

$^{150}\text{Nd}(^{36}\text{S},6n\gamma)$ : delayed 1993Ve01

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	E. A. Mccutchan	NDS 126, 151 (2015)	1-Feb-2015

$E(^{36}\text{S})=177$  MeV. Measured  $E\gamma$ ,  $I\gamma$ ,  $\gamma\gamma$ ,  $\gamma\gamma(t)$ , beam- $\gamma(t)$  in time range of 37-83 ns (beam pulsed every 90 ns) using 12 Compton-suppressed HPGe detectors and a sum-energy and  $\gamma$ -ray multiplicity filter of 48 BGO scintillators.

 $^{180}\text{Os}$  Levels

An additional isomer with  $T_{1/2}=41$  ns  $10$  was observed which de-excites by 108.6, 566.2, 665.8, 700, and 1073.4  $\gamma$ -ray transitions. Due to low-statistics the position and exact de-excitation pattern could not be determined.

E(level) <sup>†</sup>	$J^{\pi\ddagger}$	$T_{1/2}$ <sup>#</sup>	Comments
0.0	0 <sup>+</sup>		
132.17 23	2 <sup>+</sup>		
408.7 3	4 <sup>+</sup>		
795.1 3	6 <sup>+</sup>		
831.2 4	2 <sup>+</sup>		
870.43 23	2 <sup>+</sup>		
1023.1 3	3 <sup>+</sup>		
1052.5 3	4 <sup>+</sup>		
1196.8 3	4 <sup>+</sup>		
1257.6 3	8 <sup>+</sup>		
1378.8 3	6 <sup>+</sup>		
1405.6 3	5 <sup>+</sup>		
1515.7 3	4 <sup>+</sup>		
1604.4 3	5 <sup>-</sup>		
1627.3 3	6 <sup>+</sup>		
1767.9 11	10 <sup>+</sup>		
1862.6 3	7 <sup>-</sup>	17 ns 3	$T_{1/2}$ : isomeric nature of this level is not confirmed in subsequent studies.
1877.1 3	6 <sup>+</sup>		
1928.8 3	7 <sup>-</sup>	26 ns 3	
2175.8 11	9 <sup>-</sup>		
2309.1 13	12 <sup>+</sup>		
2544.6 15	11 <sup>-</sup>		
2696.0 13	12 <sup>+</sup>		
2875.2 15	14 <sup>+</sup>		
2982.4 18	13 <sup>-</sup>		
3008.1 14	14 <sup>+</sup>		
3402.5 16	16 <sup>+</sup>		
3476.9 20	15 <sup>-</sup>		
3494.9 18	16 <sup>+</sup>		
3925.8 19	18 <sup>+</sup>		
3982.5 23	17 <sup>-</sup>		
4134.9 21	18 <sup>+</sup>		
4498.0 25	19 <sup>-</sup>		
4542.9 21	20 <sup>+</sup>		
5561.9 23			
5849 3		12 ns 4	E(level): level and its isomeric character not observed in either $^{150}\text{Nd}(^{36}\text{S},6n\gamma)$ , $^{150}\text{Nd}(^{34}\text{S},4n\gamma)$ or $^{166}\text{Er}(^{18}\text{O},4n\gamma)$ , $^{168}\text{Er}(^{16}\text{O},4n\gamma)$ reactions and thus not included in the Adopted Levels. $J^{\pi}$ : $\geq 20$ from the assumption that the 286.8 $\gamma$ and 1427 $\gamma$ are both $\Delta J=1$ character.

<sup>†</sup> From a least-squares fit to  $E\gamma$  by evaluator.  $\Delta E\gamma=1$  keV assumed when not given.

<sup>‡</sup> From the Adopted Levels.

<sup>#</sup> From beam- $\gamma(t)$  measurements. Results are confirmed by  $\gamma\gamma(t)$  analysis.

