

WEPD – Type I [58, 29, 10]

This is a database of known weight enumerator parameters for singly-even binary self-dual [58, 29, 10] codes.

The possible weight enumerators of a singly-even binary self-dual [58, 29, 10] code are given in [6, 9] as

$$W_{58,1} = 1 + 55x^{10} + 5188x^{12} + \dots ,$$

$$W_{58,2} = 1 + (319 - 2\alpha - 24\beta)x^{10} + (3132 + 2\alpha + 152\beta)x^{12} + \dots ,$$

where $\alpha, \beta \in \mathbb{Z}$. A code with weight enumerator $W_{58,1}$ is given in [17].

See the link below for a list of known values of (α, β) for $W_{58,2}$.

- $W_{58,2}$ known parameters (from [1–16, 18–22])

References

- [1] I. Boukliev and S. Buyuklieva. Some new extremal self-dual codes with lengths 44, 50, 54, and 58. *IEEE Trans. Inform. Theory*, 44(2):809–812, 1998. doi: [10.1109/18.661526](https://doi.org/10.1109/18.661526).
- [2] S. Bouyuklieva. A method for constructing self-dual codes with an automorphism of order 2. *IEEE Trans. Inform. Theory*, 46(2):496–504, 2000. doi: [10.1109/18.825812](https://doi.org/10.1109/18.825812).
- [3] S. Bouyuklieva, R. Russeva, and N. Yankov. On the structure of binary self-dual codes having an automorphism of order a square of an odd prime. *IEEE Trans. Inform. Theory*, 51(10):3678–3686, 2005. doi: [10.1109/TIT.2005.855616](https://doi.org/10.1109/TIT.2005.855616).
- [4] S. Buyuklieva. Some new extremal self-dual codes with length 58. “*Proceedings of IEEE International Symposium on Information Theory*”, Ulm, Germany, 1997. doi: [10.1109/ISIT.1997.613031](https://doi.org/10.1109/ISIT.1997.613031).
- [5] S. Buyuklieva and I. Boukliev. Extremal self-dual codes with an automorphism of order 2. *IEEE Trans. Inform. Theory*, 44(1):323–328, 1998. doi: [10.1109/18.651059](https://doi.org/10.1109/18.651059).
- [6] J. H. Conway and N. J. A. Sloane. A new upper bound on the minimal distance of self-dual codes. *IEEE Trans. Inform. Theory*, 36(6):1319–1333, 1990. doi: [10.1109/18.59931](https://doi.org/10.1109/18.59931).
- [7] R. Dontcheva and M. Harada. New extremal self-dual codes of length 62 and related extremal self-dual codes. *IEEE Trans. Inform. Theory*, 48(7):2060–2064, 2002. doi: [10.1109/TIT.2002.1013144](https://doi.org/10.1109/TIT.2002.1013144).
- [8] J. Gildea, A. Korban, and A. M. Roberts. New binary self-dual codes of lengths 56, 58, 64, 80 and 92 from a modification of the four circulant construction. *Finite Fields Appl.*, 75, 2021. doi: [10.1016/j.ffa.2021.101876](https://doi.org/10.1016/j.ffa.2021.101876).
- [9] M. Harada. Binary extremal self-dual codes of length 60 and related codes. *Des. Codes Cryptogr.*, 86(5): 1085–1094, 2018. doi: [10.1007/s10623-017-0380-2](https://doi.org/10.1007/s10623-017-0380-2).
- [10] M. Harada and H. Kimura. On extremal self-dual codes. *Math. J. Okayama Univ.*, 37(1):1–14, 1995.
- [11] M. Harada, T. A. Gulliver, and H. Kaneta. Classification of extremal double-circulant self-dual codes of length up to 62. *Discrete Math.*, 188(1–3):127–136, 1998. doi: [10.1016/S0012-365X\(97\)00250-1](https://doi.org/10.1016/S0012-365X(97)00250-1).
- [12] S. Karadeniz and R. Aksoy. Self-dual R_k lifts of binary self-dual codes. *Finite Fields Appl.*, 34:317–326, 2015. doi: [10.1016/j.ffa.2015.02.005](https://doi.org/10.1016/j.ffa.2015.02.005).
- [13] S. Karadeniz and A. Kaya. New extremal binary self-dual codes of length 58 as R_3 -lifts from the shortened binary [8, 4, 4] Hamming code. *J. Franklin Inst.*, 349(9):2824–2833, 2012. doi: [10.1016/j.jfranklin.2012.08.011](https://doi.org/10.1016/j.jfranklin.2012.08.011).
- [14] A. Kaya, B. Yıldız, and I. Siap. New extremal binary self-dual codes from $\mathbb{F}_4 + u\mathbb{F}_4$ -lifts of quadratic circulant codes over \mathbb{F}_4 . *Finite Fields Appl.*, 35:318–329, 2015. doi: [10.1016/j.ffa.2015.05.004](https://doi.org/10.1016/j.ffa.2015.05.004).
- [15] H. J. Kim, H. Lee, J. B. Lee, and Y. Lee. Construction of self-dual codes with an automorphism of order p . *Adv. Math. Commun.*, 5(1):23–26, 2011. doi: [10.3934/amc.2011.5.23](https://doi.org/10.3934/amc.2011.5.23).

- [16] J.-L. Kim. New extremal self-dual codes of lengths 36, 38, and 58. *IEEE Trans. Inform. Theory*, 47(1): 386–393, 2001. doi: [10.1109/18.904540](https://doi.org/10.1109/18.904540).
- [17] H.-P. Tsai. Existence of certain extremal self-dual codes. *IEEE Trans. Inform. Theory*, 38(2):501–504, 1992. doi: [10.1109/18.119711](https://doi.org/10.1109/18.119711).
- [18] H.-P. Tsai and Y.-J. Jiang. Some new extremal self-dual [58, 29, 10] codes. *IEEE Trans. Inform. Theory*, 44(2):813–814, 1998. doi: [10.1109/18.661527](https://doi.org/10.1109/18.661527).
- [19] N. Yankov and D. Anev. On the self-dual codes with an automorphism of order 5. *Appl. Algebra Engrg. Comm. Comput.*, 32(2):97–111, 2021. doi: [10.1007/s00200-019-00403-0](https://doi.org/10.1007/s00200-019-00403-0).
- [20] N. Yankov and M. H. Lee. New binary self-dual codes of lengths 50–60. *Des. Codes Cryptogr.*, 73(3): 983–996, 2014. doi: [10.1007/s10623-013-9839-y](https://doi.org/10.1007/s10623-013-9839-y).
- [21] N. Yankov and R. Russeva. Binary self-dual codes of lengths 52 to 60 with an automorphism of order 7 or 13. *IEEE Trans. Inform. Theory*, 57(11):7498–7506, 2011. doi: [10.1109/TIT.2011.2155619](https://doi.org/10.1109/TIT.2011.2155619).
- [22] S. Zhang and S. Li. Some new extremal self-dual codes with lengths 42, 44, 52, and 58. *Discrete Math.*, 238(1–3):147–150, 2001. doi: [10.1016/S0012-365X\(00\)00420-9](https://doi.org/10.1016/S0012-365X(00)00420-9).