Simple t-designs with $v \leq 30$

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1. Introduction

In this paper, a set of tables is presented surveying existence and nonexistence results for t-designs of small order having no repeated blocks. This introduction is a guide to understanding the tables. Our intent is to be comprehensive, and hence we include every admissible parameter situations on at most thirty elements.

First, we give some basic definitions. A t-(v,k,λ) *design*, or simply *t-design* of *order* v, *blocksize* k and *index* λ is a pair $(V,\mathcal{B})$. V is a set of v *elements*, and $\mathcal{B}$ is a collection of k-subsets of V called *blocks*. Every t-subset appears in precisely λ of the blocks. When $\mathcal{B}$ contains no repeated blocks, the t-design is *simple*. We are concerned here only with simple t-designs.

One *trivial* t-design is obtained by taking $\mathcal{B}$ to be all of the k-subsets of V. This is the *complete* design, and it has index $\lambda = \lambda_{\max} = \binom{v-t}{k-t}$. A second trivial design is the *empty* design having $\mathcal{B} = \emptyset$ and $\lambda = 0$. Now when $k = v$ or $t = k$, the only simple t-designs are either empty or complete. Hence, nontrivial t-designs have $0 < \lambda < \lambda_{\max}$ and $t < k < v$. We further require that $t \geq 2$.

Given integers t, v, k and λ, the existence of a t-(v,k,λ) design necessitates that the following divisibility conditions hold :

$$\binom{k-i}{t-i} \mid \lambda \binom{v-i}{t-i} \qquad \text{for} \quad i = 0, \ldots, t-1. \tag{1}$$

A parameter set t-(v,k,λ) is *admissible* if it satisfies (1).

We can limit the number of parameter sets further by making two simple observations. First, the complement of a t-(v,k,λ) design is a t-$(v,k,\lambda_{\max} - \lambda)$ design: hence we need only consider cases when $\lambda \leq \lambda_{max}/2$. Second, complementing each block of $\mathcal{B}$ (with respect to V) from a t-(v,k,λ) design, we obtain a t-$(v,v-k,\lambda\binom{v-t}{t}/\binom{k}{t})$ design and hence we need only consider $k \leq v/2$.

Our tables include every admissible parameter set with $2 \leq t < k \leq v/2$, $v \leq 30$ and $0 < \lambda \leq \lambda_{max}/2$. In each case that is settled, we report the existence or nonexistence of such a design, along with a reference or explanation.

2. Existence

We introduce first an outline of the techniques used to establish existence. Every t-(v,k,λ) design $(V,\mathcal{B})$ is also a $(t-1)$-design with parameters $(t-1)$-$(v,k,\lambda(v-t+1)/(k-t+1))$. For a fixed element $x \in V$, we can partition $\mathcal{B}$ into two sets, those blocks $\mathcal{B}_d$ containing x and those blocks $\mathcal{B}_r$ not containing x. It is easily verified that $(V\backslash\{x\},\mathcal{B}_r)$ is a $(t-1)$-$(v-1,k,\lambda(v-k)/(k-t+1))$ design; this is termed the *residual design* of $(V,\mathcal{B})$. Moreover, removing x from each block of $\mathcal{B}_d$ to form $\mathcal{B}_d^{\bar{x}}$ yields a $(t-1)$-$(v-1,k-1,\lambda)$ design $(V\backslash\{x\},\mathcal{B}_d^{\bar{x}})$ called the *derived design* of $(V,\mathcal{B})$. The design $(V,\mathcal{B})$ is the *extension* of $(V\backslash\{x\},\mathcal{B}_d^{\bar{x}})$. Alltop [Alltop75] has shown that a t-$(2k+1,k,\lambda)$ design has an extension to a $(t+1)$-$(2k+2,k+1,\lambda)$ design if t is even, or if t is odd and $\lambda = \lambda_{max}/2$. When $(t-1)$-designs exist with the correct parameters to be the derived and residual designs of a t-(v,k,λ) design, one can combine them to form a simple $(t-1)$-$(v,k,\lambda(v-t+1)/(k-t+1))$ design (this is not in general a t-design, however). We can apply this observation to known t-designs to produce further t-designs. We call this observation "note (1)" in the tables. Van Trung [vanTrung86] presents a more general formulation which is equivalent.

Van Trung [vanTrung86] also observes that the complement of a t-$(2k+1,k,\lambda)$ design is a t-$(2k+1,k,\lambda(k+1)/(k+1-t))$ design, and hence they can be combined by the observations above to form a t-$(2k+2,k+1,\lambda(2k+2-t)/(k+1-t))$ design. We call this "note (2)" in the tables.

There is a second notion of derived and residual designs. Let $(V,\mathcal{B})$ be a symmetric 2-design (i.e., $|V| = |\mathcal{B}|$). Fix a block $b^* \in \mathcal{B}$ and define $\mathcal{B}_d = \{b \cap b^* : b \in \mathcal{B}\backslash\{b^*\}\}$ and $\mathcal{B}_r = \{b\backslash b^* : b \in \mathcal{B}\backslash\{b^*\}\}$. Then $(b^*,\mathcal{B}_d)$ and $(V\backslash b^*,\mathcal{B}_r)$ are the *derived* and *residual* designs of $(V,\mathcal{B})$, respectively. If $(V,\mathcal{B})$ is a 2-(v,k,λ) design, the derived design is a 2-$(k,\lambda,\lambda-1)$ design and the residual design is a 2-$(v-k,k-\lambda,\lambda)$ design. The derived design may be trivial (for example, when $\lambda = 1$). Hall [Hall54] showed that if a design exists with parameters 2-$(v-k,k-\lambda,\lambda)$ and $\lambda \in \{1,2\}$, this design is the residual design of some 2-(v,k,λ). We call this result "note (4)" in the tables.

Another useful tool in establishing existence is the following lemma of Ganter, Pelikán and Teirlinck [Ganter77].

Permutation Lemma. *If a t-(v,k,λ) design $(X,\mathcal{B})$ exists, then it can be chosen to be disjoint from $\mathcal{D}$, a given collection of k-subsets of X, when $v! > |\mathcal{B}|\cdot|\mathcal{D}|\cdot k!\cdot(v-k)!$.*

With the exception of this last lemma, all of the techniques reviewed here apply to specific values of λ. It is readily apparent, however, that while t, v and k are all severely constrained by our restriction to $v \leq 30$, the range of possible indices remains very large indeed. We are therefore interested in methods which settle all (or most) values of λ in a single construction. We review one such method next.

For given parameters t, v and k, denote by λ_{min} the smallest positive integer λ satisfying the divisibility conditions. It is easy to verify that if a t-(v,k,λ) design exists, $\lambda_{min} \mid \lambda$. A (t,k,v)-*partition* with index vector $(\lambda_1, \ldots, \lambda_n)$ is a v-set X together with a partition of all $\binom{v}{k}$ k-subsets on X into classes $\{\mathcal{B}_1, \ldots, \mathcal{B}_n\}$ so that $(X, \mathcal{B}_i)$ is a t-(v,k,λ_i) design. If $\lambda_1 = \lambda_2 = \cdots = \lambda_n$, the (t,k,v)-partition is *uniform*. If we further require that $\lambda_i = \lambda_{min}$, the partition is a (t,k,v)-*large set*. Observe that the existence of a (t,k,v)-large set establishes the existence of designs for all admissible parameter sets t-(v,k,λ) (that is, for all admissible λ values for the fixed parameters t, k and v). Since the existence of a (t,k,v)-large set is a particularly elegant method for settling many existence questions, in the **Existence** column, we report on the existence or (proved) nonexistence of a (t,k,v)-large set by writing LS or NLS respectively.

Often the explanation or reference we give is not the first reference; typically we choose a reference giving the strongest or most general result.

3. Nonexistence

Next we turn to authorities for nonexistence results. The main basic observation is Fisher's inequality : $|\mathcal{B}| \geq |V|$ is necessary for a 2-design $(V,\mathcal{B})$ to exist [Fisher40]. Ray-Chaudhuri and Wilson [Ray-Chaudhuri75] generalized this to prove that for a t-(v,k,λ) design $(V,\mathcal{B})$ with even t to exist, we require $|\mathcal{B}| \geq \binom{v}{t/2}$.

Naturally, we can also use the relations discussed earlier to establish nonexistence as well. If a design does not exist, the extension of that design does not exist. Similarly, if the required residual of a design does not exist, the design does not exist. These eliminate a number of parameter sets.

A classic nonexistence result for symmetric 2-designs is also useful. If a symmetric 2-$(v,n+\lambda,\lambda)$ design exists, then n must be a square if v is even; if v is odd, $z^2 = nx^2 + (-1)^{(v-1)/2}\lambda y^2$ must have a solution in integers x, y and z not all zero. See [Chowla50]. We refer to this as "note (3)" in the tables.

Finally, nonexistence for many parameter sets has been established in various references; these are cited in the tables.