$^{150}\text{Nd}(^{36}\text{S},6n\gamma)$ : delayed **1993Ve01** (continued) $\gamma(^{180}\text{Os})$ 

$E_\gamma$ †	$I_\gamma$ †	$E_i(\text{level})$	$J_i^\pi$	$E_f$	$J_f^\pi$	Comments
51.7		1928.8	7 <sup>-</sup>	1877.1	6 <sup>+</sup>	E <sub>γ</sub> : included in Fig. 5 of <b>1993Ve01</b> , but not in Table 1.
132.2 3	65 13	132.17	2 <sup>+</sup>	0.0	0 <sup>+</sup>	
235.5 3	2.1 7	1862.6	7 <sup>-</sup>	1627.3	6 <sup>+</sup>	
258.0 3	3.5 11	1862.6	7 <sup>-</sup>	1604.4	5 <sup>-</sup>	
276.4 3	53 8	408.7	4 <sup>+</sup>	132.17	2 <sup>+</sup>	
286.8		5849		5561.9		
301.6 5	1.7 6	1928.8	7 <sup>-</sup>	1627.3	6 <sup>+</sup>	
312.0		3008.1	14 <sup>+</sup>	2696.0	12 <sup>+</sup>	
313.2		2175.8	9 <sup>-</sup>	1862.6	7 <sup>-</sup>	
318.7 5	1.1 4	1515.7	4 <sup>+</sup>	1196.8	4 <sup>+</sup>	E <sub>γ</sub> : placed from 1514.6-keV level in Adopted Levels.
324.4 3	6.3 11	1928.8	7 <sup>-</sup>	1604.4	5 <sup>-</sup>	
326.4 3	1.3 4	1378.8	6 <sup>+</sup>	1052.5	4 <sup>+</sup>	
326.5 8	≤0.2	1196.8	4 <sup>+</sup>	870.43	2 <sup>+</sup>	
361.4 3	7.6 13	1877.1	6 <sup>+</sup>	1515.7	4 <sup>+</sup>	
368.8		2544.6	11 <sup>-</sup>	2175.8	9 <sup>-</sup>	
382.5 3	1.7 5	1405.6	5 <sup>+</sup>	1023.1	3 <sup>+</sup>	
386.3 3	36 6	795.1	6 <sup>+</sup>	408.7	4 <sup>+</sup>	
387.0		2696.0	12 <sup>+</sup>	2309.1	12 <sup>+</sup>	
394.4		3402.5	16 <sup>+</sup>	3008.1	14 <sup>+</sup>	
407.6 3	3.9 7	1604.4	5 <sup>-</sup>	1196.8	4 <sup>+</sup>	
430.6 3	1.0 4	1627.3	6 <sup>+</sup>	1196.8	4 <sup>+</sup>	
437.8		2982.4	13 <sup>-</sup>	2544.6	11 <sup>-</sup>	
461.8 5	1.2 6	870.43	2 <sup>+</sup>	408.7	4 <sup>+</sup>	
462.4 3	13.3 20	1257.6	8 <sup>+</sup>	795.1	6 <sup>+</sup>	
471.3 3	3.3 7	1877.1	6 <sup>+</sup>	1405.6	5 <sup>+</sup>	
483.4 5	≤0.6	1862.6	7 <sup>-</sup>	1378.8	6 <sup>+</sup>	
492.8 3	4.8 9	1515.7	4 <sup>+</sup>	1023.1	3 <sup>+</sup>	E <sub>γ</sub> : placed from 1514.6-keV level in Adopted Levels.
494.5		3476.9	15 <sup>-</sup>	2982.4	13 <sup>-</sup>	
498.4 5	1.1 9	1877.1	6 <sup>+</sup>	1378.8	6 <sup>+</sup>	
505.6		3982.5	17 <sup>-</sup>	3476.9	15 <sup>-</sup>	
510.3		1767.9	10 <sup>+</sup>	1257.6	8 <sup>+</sup>	
515.5		4498.0	19 <sup>-</sup>	3982.5	17 <sup>-</sup>	
523.3		3925.8	18 <sup>+</sup>	3402.5	16 <sup>+</sup>	
527.3		3402.5	16 <sup>+</sup>	2875.2	14 <sup>+</sup>	
541.2		2309.1	12 <sup>+</sup>	1767.9	10 <sup>+</sup>	
550.0 3	2.6 5	1928.8	7 <sup>-</sup>	1378.8	6 <sup>+</sup>	
566.2		2875.2	14 <sup>+</sup>	2309.1	12 <sup>+</sup>	
583.6 3	2.2 5	1378.8	6 <sup>+</sup>	795.1	6 <sup>+</sup>	
604.9 3	4.2 7	1862.6	7 <sup>-</sup>	1257.6	8 <sup>+</sup>	
610.3 3	2.3 5	1405.6	5 <sup>+</sup>	795.1	6 <sup>+</sup>	
614.4 5	1.7 7	1023.1	3 <sup>+</sup>	408.7	4 <sup>+</sup>	
617.1		4542.9	20 <sup>+</sup>	3925.8	18 <sup>+</sup>	
619.7		3494.9	16 <sup>+</sup>	2875.2	14 <sup>+</sup>	
640.0		4134.9	18 <sup>+</sup>	3494.9	16 <sup>+</sup>	
643.9 5	2.2 4	1052.5	4 <sup>+</sup>	408.7	4 <sup>+</sup>	
645.0 3	2.6 5	1515.7	4 <sup>+</sup>	870.43	2 <sup>+</sup>	
671.1 3	3.6 5	1928.8	7 <sup>-</sup>	1257.6	8 <sup>+</sup>	
680.2 5	≤0.6	1877.1	6 <sup>+</sup>	1196.8	4 <sup>+</sup>	
684.5		1515.7	4 <sup>+</sup>	831.2	2 <sup>+</sup>	E <sub>γ</sub> : included in Fig. 5 of <b>1993Ve01</b> , but not in Table 1.
699.0 3	2.7 7	831.2	2 <sup>+</sup>	132.17	2 <sup>+</sup>	
699.0		3008.1	14 <sup>+</sup>	2309.1	12 <sup>+</sup>	
738.0 3	1.4 6	870.43	2 <sup>+</sup>	132.17	2 <sup>+</sup>	
788.0 3	2.5 6	1196.8	4 <sup>+</sup>	408.7	4 <sup>+</sup>	
809.2 3	3.0 6	1604.4	5 <sup>-</sup>	795.1	6 <sup>+</sup>	
824.6 3	0.9 5	1877.1	6 <sup>+</sup>	1052.5	4 <sup>+</sup>	

