-217					