4. Supplement

After the tables, we provide a quick summary of known infinite families of simple t-designs for $t \geq 4$. We also provide a table of known *exact* enumerations for simple t-designs. In many further cases, lower bounds on the number of solutions are available; see the tables of Mathon and Rosa [Mathon85] for the case when repeated blocks are permitted.

Disclaimer

While every effort has been made to make these tables accurate and complete, in a tabulation of this size it would be naive to think that no errors have crept in. Please report any omissions or errors to one of the authors.

Furthermore, we do *not* suggest that simply because a case remains open in the tables, it is by definition interesting. Millions of open cases remain!

Acknowledgements

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t-(v, k, λ)	Existence		Remarks
2-(6,3,2)	Yes	LS	[Bhattacharya43]
2-(7,3,s), $1 \le s \le 2$	Yes	NLS	[Cayley50]
2-(8,4,3s), $1 \le s \le 2$	Yes		3-(8,4,s) as a 2-design
2-(9,3,s), $1 \le s \le 3$	Yes	LS	[Kirkman50]
2-(9,4,3s), $1 \le s \le 3$	Yes		Derived design of 3-(10,5,3s)
2-(10,3,2s), $1 \le s \le 2$	Yes	LS	[Teirlinck75]
2-(10,4,2)	Yes		[Fisher43]
2-(10,4,2s), $2 \le s \le 7$	Yes		Derived design of 3-(11,5,2s)
2-(10,5,4s), $1 \le s \le 7$	Yes		[Brouwer86]
2-(11,3,3)	Yes	LS	Derived design of 3-(12,4,3)
2-(11,4,6s), $1 \le s \le 3$	Yes	LS	[Chee89]
2-(11,5,2s), $1 \le s \le 21$	Yes		[Brouwer86]
2-(12,3,2s), $1 \le s \le 2$	Yes	LS	[Schreiber74]
2-(12,4,3s), $1 \le s \le 7$	Yes		[Brouwer86]
2-(12,5,20s), $1 \le s \le 3$	Yes		Derived design of 3-(13,6,20s)
2-(12,6,5s), $1 \le s \le 21$	Yes		3-(12,6,2s) as a 2-design
2-(13,3,s), $1 \le s \le 5$	Yes	LS	[Denniston74]
2-(13,4,s), $1 \le s \le 27$	Yes	LS	[Chouinard83]
2-(13,5,5s), $1 \le s \le 16$	Yes		Derived design of 3-(14,6,5s)
2-(13,6,5s), $1 \le s \le 33$	Yes		[Brouwer86]
2-(14,3,6)	Yes	LS	[Hanani75]
2-(14,4,6s), $1 \le s \le 5$	Yes	LS	See note (1) with 2-(13,3,s) and 2-(13,4,5s)
2-(14,5,20s), $1 \le s \le 5$	Yes		Derived design of 3-(15,6,20s)
2-(14,6,15s), $1 \le s \le 16$	Yes		Derived design of 3-(15,7,15s)
2-(14,7,6s), $1 \le s \le 66$	Yes		[Brouwer86]
2-(15,3,s), $1 \le s \le 6$	Yes	LS	[Denniston74]
2-(15,4,6s), $1 \le s \le 6$	Yes		Derived design of 3-(16,5,6s)
2-(15,5,2)	No		See note (4) with 2-(22,7,2)
2-(15,5,2s), $2 \le s \le 71$	Yes		Derived design of 3-(16,6,2s)
2-(15,6,5s), $1 \le s \le 71$	Yes		[Brouwer86]
2-(15,7,3s), $1 \le s \le 214$	Yes		[Brouwer86]
2-(16,3,2s), $1 \le s \le 3$	Yes	LS	[Schreiber74]
2-(16,4,s), $1 \le s \le 2$	Yes		Derived design of 3-(17,5,s)
2-(16,4,3)	Yes		[Kramer76]
2-(16,4,s), $4 \le s \le 45$	Yes		Derived design of 3-(17,5,s)
2-(16,5,4s), $1 \le s \le 45$	Yes		Derived design of 3-(17,6,4s)
2-(16,6,1)	No		Violates Fisher's inequality
2-(16,6,2)	Yes		[Husain45]
2-(16,6,3)	Yes		Residual of 2-(25,9,3)
2-(16,6,s), $4 \le s \le 500$	Yes		[Brouwer86]
2-(16,7,14s), $1 \le s \le 71$	Yes		See note (1) with 2-(15,6,5s) and 2-(15,7,9s)
2-(16,8,7s), $1 \le s \le 214$	Yes		3-(16,8,3s) as a 2-design
2-(17,3,3s), $1 \le s \le 2$	Yes	LS	[Kramer77]

t–(v, k, λ)	Existence		Remarks
2-(17,4,3s), 1≤s≤17	Yes		[Brouwer86]
2-(17,5,5s), 1≤s≤45	Yes		[Brouwer86]
2-(17,6,15s), 1≤s≤45	Yes		[Brouwer86]
2-(17,7,21s), 1≤s≤71	Yes		[Brouwer86]
2-(17,8,7s), 1≤s≤357	Yes		[Brouwer86]
2-(18,3,2s), 1≤s≤4	Yes	LS	[Teirlinck75]
2-(18,4,6s), 1≤s≤10	Yes		[Brouwer86]
2-(18,5,20s), 1≤s≤14	Yes		Derived design of 3-(19,6,20s)
2-(18,6,5)	Yes		[Takeuchi62]
2-(18,6,5s), 2≤s≤8	Yes		See Permutation Lemma with 2-(18,6,5)
2-(18,6,5s), s≡0 (mod 2)	Yes		[Brouwer86]
2-(18,6,5s), s≡0 (mod 7)	Yes		Derived design of 3-(19,7,5s)
2-(18,6,5s), s=11,13,15,19,21,23,25 etc	Yes		[Brouwer86]
2-(18,6,5s), all other s	?		
2-(18,7,42s), s≡0 (mod 8)	Yes		[Kreher89]
2-(18,7,42s), all other s	?		
2-(18,8,28)	Yes		[Assmus??]
2-(18,8,28s), s≡0 (mod 2)	Yes		See note (1) with 2-(17,7,21s/2) and 2-(17,8,35s/2)
2-(18,8,28s), all other s	?		
2-(18,9,8s), 1≤s≤715	Yes		[Dehon76]
2-(19,3,s), 1≤s≤8	Yes	LS	[Denniston74]
2-(19,4,2s), 1≤s≤34	Yes		[Brouwer86]
2-(19,5,10s), 1≤s≤34	Yes	LS	[Brouwer86]
2-(19,6,5s), 1≤s≤238	Yes		[Brouwer86]
2-(19,7,7s), 1≤s≤442	Yes		[Brouwer86]
2-(19,8,28s), 1≤s≤221	Yes	LS	[Brouwer86]
2-(19,9,4s), 1≤s≤2431	Yes		[Brouwer86]
2-(20,3,6)	Yes	LS	[Teirlinck75]
2-(20,4,3s), 1≤s≤25	Yes		[Kreher89]
2-(20,5,4)	Yes		[Takeuchi62]
2-(20,5,4s), 2≤s≤3	Yes		See Permutation Lemma with 2-(20,5,4)
2-(20,5,4s), s=4,20,40,44,52,64,92,100	Yes		Residual design of 3-(21,5,3s/4)
2-(20,5,4s), s=10,17,32,34,37,55, 59,62,67,70,74,80,82,85,89,94	Yes		Derived design of 3-(21,6,4s)
2-(20,5,4s), s≡0 (mod 3)	Yes		See note (1) with 2-(19,4,2s/3) and 2-(19,5,10s/3)
2-(20,5,4s), all other s	?		
2-(20,6,15s), s≡0 (mod 3)	Yes		Derived design of 3-(21,7,15s)
2-(20,6,15s), s=28,40,52,56,64,68,80,91	Yes		Derived design of 3-(21,7,15s)
2-(20,6,15s), s=10,17,34,37,44,55, 59,62,67,70,74,82,85,89,94,100	Yes		Residual design of 3-(21,6,4s)
2-(20,6,15s), all other s	?		