Continued on next page (footnotes at end of table)

$^{150}\text{Nd}(^{36}\text{S},6n\gamma)$ : delayed [1993Ve01](#) (continued) $\gamma(^{180}\text{Os})$  (continued)

$E_\gamma$ †	$I_\gamma$ †	$E_i(\text{level})$	$J_i^\pi$	$E_f$	$J_f^\pi$	Comments
832.4 3	0.9 5	1627.3	6 <sup>+</sup>	795.1	6 <sup>+</sup>	
870.4 3	3.8 11	870.43	2 <sup>+</sup>	0.0	0 <sup>+</sup>	
891.0 3	4.1 6	1023.1	3 <sup>+</sup>	132.17	2 <sup>+</sup>	
928.0		2696.0	12 <sup>+</sup>	1767.9	10 <sup>+</sup>	
996.9 3	4.2 6	1405.6	5 <sup>+</sup>	408.7	4 <sup>+</sup>	
1064.7 3	1.7 6	1196.8	4 <sup>+</sup>	132.17	2 <sup>+</sup>	
1082.1 3	3.9 6	1877.1	6 <sup>+</sup>	795.1	6 <sup>+</sup>	
1107.2 5	1.5 5	1515.7	4 <sup>+</sup>	408.7	4 <sup>+</sup>	$E_\gamma$ : placed from 1514.6-keV level in Adopted Levels.
1133.8 3	4.9 7	1928.8	7 <sup>-</sup>	795.1	6 <sup>+</sup>	
1195.8 5	0.9 6	1604.4	5 <sup>-</sup>	408.7	4 <sup>+</sup>	
1218.7 3	0.7 6	1627.3	6 <sup>+</sup>	408.7	4 <sup>+</sup>	
1383.8 3	1.5 7	1515.7	4 <sup>+</sup>	132.17	2 <sup>+</sup>	
1427.0		5561.9		4134.9	18 <sup>+</sup>	
1468.5 3	3.4 7	1877.1	6 <sup>+</sup>	408.7	4 <sup>+</sup>	

† [1993Ve01](#) provide detailed information only for  $\gamma$ -rays de-exciting the 7<sup>-</sup> isomers at 1863 keV and 1929 keV.  $\gamma$ -rays observed from the depopulation of the higher spin isomers are given in Fig. 1 of [1993Ve01](#) with no details on  $\Delta E_\gamma$  or  $I_\gamma$ .