t–(v, k, λ)	Existence		Remarks
2-(20,7,42s), $s\equiv0$ (mod 3)	Yes		3-(20,7,35s) as a 2-design
2-(20,7,42s), s=16,28,32,44,64,76,80,92	Yes		Derived design of 3-(21,8,42s)
2-(20,7,42s), all other s	?		
2-(20,8,14s), $s\equiv0$ (mod 3)	Yes		3-(20,8,14s) as a 2-design
2-(20,8,14s), s=104,182,208,286,416,494,520,598	Yes		Residual design of 3-(21,8,84s/13)
2-(20,8,14s), all other s	?		
2-(20,9,72s), $1\leq s\leq221$	Yes		See note (1) with 2-(19,8,28s) and 2-(19,9,44s)
2-(20,10,9s), $1\leq s\leq2431$	Yes		See note (2) with 2-(19,9,4s)
2-(21,3,s), $1\leq s\leq9$	Yes	LS	[Denniston74]
2-(21,4,3s), $1\leq s\leq28$	Yes		Derived design of 3-(22,5,3s)
2-(21,5,s), $1\leq s\leq60$	Yes		Derived design of 3-(22,6,s)
2-(21,5,s), $s\equiv0$ (mod 17)	Yes		Derived design of 3-(22,6,s)
2-(21,5,s), s=96,97,112,113,128,129	Yes		Derived design of 3-(22,6,s)
2-(21,5,s), s=19,95,114,152,171,190, 209,247,285,304,342,399,437,456,475	Yes		3-(21,5,3s/19) as a 2-design
2-(21,5,s), all other s	?		
2-(21,6,1)	No		Violates Fisher's inequality
2-(21,6,2)	No		See note (4) with 2-(29,8,2)
2-(21,6,3)	Yes		[Hall67]
2-(21,6,s), s=5,7	Yes		[Southern81]
2-(21,6,s), $s\equiv0$ (mod 4) and $4\leq s\leq240$	Yes		Residual design of 3-(22,6,s/4)
2-(21,6,s), s=384,388,448,452,512,516	Yes		Residual design of 3-(22,6,s/4)
2-(21,6,s), $s\equiv0$ (mod 68)	Yes		Residual design of 3-(22,6,s/4)
2-(21,6,s), s=6,1386,1890	Yes		Derived design of 3-(22,7,s)
2-(21,6,s), s=190,323,608,646,703, 836,1045,1121,1178,1273,1330, 1406,1558,1615,1691,1748,1786,1900	Yes		3-(21,6,4s/19) as a 2-design
2-(21,6,s), $s\equiv0$ (mod 57)	Yes		See note (1) with 2-(20,5,4s/19) and 2-(20,6,15s/19)
2-(21,6,s), all other s	?		
2-(21,7,3)	Yes		[Takeuchi62]
2-(21,7,3s), $2\leq s\leq130$	Yes		See Permutation Lemma with 2-(21,7,3)
2-(21,7,3s), s=144,180,336,360,512,516, 1680,1712,1716	Yes		Derived design of 3-(22,8,3s)
2-(21,7,3s), $s\equiv0$ (mod 57)	Yes		3-(21,7,15s/19) as a 2-design
2-(21,7,3s), s=532,760,988,1064,1216,1292,1520,1729	Yes		3-(21,7,15s/19) as a 2-design
2-(21,7,3s), s=448,452,1260,1288,1386,1860,1890	Yes		Residual design of 3-(22,7,s)
2-(21,7,3s), $s\equiv0$ (mod 4) and $4\leq s\leq96$	Yes		Residual design of 3-(22,7,s)
2-(21,7,3s), $s\equiv0$ (mod 68)	Yes		Residual design of 3-(22,7,s)
2-(21,7,3s), all other s	?		

t-(v,k,λ)	Existence		Remarks
2-(21,8,14s), s=3,18,72,90,180,240,330, 504,840,858	Yes		Derived design of 3-(22,9,14s)
2-(21,8,14s), s=2,4,6,8,10,12,14,16,56, 180,256,258,856	Yes		Residual design of 3-(22,8,6s)
2-(21,8,14s), $s\equiv0$ (mod 57)	Yes		See note (1) with 2-(20,7,84s/19) and 2-(20,8,182s/19)
2-(21,8,14s), s=152,266,304,418, 608,722,760,874	Yes		See note (1) with 2-(20,7,84s/19) and 2-(20,8,182s/19)
2-(21,8,14s), all other s	?		
2-(21,9,6)	Yes		[Takeuchi62]
2-(21,9,6s), $2\le s\le240$	Yes		See Permutation Lemma with 2-(21,9,6)
2-(21,9,6s), s=390,1040,1430, 2584,3876	Yes		Derived design of 3-(22,10,6s)
2-(21,9,6s), s=312,780,2184, 3640,3718	Yes		Residual design of 3-(22,9,42s/13)
2-(21,9,6s), $s\equiv0$ (mod 19)	Yes		See note (1) with 2-(20,8,42s/19) and 2-(20,9,72s/19)
2-(21,9,6s), all other s	?		
2-(21,10,9)	Yes		Derived design of 3-(22,11,9)
2-(21,10,9s), $2\le s\le200$	Yes		See Permutation Lemma with 2-(21,10,9)
2-(21,10,9s), s=1430,2584,3876	Yes		Derived design of 3-(22,11,9s)
2-(21,10,9s), s=390,1040	Yes		Residual design of 3-(22,10,6s)
2-(21,10,9s), $s\equiv0$ (mod 19)	Yes		See note (1) with 2-(20,9,72s/19) and 2-(20,10,99s/19)
2-(21,10,9s), all other s	?		
2-(22,3,2s), $1\le s\le5$	Yes	LS	[Teirlinck84]
2-(22,4,2)	Yes		[Takeuchi62]
2-(22,4,2s), $s\equiv0$ (mod 5)	Yes		Derived design of 3-(23,5,2s)
2-(22,4,2s), $s\equiv0$ (mod 19)	Yes		Residual design of 3-(23,4,4s/19)
2-(22,4,2s), all other s	?		
2-(22,5,20s), $1\le s\le28$	Yes		Derived design of 3-(23,6,20s)
2-(22,6,5s), $1\le s\le60$	Yes		3-(22,6,s) as a 2-design
2-(22,6,5s), s=96,97,112,113,128,129	Yes		3-(22,6,s) as a 2-design
2-(22,6,5s), $s\equiv0$ (mod 17)	Yes		3-(22,6,s) as a 2-design
2-(22,6,5s), all other s	?		
2-(22,7,2)	No		See note (3)
2-(22,7,4)	Yes		[Southern81]
2-(22,7,6)	Yes		[Hanani75]
2-(22,7,2s), $s\equiv0$ (mod 4), $s\ge8$	Yes		Derived design of 3-(23,8,8s)
2-(22,7,2s), all other s	?		
2-(22,8,8)	Yes		[Southern81]
2-(22,8,4s), $s\equiv0$ (mod 5), $s\ge10$	Yes		Residual design of 3-(23,8,8s)
2-(22,8,4s), $s\equiv0$ (mod 6), $s\ge12$	Yes		Derived design of 3-(23,9,24s)
2-(22,8,4s), all other s	?		

t–(v, k, λ)	Existence		Remarks
2-(22,9,120)	Yes		Residual design of 3-(23,9,120)
2-(22,9,24s), $s \equiv 0 \pmod 2$), $s \geq 4$	Yes		Residual design of 3-(23,9,24s)
2-(22,9,24s), all other s	?		
2-(22,10,15s), $s \equiv 0 \pmod{19}$	Yes		See note (1) with 2-(21,9,6s) and 2-(21,10,9s)
2-(22,10,15s), s=8,13,78,96,390, 1040,1430,2584,3876	Yes		See note (1) with 2-(21,9,6s) and 2-(21,10,9s)
2-(22,10,15s), all other s	?		
2-(22,11,10)	Yes		[Hall56], [Takeuchi62], [Kageyama72]
2-(22,11,10s), $2 \leq s \leq 400$	Yes		See Permutation Lemma with 2-(22,11,10)
2-(22,11,10s), s=2860,5168,7752	Yes		Residual design of 3-(23,11,9s/2)
2-(22,11,10s), s=780,2080	Yes		See note (2) with 2-(21,10,9s/2)
2-(22,11,10s), $s \equiv 0 \pmod{38}$	Yes		See note (2) with 2-(21,10,9s/2)
2-(22,11,10s), all other s	?		
2-(23,3,3s), $1 \leq s \leq 3$	Yes	LS	[Kramer77]
2-(23,4,6s), $1 \leq s \leq 17$	Yes	LS	[Chee89]
2-(23,5,10s), $1 \leq s \leq 66$	Yes	LS	[Chee89]
2-(23,6,15s), $1 \leq s \leq 199$	Yes	LS	[Chee89]
2-(23,7,21s), $1 \leq s \leq 484$	Yes	LS	[Chee89]
2-(23,8,28s), $1 \leq s \leq 969$	Yes	LS	[Chee89]
2-(23,9,36s), $1 \leq s \leq 1615$	Yes	LS	[Chee89]
2-(23,10,45s), $1 \leq s \leq 2261$	Yes	LS	[Chee89]
2-(23,11,5)	Yes		Derived design of 3-(24,12,5)
2-(23,11,5s), $2 \leq s \leq 2556$	Yes		See Permutation Lemma with 2-(23,11,5)
2-(23,11,5s), s=4004,4356,4357,4500,4501	Yes		Derived design of 3-(24,12,5s)
2-(23,11,5s), s=10010,15730,15743,16588,16601	Yes		Residual design of 3-(24,11,45s/13)
2-(23,11,5s), s=2730,7280,18088,27132	Yes		See note (1) with 2-(22,10,15s/7) and 2-(22,11,20s/7)
2-(23,11,5s), $s \equiv 0 \pmod{133}$	Yes		See note (1) with 2-(22,10,15s/7) and 2-(22,11,20s/7)
2-(23,11,5s), all other s	?		
2-(24,3,2s), $1 \leq s \leq 5$	Yes	LS	[Schreiber74]
2-(24,4,3)	Yes		[Hanani61]
2-(24,4,3s), $s \equiv 0 \pmod{11}$	Yes		Derived design of 3-(25,5,3s)
2-(24,4,3s), s=7,28,35	Yes		Residual design of 3-(25,4,2s/7)
2-(24,4,3s), all other s	?		
2-(24,5,20)	Yes		[Hanani72]
2-(24,5,20s), $s \equiv 0 \pmod{11}$	Yes		Derived design of 3-(25,6,20s)
2-(24,5,20s), all other s	?		
2-(24,6,5)	Yes		[Hanani75]
2-(24,6,5s), $2 \leq s \leq 16$	Yes		See Permutation Lemma with 2-(24,6,5)
2-(24,6,5s), $s \equiv 0 \pmod{11}$	Yes		3-(24,6,10s/11) as a 2-design
2-(24,6,5s), all other s	?		

t-(v, k, λ)	Existence		Remarks
2-(24,7,42s), $s\equiv 0$ (mod 11)	Yes		Derived design of 3-(25,8,42s)
2-(24,7,42s), all other s	?		
2-(24,8,7)	Yes		[Hanani75]
2-(24,8,7s), $2\leq s\leq 155$	Yes		See Permutation Lemma with 2-(24,8,7)
2-(24,8,7s), $s\equiv 0$ (mod 11)	Yes		3-(24,8,21s/11) as a 2-design
2-(24,8,7s), all other s	?		
2-(24,9,24s), $s\equiv 0$ (mod 11)	Yes		See note (1) with 2-(23,8,84s/11) and 2-(23,9,180s/11)
2-(24,9,24s), all other s	?		
2-(24,10,45s), $s\equiv 0$ (mod 11)	Yes		See note (1) with 2-(23,9,180s/11) and 2-(23,9,315s/11)
2-(24,10,45s), all other s	?		
2-(24,11,110)	Yes		Derived design of 3-(25,12,110)
2-(24,11,110s), $2\leq s\leq 9$	Yes		See Permutation Lemma with 2-(24,11,110)
2-(24,11,110s), s=42,66,67,210,308, 560,770,1210,1211,1276,1277	Yes		See note (1) with 2-(23,10,45s) and 2-(23,11,65s)
2-(24,11,110s), all other s	?		
2-(24,12,11)	Yes		[Takeuchi62]
2-(24,12,11s), $2\leq s\leq 1278$	Yes		See Permutation Lemma with 2-(24,12,11)
2-(24,12,11s), s=2730,4004,4356,4357, 4500,4501,7280,10010,15730, 15743,16588,16601,18088,27132	Yes		See note (2) with 2-(23,11,5s)
2-(24,12,11s), $s\equiv 0$ (mod 133)	Yes		See note (2) with 2-(23,11,5s)
2-(24,12,11s), all other s	?		
2-(25,3,s), $1\leq s\leq 11$	Yes	LS	[Denniston74]
2-(25,4,1)	Yes		Derived design of 3-(26,5,1)
2-(25,4,s), $2\leq s\leq 6$	Yes		See Permutation Lemma with 2-(25,4,1)
2-(25,4,s), s=23,92,115	Yes		3-(25,4,2s/23) as a 2-design
2-(25,4,s), $s\equiv 0$ (mod 11)	Yes		Residual design of 3-(26,4,s/11)
2-(25,4,s), all other s	?		
2-(25,5,1)	Yes		[Takeuchi62]
2-(25,5,s), $2\leq s\leq 60$	Yes		See Permutation Lemma with 2-(25,5,1)
2-(25,5,s), s=253,506,759	Yes		Derived design of 3-(26,6,s)
2-(25,5,s), $s\equiv 0$ (mod 77) and $s\geq 154$	Yes		Derived design of 3-(26,6,s)
2-(25,5,s), all other s	?		
2-(25,6,5)	Yes		[Southern81]
2-(25,6,5s), $2\leq s\leq 18$	Yes		See Permutation Lemma with 2-(25,6,5)
2-(25,6,5s), s=253,506,759	Yes		Residual design of 3-(26,6,s)
2-(25,6,5s), $s\equiv 0$ (mod 77) and $s\geq 154$	Yes		Residual design of 3-(26,6,s)
2-(25,6,5s), all other s	?		

t-(v, k, λ)	Existence		Remarks
2-(25,7,7)	Yes		[Southern81]
2-(25,7,7s), $2 \le s \le 49$	Yes		See Permutation Lemma with 2-(25,7,7)
2-(25,7,7s), $s \equiv 0$ (mod 253)	Yes		Derived design of 3-(26,8,7s)
2-(25,7,7s), all other s	?		
2-(25,8,7)	Yes		[Wilson75]
2-(25,8,7s), $2 \le s \le 193$	Yes		See Permutation Lemma with 2-(25,8,7)
2-(25,8,7s), $s \equiv 0$ (mod 253)	Yes		3-(25,8,42s/23) as a 2-design
2-(25,8,7s), all other s	?		
2-(25,9,3)	Yes		[Hall67]
2-(25,9,3s), $2 \le s \le 3269$	Yes		See Permutation Lemma with 2-(25,9,3)
2-(25,9,3s), $s \equiv 0$ (mod 253)	Yes		See note (1) with 2-(24,8,21s/23) and 2-(24,9,48s/23)
2-(25,9,3s), all other s	?		
2-(25,10,3)	No		Violates Fisher's inequality
2-(25,10,3s), s=2,3	Yes		[Southern81]
2-(25,10,3s), $s \equiv 0$ (mod 253)	Yes		See note (1) with 2-(24,9,24s/23) and 2-(24,10,45s/23)
2-(25,10,3s), all other s	?		
2-(25,11,55s), s=23,138,690,1012,1840,2530,3979	Yes		See note (1) with 2-(24,10,495s/23) and 2-(24,11,770s/23)
2-(25,11,55s), all other s	?		
2-(25,12,11)	Yes		[Takeuchi62], [Wilson75]
2-(25,12,11s), $2 \le s \le 2081$	Yes		See Permutation Lemma with 2-(25,12,11)
2-(25,12,11s), s=4830,7084,12880,17710, 27830,27853,29348,29371	Yes		See note (1) with 2-(24,11,110s/23) and 2-(24,12,143s/23)
2-(25,12,11s), all other s	?		
2-(26,3,6s), $1 \le s \le 2$	Yes	LS	[Teirlinck75]
2-(26,4,6)	Yes		[Hanani61]
2-(26,4,6s), $s \equiv 0$ (mod 2)	Yes		3-(26,4,s/2) as a 2-design
2-(26,4,138)	Yes		Derived design of 3-(27,5,138)
2-(26,4,6s), all other s	?		
2-(26,5,4)	Yes		[Hanani72]
2-(26,5,4s), $2 \le s \le 4$	Yes		See Permutation Lemma with 2-(26,5,4)
2-(26,5,1012)	Yes		Derived design of 3-(27,6,1012)
2-(26,5,4s), $s \equiv 0$ (mod 22) and $s \ge 44$	Yes		Derived design of 3-(27,6,4s)
2-(26,5,4s), all other s	?		
2-(26,6,3)	Yes		[Takeuchi62]
2-(26,6,3s), $2 \le s \le 55$	Yes		See Permutation Lemma with 2-(26,6,3)
2-(26,6,5313)	Yes		Derived design of 3-(27,7,5313)
2-(26,6,3s), s=3542,70814,10626	Yes		3-(26,6,s/2) as a 2-design
2-(26,6,3s), $s \equiv 0$ (mod 154) and $s \ge 308$	Yes		Residual design of 3-(27,6,4s/7)
2-(26,6,3s), all other s	?		