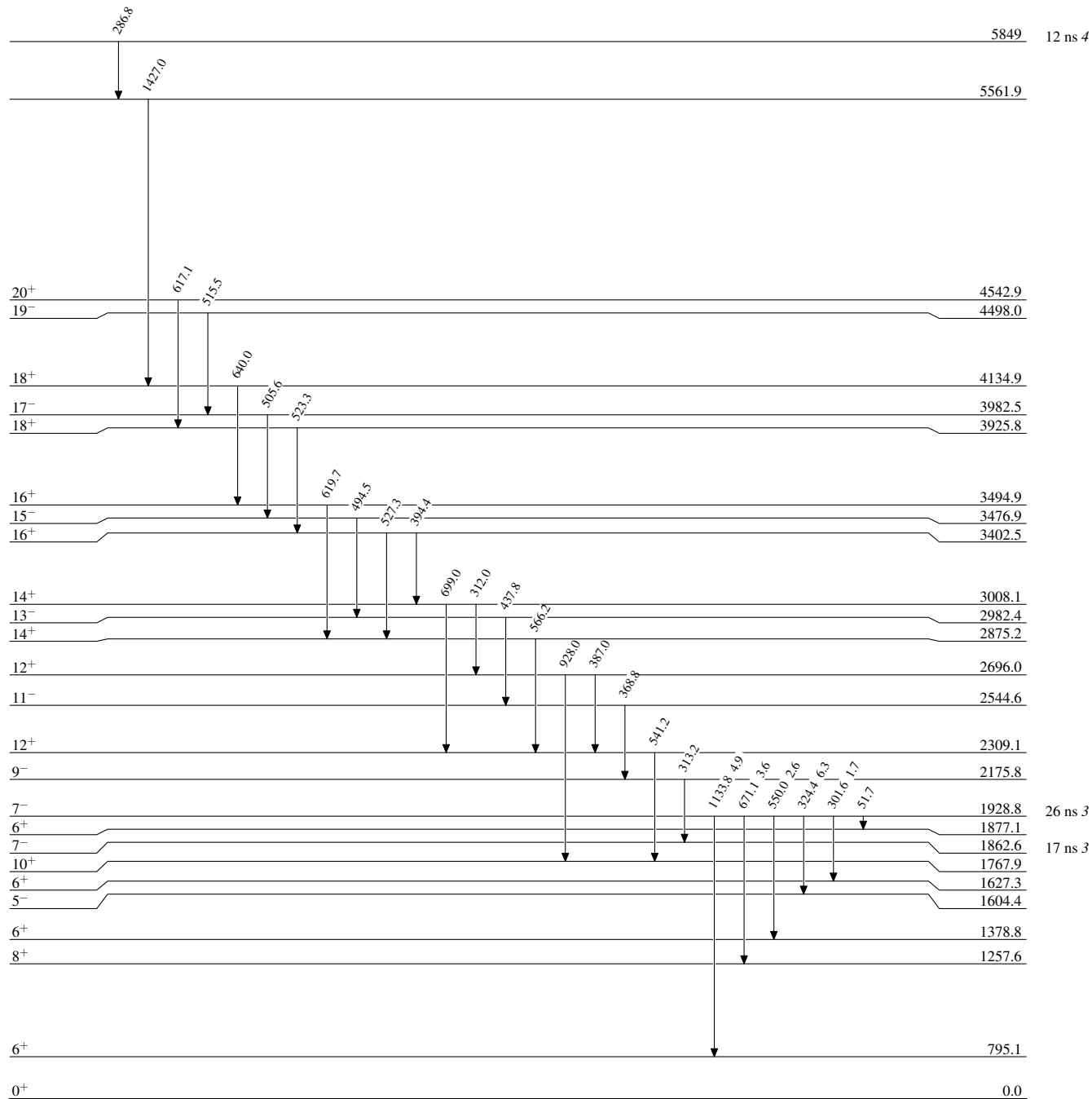
$^{150}\text{Nd}(^{36}\text{S},6n\gamma)$ : delayed 1993Ve01