t–(v, k, λ)	Existence		Remarks
2-(26,7,42s), s=4,506	Yes		Residual design of 3-(27,7,21s/2)
2-(26,7,336)	Yes		See note (1) with 2-(25,6,70) and 2-(25,7,266)
2-(26,7,42s), all other s	?		
2-(26,8,28s), 1≤s≤49	Yes		See note (1) with 2-(25,7,7s) and 2-(25,8,21s)
2-(26,8,28s), s≡0 (mod 253)	Yes		3-(26,8,7s) as a 2-design
2-(26,8,28s), all other s	?		
2-(26,9,72s), 1≤s≤64	Yes		See note (1) with 2-(25,8,21s) and 2-(25,9,51s)
2-(26,9,72s), 65≤s≤2403	?		
2-(26,10,9)	Yes		[Southern81]
2-(26,10,9s), 2≤s≤1258	Yes		See Permutation Lemma with 2-(26,10,9)
2-(26,10,9s), s≡0 (mod 253)	Yes		See note (1) with 2-(25,9,3s) and 2-(25,10,6s)
2-(26,10,9s), all other s	?		
2-(26,11,22s), s=92,552,2760,4048, 7360,10120,15916	Yes		See note (1) with 2-(25,10,33s/4) and 2-(25,11,55s/4)
2-(26,11,22s), all other s	?		
2-(26,12,66s), s=46,276,1380,2024, 3680,5060,7958	Yes		See note (1) with 2-(25,11,55s/2) and 2-(25,12,77s/2)
2-(26,12,66s), all other s	?		
2-(26,13,12)	Yes		[Takeuchi62], [Kageyama72]
2-(26,13,12s), 2≤s≤4161	Yes		See Permutation Lemma with 2-(26,13,12)
2-(26,13,12s), s=4162,9660,14168,25760, 35420,55660,55706,58969,58742	Yes		See note (2) with 2-(25,12,11s/2)
2-(26,13,12s), all other s	?		
2-(27,3,s), 1≤s≤12	Yes	LS	[Rosa75]
2-(27,4,6)	Yes		[Hanani61]
2-(27,4,150)	Yes		Derived design of 3-(28,5,150)
2-(27,4,6s), s≡0 (mod 2)	Yes		Residual design of 2-(28,4,s/2)
2-(27,4,6s), all other s	?		
2-(27,5,10)	Yes		[Hanani72]
2-(27,5,460)	Yes		Residual design of 3-(28,5,60)
2-(27,5,10s), s≡0 (mod 5) and s≥20	Yes		Derived design of 3-(28,6,10s)
2-(27,5,1150)	Yes		Derived design of 3-(28,6,1150)
2-(27,5,10s), all other s	?		
2-(27,6,5)	Yes		[Southern81]
2-(27,6,5s), 2≤s≤22	Yes		See Permutation Lemma with 2-(27,6,5)
2-(27,6,5s), s≡0 (mod 55) and s≥220	Yes		Residual design of 3-(28,6,10s/11)
2-(27,6,6325)	Yes		Derived design of 3-(28,7,6325)
2-(27,6,5s), all other s	?		
2-(27,7,21s), s=10,1265	Yes		Residual design of 3-(28,7,5s)
2-(27,7,21s), all other s	?		

t-(v,k,λ)	Existence		Remarks
2-(27,8,28s), s=25,50	Yes		See note (1) with 2-(26,7,168s/25) and 2-(26,8,532s/25)
2-(27,8,28s), all other s	?		
2-(27,9,4)	Yes		[Takeuchi62]
2-(27,9,4s), 2≤s≤3082	Yes		See Permutation Lemma with 2-(27,9,4)
2-(27,9,4s), 3083≤s≤60087	?		
2-(27,10,495)	Yes		Derived design of 3-(28,11,495)
2-(27,10,45s), s≡0 (mod 5) and s≤320	Yes		See note (1) with 2-(26,9,72s/5) and 2-(26,10,153s/5)
2-(27,10,45s), all other s	?		
2-(27,11,55s), s=17,98,1025	Yes		Derived design of 3-(28,12,55s)
2-(27,11,55s), s=345,1725,2530,4600,6325	Yes		See note (1) with 2-(26,10,99s/5) and 2-(26,11,176s/5)
2-(27,11,55s), all other s	?		
2-(27,12,22s), s=68,392,4100	Yes		Residual design of 3-(28,12,55s/4)
2-(27,12,22s), s=230,1380,6900,10120, 18400,25300,39790	Yes		See note (1) with 2-(26,11,44s/5) and 2-(26,12,66s/5)
2-(27,12,22s), all other s	?		
2-(27,13,6)	Yes		[Takeuchi62]
2-(27,13,6s), 2≤s≤27515	Yes		See Permutation Lemma with 2-(27,13,6)
2-(27,13,6s), s=34500,50600,92000, 126500,198950	Yes		See note (1) with 2-(26,12,66s/25) and 2-(26,13,84s/25)
2-(27,13,6s), all other s	?		
2-(28,3,2s), 1≤s≤6	Yes	LS	[Schreiber74]
2-(28,4,1)	Yes		[Hanani61]
2-(28,4,s), 2≤s≤6	Yes		See Permutation Lemma with 2-(28,4,1)
2-(28,4,s), s≡0 (mod 25)	Yes		Residual design of 3-(29,4,2s/25)
2-(28,4,s), s≡0 (mod 13)	Yes		3-(28,4,s/13) as a 2-design
2-(28,4,s), s=55,80,85,95,110, 120,125,135,150	Yes		[Kreher89]
2-(28,4,s), all other s	?		
2-(28,5,20)	Yes		[Hanani72]
2-(28,5,20s), s=26,65	Yes		3-(28,5,30s/13) as a 2-design
2-(28,5,20s), all other s	?		
2-(28,6,5)	Yes		[Southern81]
2-(28,6,5s), 2≤s≤24	Yes		See Permutation Lemma with 2-(28,6,5)
2-(28,6,5s), s≡0 (mod 65) and s≥260	Yes		3-(28,6,10s/13) as a 2-design
2-(28,6,5s), all other s	?		
2-(28,7,2)	Yes		[Hall67]
2-(28,7,2s), 2≤s≤914	Yes		See Permutation Lemma with 2-(28,7,2)
2-(28,7,32890)	Yes		Residual design of 3-(29,7,7475)
2-(28,7,2s), all other s	?		

$t-(v,k,\lambda)$	Existence		Remarks
2-(28,8,14s), 1≤s≤64	?		
2-(28,8,910)	Yes		See note (1) with 2-(27,7,210) and 2-(27,8,700)
2-(28,8,14s), 66≤s≤8222	?		
2-(28,9,8)	Yes		[Southern81]
2-(28,9,8s), 2≤s≤979	Yes		See Permutation Lemma with 2-(28,9,8)
2-(28,9,8s), 980≤s≤41112	?		
2-(28,10,10)	Yes		[Southern81]
2-(28,10,5s), s≡0 (mod 2) and 4≤s≤3720	Yes		See Permutation Lemma with 2-(28,10,10)
2-(28,10,715)	Yes		Derived design of 3-(29,11,715)
2-(28,10,5s), all other s	?		
2-(28,11,110s), 1≤s≤12	?		
2-(28,11,1430)	Yes		Derived design of 3-(29,12 1430)
2-(28,11,110s), 14≤s≤14202	?		
2-(28,12,11)	Yes		[Shrikhande62]
2-(28,12,11s), 2≤s≤7665	Yes		See Permutation Lemma with 2-(28,12,11)
2-(28,12,11s), s=13325,22425,32890, 59800,82225	Yes		See note (1) with 2-(27,11,55s/13) and 2-(27,12,88s/13)
2-(28,12,11s), all other s	?		
2-(28,13,52s), s=68,230,392,1380,4100, 6900,10120,18400,25300,39790	Yes		See note (1) with 2-(27,12,22s) and 2-(27,13,30s)
2-(28,13,52s), all other s	?		
2-(28,14,13s), 1≤s≤27515	Yes		See note (2) with 2-(27,13,6s)
2-(28,14,13s), s=34500,50600,92000, 126500,198950	Yes		See note (2) with 2-(27,13,6s)
2-(28,14,13s), all other s	?		
2-(29,3,3s), 1≤s≤4	Yes	LS	[Kramer77]
2-(29,4,3s), 1≤s≤58	Yes		[Kreher89]
2-(29,5,5s), 1≤s≤292	Yes		[Kreher89]
2-(29,6,15s), 1≤s≤584	?		
2-(29,6,8775)	Yes		3-(29,6,1300) as a 2-design
2-(29,7,3)	Yes		[Bose39]
2-(29,7,3s), 2≤s≤464	Yes		See Permutation Lemma with 2-(29,7,3)
2-(29,7,3s), 465≤s≤13454	?		
2-(29,7,40365)	Yes		Residual design of 3-(30,7,8775)
2-(29,8,2)	No		[Shrikhande50]
2-(29,8,4)	Yes		[Takeuchi62]
2-(29,8,2s), s≡0 (mod 2) and s≤2552	Yes		See Permutation Lemma with 2-(29,8,4)
2-(29,8,1170)	Yes		See note (1) with 2-(28,7,260) and 2-(28,8,910)
2-(29,8,2s), all other s	?		
2-(29,9,18s), 1≤s≤194	?		
2-(29,9,3510)	Yes		See note (1) with 2-(28,8,910) and 2-(28,9,2600)
2-(29,9,18s), 196≤s≤24667	?		
2-(29,10,45s), 1≤s≤24667	?		