Level Scheme

Intensities: Type not specified

Legend

- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$



$^{180}_{76}\text{Os}_{104}$

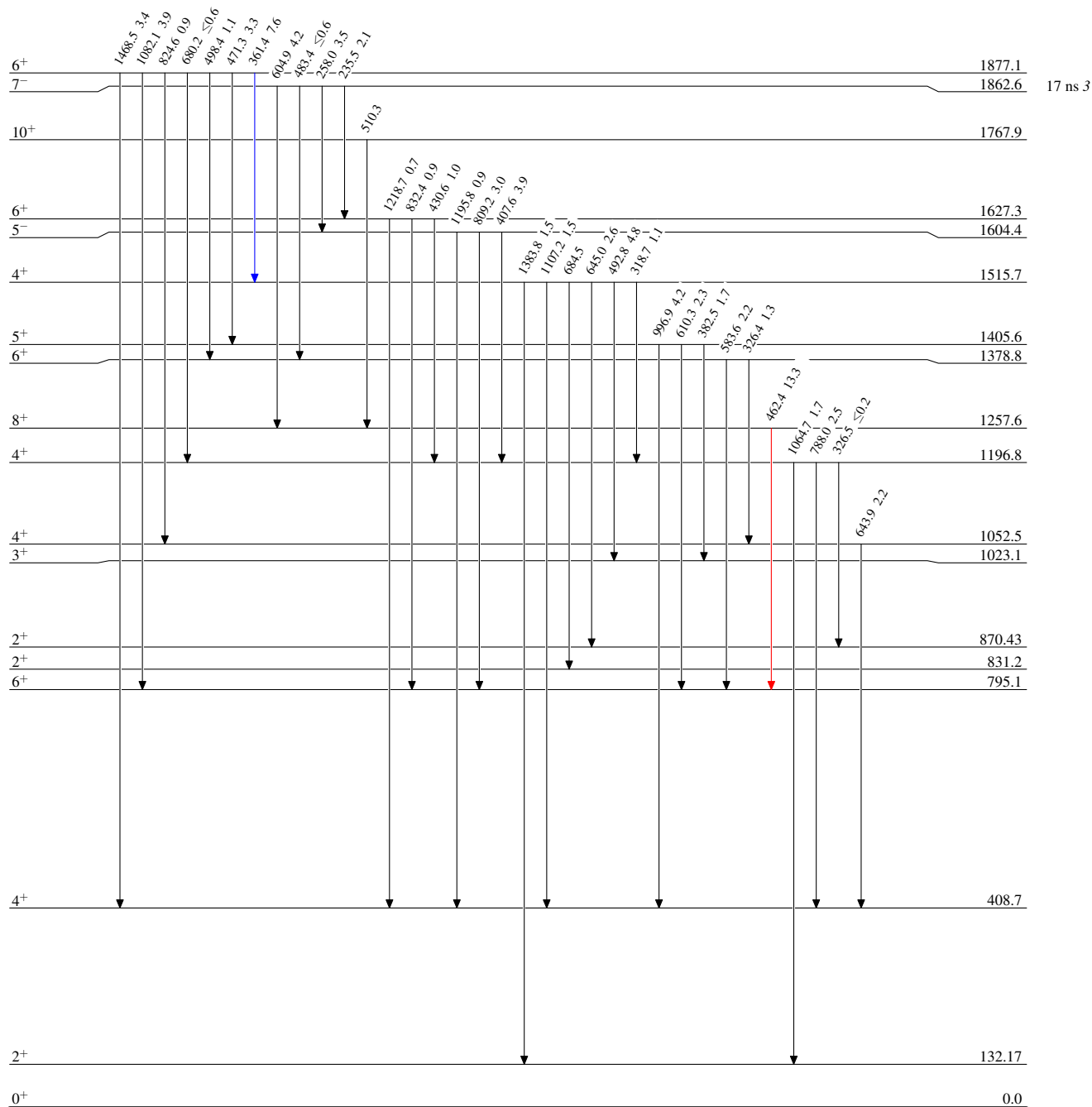
$^{150}\text{Nd}(^{36}\text{S},6n\gamma)$ : delayed 1993Ve01

## Level Scheme (continued)

Intensities: Type not specified

## Legend

- $I_\gamma < 2\% \times I_\gamma^{\max}$
- $I_\gamma < 10\% \times I_\gamma^{\max}$
- $I_\gamma > 10\% \times I_\gamma^{\max}$




 $^{180}_{76}\text{Os}_{104}$

$^{150}\text{Nd}(^{36}\text{S},6n\gamma)$ : delayed 1993Ve01

## Level Scheme (continued)

Intensities: Type not specified

## Legend

-   $I_\gamma < 2\% \times I_\gamma^{\max}$
-   $I_\gamma < 10\% \times I_\gamma^{\max}$
-   $I_\gamma > 10\% \times I_\gamma^{\max}$