t–(v, k, λ)	Existence		Remarks
2-(29,11,55s), $1\leq s\leq 38$	?		
2-(29,11,2145)	Yes		Derived design of 3-(30,12,2145)
2-(29,11,55s), $40\leq s\leq 42607$	?		
2-(29,12,33s), $1\leq s\leq 116$	?		
2-(29,12,3861)	Yes		Residual design of 3-(30,12,2145)
2-(29,12,33s), $118\leq s\leq 127822$	?		
2-(29,13,39s), s=153,882,3105,9225, 15525,22770,41400,56925	Yes		See note (1) with 2-(28,12,143s/9) and 2-(28,13,208s/9)
2-(29,13,39s), all other s	?		
2-(29,14,13)	Yes		[Wilson72]
2-(29,14,13s), $2\leq s\leq 23056$	Yes		See Permutation Lemma with 2-(29,14,13)
2-(29,14,13s), s=36900,62100,91080, 165600,227700,358110	Yes		See note (1) with 2-(28,13,52s/9) and 2-(28,14,65s/9)
2-(29,14,13s), all other s	?		
2-(30,3,2s), $1\leq s\leq 7$	Yes	LS	[Teirlinck75]
2-(30,4,6)	Yes		[Hanani61]
2-(30,4,6s), $s\equiv 0$ (mod 7)	Yes		3-(30,5,3s/7) as a 2-design
2-(30,4,6s), all other s	?		
2-(30,5,4)	Yes		[Hanani72]
2-(30,5,4s), $2\leq s\leq 5$	Yes		See Permutation Lemma with 2-(30,5,4)
2-(30,5,4s), $s\equiv 0$ (mod 7)	Yes		See note (1) with 2-(29,4,3s/7) and 2-(29,5,25s/7)
2-(30,5,4s), all other s	?		
2-(30,6,5)	Yes		[Southern81]
2-(30,6,5s), $2\leq s\leq 29$	Yes		See Permutation Lemma with 2-(30,6,5)
2-(30,6,5s), $30\leq s\leq 2047$	?		
2-(30,7,42s), $1\leq s\leq 1169$	?		
2-(30,7,49140)	Yes		3-(30,7,8775) as a 2-design
2-(30,8,28s), $1\leq s\leq 6727$	?		
2-(30,9,24s), $1\leq s\leq 194$	?		
2-(30,9,4680)	Yes		See note (1) with 2-(29,8,1170) and 2-(29,9,3510)
2-(30,9,24s), $196\leq s\leq 24667$	?		
2-(30,10,9s), $1\leq s\leq 172672$	?		
2-(30,11,110s), $1\leq s\leq 31395$	?		
2-(30,12,22s), $1\leq s\leq 272$	?		
2-(30,12,6006)	Yes		3-(30,12,2145) as a 2-design
2-(30,12,22s), $274\leq s\leq 298252$	?		

t-(v, k, λ)	Existence		Remarks
2-(30,13,156s), 1≤s≤62	?		
2-(30,13,9828)	Yes		See note (1) with 2-(29,12,3861) and 2-(29,13,5967)
2-(30,13,156s), 64≤s≤68827	?		
2-(30,14,91s), s=153,882,3105,9225, 15525,22770,165600,56925	Yes		See note (1) with 2-(29,13,39s) and 2-(29,14,52s)
2-(30,14,91s), all other s	?		
2-(30,15,14)	Yes		[Kageyama72], [Wilson72]
2-(30,15,14s), 2≤s≤46112	Yes		See Permutation Lemma with 2-(30,15,14)
2-(30,15,14s), s=73800,124200,182160, 331200,455400,716220	Yes		See note (2) with 2-(29,14,13s)
2-(30,15,14s), all other s	?		

t-(v, k, λ)	Existence		Remarks
3-(8,4,s), 1≤s≤2	Yes	NLS	Extension of 2-(7,3,s)
3-(10,4,s), 1≤s≤3	Yes	NLS	Derived design of 4-(11,5,s)
3-(10,5,3s), 1≤s≤3	Yes		Residual design of 4-(11,5,s)
3-(11,4,4)	Yes	LS	[Teirlinck88]
3-(11,5,2)	No		[Oberschelp72], [Dehon76]
3-(11,5,2s), 2≤s≤7	Yes		[Brouwer86]
3-(12,4,3)	Yes	LS	[Teirlinck84]
3-(12,5,6)	Yes		[Brouwer86]
3-(12,5,12)	Yes		Derived design of 4-(13,6,12)
3-(12,5,18)	Yes		[Brouwer86]
3-(12,6,2s), 1≤s≤21	Yes		Extension of 2-(11,5,2s)
3-(13,4,2s), 1≤s≤2	Yes		[Brouwer86]
3-(13,5,15)	Yes	LS	[Chee89]
3-(13,6,20s), 1≤s≤3	Yes		[Kramer76]
3-(14,4,s), 1≤s≤2	Yes		[Bays35]
3-(14,4,s), 3≤s≤5	Yes		[Brouwer86]
3-(14,5,5)	Yes		[Kramer88b]
3-(14,5,5s), 2≤s≤3	Yes		[Brouwer86]
3-(14,5,20)	Yes		Residual design of 4-(15,5,4)
3-(14,5,25)	Yes		[Brouwer86]
3-(14,6,5s), 1≤s≤16	Yes		[Brouwer86]
3-(14,7,5s), 1≤s≤33	Yes		Extension of 2-(13,6,5s)

t–(v, k, λ)	Existence		Remarks
3-(15,5,6)	Yes		[Brouwer86]
3-(15,5,6s), 2≤s≤5	Yes		Derived design of 4-(16,6,6s)
3-(15,6,20s), 1≤s≤5	Yes		Derived design of 4-(16,7,20s)
3-(15,7,15s), 1≤s≤5	Yes		[Brouwer86]
3-(15,7,15s), 6≤s≤16	Yes		4-(15,7,5s) as a 3-design
3-(16,4,s), 1≤s≤6	Yes		[Lindner77]
3-(16,5,6s), 1≤s≤6	Yes		Derived design of 4-(17,6,6s)
3-(16,6,2)	No		Extend 2-(15,5,2)
3-(16,6,2s), 2≤s≤5	Yes		[Brouwer86]
3-(16,6,2s), 6≤s≤71	Yes		Derived design of 4-(17,7,2s)
3-(16,7,5)	?		
3-(16,7,10)	Yes		[Kreher89]
3-(16,7,5s), 3≤s≤71	Yes		[Brouwer86]
3-(16,8,3s), 1≤s≤214	Yes		Extension of 2-(15,7,3s)
3-(17,4,2s), 1≤s≤3	Yes		Derived design of 4-(18,5,2s)
3-(17,5,s), 1≤s≤2	Yes		[Skolem27]
3-(17,5,3)	?		
3-(17,5,s), 4≤s≤45	Yes		[Brouwer86]
3-(17,6,4s), 1≤s≤45	Yes		[Brouwer86]
3-(17,7,7)	?		
3-(17,7,7s), 2≤s≤71	Yes		[Brouwer86]
3-(17,8,14s), 1≤s≤71	Yes		[Brouwer86]
3-(18,4,3s), 1≤s≤2	Yes	LS	[Teirlinck84]
3-(18,5,15s), 1≤s≤3	Yes		Derived design of 4-(19,6,15s)
3-(18,6,5s), 1≤s≤45	Yes		[Brouwer86]
3-(18,7,105s), 1≤s≤6	Yes		Derived design of 4-(19,8,105s)
3-(18,8,21s), 1≤s≤13	Yes		[Brouwer86]
3-(18,8,21s), 14≤s≤71	Yes		4-(18,8,7s) as a 3-design
3-(18,9,7s), 1≤s≤357	Yes		Extension of 2-(17,8,7s)
3-(19,4,4s), 1≤s≤2	Yes		Derived design of 4-(20,5,4s)
3-(19,5,30s), 1≤s≤2	Yes	LS	[Brouwer86]
3-(19,6,20s), 1≤s≤14	Yes		[Brouwer86]
3-(19,7,35s), 1≤s≤26	Yes		[Kreher89]
3-(19,8,168s), 1≤s≤13	Yes		Residual design of 4-(20,8,70s)
3-(19,9,28)	Yes		[Kreher89]
3-(19,9,56)	?		
3-(19,9,84)	Yes		[Kreher89]
3-(19,9,28s), 4≤s≤5	?		
3-(19,9,168)	Yes		Derived design of 4-(20,10,168)
3-(19,9,28s), 7≤s≤8	?		

t–(v, k, λ)	Existence		Remarks
3-(19,9,252)	Yes		Derived design of 4-(20,10,252)
3-(19,9,280)	?		
3-(19,9,28s), 11≤s≤12	Yes		Derived design of 4-(20,10,28s)
3-(19,9,364)	?		
3-(19,9,28s), 14≤s≤22	Yes		Derived design of 4-(20,10,28s)
3-(19,9,644)	?		
3-(19,9,28s), 24≤s≤32	Yes		Derived design of 4-(20,10,28s)
3-(19,9,924)	?		
3-(19,9,28s), 34≤s≤42	Yes		Derived design of 4-(20,10,28s)
3-(19,9,1204)	?		
3-(19,9,28s), 44≤s≤52	Yes		Derived design of 4-(20,10,28s)
3-(19,9,1484)	?		
3-(19,9,28s), 54≤s≤62	Yes		Derived design of 4-(20,10,28s)
3-(19,9,1764)	?		
3-(19,9,28s), 64≤s≤72	Yes		Derived design of 4-(20,10,28s)
3-(19,9,2044)	?		
3-(19,9,28s), 74≤s≤82	Yes		Derived design of 4-(20,10,28s)
3-(19,9,2324)	?		
3-(19,9,28s), 84≤s≤92	Yes		Derived design of 4-(20,10,28s)
3-(19,9,2604)	?		
3-(19,9,28s), 94≤s≤102	Yes		Derived design of 4-(20,10,28s)
3-(19,9,2884)	?		
3-(19,9,28s), 104≤s≤112	Yes		Derived design of 4-(20,10,28s)
3-(19,9,3164)	?		
3-(19,9,28s), 114≤s≤122	Yes		Derived design of 4-(20,10,28s)
3-(19,9,3444)	?		
3-(19,9,28s), 124≤s≤132	Yes		Derived design of 4-(20,10,28s)
3-(19,9,3724)	?		
3-(19,9,28s), 134≤s≤143	Yes		Derived design of 4-(20,10,28s)
3-(20,4,s), 1≤s≤8	Yes		[Kramer85]
3-(20,5,2s), s≡0,3,5,8 (mod15)	Yes		[Kramer85]
3-(20,5,2s), s=6,9,11,12,14,17,21,24,25,26,27, 28,29,32,33,34	Yes		[Kreher89]
3-(20,5,2s), s=1,2,4,7,10,13,16,19,22,31	?		
3-(20,6,10s), 1≤s≤34	Yes		[Kramer85]
3-(20,7,35s), 1≤s≤34	Yes		[Kramer85]
3-(20,8,14s), 1≤s≤221	Yes		[Kramer85]
3-(20,9,28s), s≡0,1 (mod 3)	Yes		[Kramer85]
3-(20,9,28s), s≡2 (mod 3)	?		
3-(20,10,4s), 1≤s≤2431	Yes		Extension of 2-(19,9,4s)
3-(21,4,6)	Yes	LS	[Teirlinck84]

t–(v, k, λ)	Existence		Remarks
3-(21,5,3)	Yes		[Kramer88a]
3-(21,5,3s), 2≤s≤4	?		
3-(21,5,15)	Yes		[Kreher89]
3-(21,5,18)	Yes		See note (1) with 3-(20,4,2) and 3-(20,5,16)
3-(21,5,21)	?		
3-(21,5,24)	Yes		[Kramer84]
3-(21,5,27)	Yes		See note (1) with 3-(20,4,3) and 3-(20,5,24)
3-(21,5,3s), 10≤s≤11	Yes		[Kreher89]
3-(21,5,36)	?		
3-(21,5,39)	Yes		[Kreher89]
3-(21,5,42)	?		
3-(21,5,45)	Yes		See note (1) with 3-(20,4,5) and 3-(20,5,40)
3-(21,5,48)	Yes		[Kreher89]
3-(21,5,51)	?		
3-(21,5,54)	Yes		See note (1) with 3-(20,4,6) and 3-(20,5,48)
3-(21,5,3s), 19≤s≤20	?		
3-(21,5,63)	Yes		See note (1) with 3-(20,4,7) and 3-(20,5,56)
3-(21,5,66)	?		
3-(21,5,69)	Yes		[Kreher89]
3-(21,5,72)	Yes		See note (1) with 3-(20,4,8) and 3-(20,5,64)
3-(21,5,75)	Yes		[Kreher89]
3-(21,6,4s), 1≤s≤8	?		
3-(21,6,36)	Yes		See note (1) with 3-(20,5,6) and 3-(20,6,30)
3-(21,6,40)	Yes		[Kreher89]
3-(21,6,4s), 11≤s≤14	?		
3-(21,6,60)	Yes		See note (1) with 3-(20,5,10) and 3-(20,6,50)
3-(21,6,64)	?		
3-(21,6,68)	Yes		[Kreher89]
3-(21,6,72)	Yes		4-(21,6,12) as a 3-design
3-(21,6,4s), 19≤s≤23	?		
3-(21,6,96)	Yes		[Kramer84]
3-(21,6,4s), 25≤s≤26	?		
3-(21,6,108)	Yes		See note (1) with 3-(20,5,18) and 3-(20,6,90)
3-(21,6,4s), 28≤s≤39	?		
3-(21,6,120)	Yes		[Kreher89]
3-(21,6,124)	?		
3-(21,6,128)	Yes		[Kramer84]
3-(21,6,132)	Yes		See note (1) with 3-(20,5,22) and 3-(20,6,110)
3-(21,6,136)	Yes		[Kreher89]
3-(21,6,140)	?		
3-(21,6,144)	Yes		[Kramer84]
3-(21,6,148)	Yes		[Kreher89]
3-(21,6,4s), 38≤s≤39	?		

$t-(v, k, \lambda)$	Existence		Remarks
3-(21,6,160)	Yes		[Kreher89]
3-(21,6,164)	?		
3-(21,6,168)	Yes		See note (1) with 3-(20,5,28) and 3-(20,6,140)
3-(21,6,172)	?		
3-(21,6,176)	Yes		[Kreher89]
3-(21,6,180)	Yes		See note (1) with 3-(20,5,30) and 3-(20,6,150)
3-(21,6,4s), $46 \le s \le 50$	?		
3-(21,6,204)	Yes		4-(21,6,34) as a 3-design
3-(21,6,208)	Yes		[Kreher89]
3-(21,6,212)	?		
3-(21,6,216)	Yes		4-(21,6,36) as a 3-design
3-(21,6,220)	Yes		[Kreher89]
3-(21,6,4s), $56 \le s \le 58$	?		
3-(21,6,236)	Yes		[Kreher89]
3-(21,6,240)	Yes		4-(21,6,40) as a 3-design
3-(21,6,244)	?		
3-(21,6,248)	Yes		[Kreher89]
3-(21,6,252)	Yes		See note (1) with 3-(20,5,42) and 3-(20,6,210)
3-(21,6,4s), $64 \le s \le 66$	?		
3-(21,6,268)	Yes		[Kreher89]
3-(21,6,272)	?		
3-(21,6,276)	Yes		See note (1) with 3-(20,5,46) and 3-(20,6,230)
3-(21,6,280)	Yes		[Kreher89]
3-(21,6,284)	?		
3-(21,6,288)	Yes		See note (1) with 3-(20,5,48) and 3-(20,6,240)
3-(21,6,292)	?		
3-(21,6,296)	Yes		[Kreher89]
3-(21,6,300)	Yes		See note (1) with 3-(20,5,50) and 3-(20,6,250)
3-(21,6,4s), $76 \le s \le 77$	?		
3-(21,6,312)	Yes		See note (1) with 3-(20,5,52) and 3-(20,6,260)
3-(21,6,316)	?		
3-(21,6,320)	Yes		[Kreher89]
3-(21,6,324)	Yes		See note (1) with 3-(20,5,54) and 3-(20,6,270)
3-(21,6,328)	Yes		[Kreher89]
3-(21,6,332)	?		
3-(21,6,336)	Yes		[Kramer84]
3-(21,6,340)	Yes		[Kreher89]
3-(21,6,344)	?		
3-(21,6,348)	Yes		See note (1) with 3-(20,5,58) and 3-(20,6,290)
3-(21,6,352)	?		
3-(21,6,356)	Yes		[Kreher89]
3-(21,6,360)	Yes		4-(21,6,60) as a 3-design

t–(v, k, λ)	Existence		Remarks
3-(21,6,364)	?		
3-(21,6,368)	Yes		[Kramer84]
3-(21,6,372)	?		
3-(21,6,376)	Yes		[Kreher89]
3-(21,6,380)	?		
3-(21,6,384)	Yes		See note (1) with 3-(20,5,64) and 3-(20,6,320)
3-(21,6,4s), $97\le s\le 98$	?		
3-(21,6,396)	Yes		See note (1) with 3-(20,5,66) and 3-(20,6,330)
3-(21,6,400)	Yes		[Kreher89]
3-(21,6,404)	?		
3-(21,6,408)	Yes		Derived design of 4-(22,7,408)
3-(21,7,15s), $s\equiv 0$ (mod 3)	Yes		See note (1) with 3-(20,6,10s/3) and 3-(20,7,35s/3)
3-(21,7,15s), s=28,40,52,56,64,68,80,91	Yes		[Kramer84]
3-(21,7,15s), all other s	?		
3-(21,8,84s), $1\le s\le 2$	?		
3-(21,8,252)	Yes		See note (1) with 3-(20,7,70) and 3-(20,8,182)
3-(21,8,84s), $4\le s\le 5$	?		
3-(21,8,504)	Yes		See note (1) with 3-(20,7,140) and 3-(20,8,364)
3-(21,8,588)	?		
3-(21,8,672)	Yes		[Kramer84]
3-(21,8,756)	Yes		See note (1) with 3-(20,7,210) and 3-(20,8,546)
3-(21,8,84s), $10\le s\le 11$	?		
3-(21,8,1008)	Yes		See note (1) with 3-(20,7,280) and 3-(20,8,728)
3-(21,8,1092)	?		
3-(21,8,1176)	Yes		[Kramer84]
3-(21,8,1260)	Yes		See note (1) with 3-(20,7,350) and 3-(20,8,910)
3-(21,8,1344)	Yes		[Kramer84]
3-(21,8,1428)	?		
3-(21,8,1512)	Yes		See note (1) with 3-(20,7,420) and 3-(20,8,1092)
3-(21,8,84s), $19\le s\le 20$	?		
3-(21,8,1764)	Yes		See note (1) with 3-(20,7,490) and 3-(20,8,1274)
3-(21,8,1848)	Yes		[Kramer84]
3-(21,8,1932)	?		
3-(21,8,2016)	Yes		See note (1) with 3-(20,7,560) and 3-(20,8,1456)
3-(21,8,84s), $25\le s\le 26$	?		
3-(21,8,2268)	Yes		See note (1) with 3-(20,7,630) and 3-(20,8,1638)
3-(21,8,84s), $28\le s\le 29$	?		
3-(21,8,2520)	Yes		See note (1) with 3-(20,7,700) and 3-(20,8,1820)
3-(21,8,2604)	?		
3-(21,8,2688)	Yes		[Kramer84]
3-(21,8,2772)	Yes		See note (1) with 3-(20,7,770) and 3-(20,8,2002)
3-(21,8,84s), $34\le s\le 35$	?		
3-(21,8,3024)	Yes		See note (1) with 3-(20,7,840) and 3-(20,8,2184)

t-(v, k, λ)	Existence		Remarks
3-(21,8,3108)	?		
3-(21,8,3192)	Yes		[Kramer84]
3-(21,8,3276)	Yes		See note (1) with 3-(20,7,910) and 3-(20,8,2366)
3-(21,8,3360)	Yes		[Kramer84]
3-(21,8,3444)	?		
3-(21,8,3528)	Yes		See note (1) with 3-(20,7,980) and 3-(20,8,2548)
3-(21,8,84s), $43 \le s \le 44$	?		
3-(21,8,3780)	Yes		See note (1) with 3-(20,7,1050) and 3-(20,8,2730)
3-(21,8,3864)	Yes		[Kramer84]
3-(21,8,3948)	?		
3-(21,8,4032)	Yes		See note (1) with 3-(20,7,1120) and 3-(20,8,2912)
3-(21,8,84s), $49 \le s \le 50$	?		
3-(21,8,4284)	Yes		See note (1) with 3-(20,7,1190) and 3-(20,8,3094)
3-(21,9,42s), $s \equiv 0,1 \pmod 3$	Yes		See note (1) with 3-(20,8,14s) and 3-(20,9,28s)
3-(21,9,42s), $s \equiv 2 \pmod 3$	?		
3-(21,10,72s), $s \equiv 0,1 \pmod 3$	Yes		See note (1) with 3-(20,9,28s) and 3-(20,10,44s)
3-(21,10,72s), $s \equiv 2 \pmod 3$	?		
3-(22,4,s), $1 \le s \le 9$	Yes		Derived design of 4-(23,5,s)
3-(22,5,3s), $1 \le s \le 28$	Yes		Derived design of 4-(23,6,3s)
3-(22,6,s), $1 \le s \le 60$	Yes		[Kramer74b]
3-(22,6,s), s=96,97	Yes		[Driessen78]
3-(22,6,s), s=112,113,128,129	Yes		Derived design of 4-(23,7,s)
3-(22,6,s), $s \equiv 0 \pmod{17}$	Yes		Derived design of 4-(23,7,s)
3-(22,6,s), all other s	?		
3-(22,7,1)	No		[Haemers74]
3-(22,7,2)	No		[Driessen78]
3-(22,7,s), s=4,6,8,12,16,20,24,28,32,36,360,512, 516,1680,1712,1716	Yes		Derived design of 4-(23,8,s)
3-(22,7,s), s=1260,1288,1386,1860,1890	Yes		[Driessen78]
3-(22,7,s), s=448,452	Yes		Residual design of 4-(23,7,s/4)
3-(22,7,s), $s \equiv 0 \pmod 4$ and $4 \le s \le 96$	Yes		Residual design of 4-(23,7,s/4)
3-(22,7,s), $s \equiv 0 \pmod{68}$	Yes		Residual design of 4-(23,7,s/4)
3-(22,7,s), all other s	?		
3-(22,8,6s), $2 \le s \le 4$, s=6,8,10,12,14,16,18,180,256,258,840, 856,858	Yes		Residual design of 4-(23,8,2s)
3-(22,8,336)	Yes		[Driessen78]
3-(22,8,6s), s=72,90	Yes		Derived design of 4-(23,9,6s)
3-(22,8,6s), all other s	?		
3-(22,9,42s), s=1,6,24,60,280,286	Yes		Residual design of 4-(23,9,18s)
3-(22,9,168)	Yes		[Driessen78]
3-(22,9,42s), s=30,80,110	Yes		Derived design of 4-(23,10,42s)

t-(v, k, λ)	Existence		Remarks
3-(22,9,42s), all other s	?		
3-(22,10,6s), s=8,96,1430,2584,3876	Yes		Derived design of 4-(23,11,6s)
3-(22,10,6s), s=390,1040	Yes		Residual design of 4-(23,10,42s/13)
3-(22,10,6s), all other s	?		
3-(22,11,9)	Yes		[Driessen78]
3-(22,11,9s), 2≤s≤100	Yes		See Permutation Lemma with 3-(22,11,9)
3-(22,11,9s), s=1430,2584,3876	Yes		Residual design of 4-(23,11,6s)
3-(22,11,9s), s≡0,19 (mod 57)	Yes		See note (2) with 3-(21,10,72s/19)
3-(22,11,9s), all other s	?		
3-(23,4,4s), 1≤s≤2	Yes	LS	[Chee89]
3-(23,5,10s), 1≤s≤9	Yes		4-(23,5,s) as a 3-design
3-(23,6,20s), 1≤s≤28	Yes		Derived design of 4-(24,7,20s)
3-(23,7,5s), 1≤s≤24	Yes		See note (1) with 3-(22,6,s) and 3-(22,7,4s)
3-(23,7,5s), s=112,113,128,129	Yes		4-(23,7,s) as a 3-design
3-(23,7,5s), s≡0 (mod 17)	Yes		4-(23,7,s) as a 3-design
3-(23,7,5s), all other s	?		
3-(23,8,8)	?		
3-(23,8,8s), 2≤s≤969	Yes		[Kreher89]
3-(23,9,60)	Yes		4-(23,9,18) as a 3-design
3-(23,9,12s), s≡0 (mod 2), s≥4	Yes		[Kreher89]
3-(23,9,12s), all other s	?		
3-(23,10,120s), s=30,80,110	Yes		4-(23,10,42s) as a 3-design
3-(23,10,120s), all other s	?		
3-(23,11,15s), s=8,96,1430,2584,3876	Yes		4-(23,11,6s) as a 3-design
3-(23,11,15s), all other s	?		
3-(24,4,3s), 1≤s≤3	Yes	LS	[Teirlinck84]
3-(24,5,30s), 1≤s≤3	Yes	LS	[Chee89]
3-(24,6,10s), 1≤s≤66	Yes		[Kreher89]
3-(24,7,105s), 1≤s≤28	Yes	LS	[Chee89]
3-(24,8,21s), 1≤s≤484	Yes		[Kreher89]
3-(24,9,84s), s=1,6,60,280,286	Yes		4-(24,9,24s) as a 3-design
3-(24,9,84s), s=5,135,140	Yes		[Driessen78]
3-(24,9,84s), all other s	?		
3-(24,10,180s), s=1,40,41	Yes		[Driessen78]
3-(24,10,5400)	Yes		4-(24,10,1800) as a 3-design
3-(24,10,180s), all other s	?		
3-(24,11,45s), s=1,66,67,1210,1211,1276,1277	Yes		[Driessen78]
3-(24,11,34650)	Yes		4-(24,11,13200) as a 3-design
3-(24,11,45s), all other s	?		

t–(v, k, λ)	Existence		Remarks
3-(24,12,5s), s=1,2,144,145,4356,4357, 4500,4501	Yes		[Driessen78]
3-(24,12,120)	Yes		[Hughes65]
3-(24,12,5s), s=56,672,4004,10010,18088	Yes		4-(24,12,15s/7) as a 3-design
3-(24,12,5s), all other s	?		
3-(25,4,2s), s=1,4,5	Yes		[Kreher89]
3-(25,4,2s), s=2,3	?		
3-(25,5,3s), s=11,22,33	Yes		See note (1) with 3-(24,4,3s) and 3-(24,5,30s)
3-(25,5,3s), all other s	?		
3-(25,6,20s), s=11,22,33	Yes		See note (1) with 3-(24,5,30s/11) and 3-(24,6,190s/11)
3-(25,6,20s), all other s	?		
3-(25,7,35s), $s\equiv0$ (mod 11)	Yes		See note (1) with 3-(24,6,70s/11) and 3-(24,7,315s/11)
3-(25,7,35s), all other s	?		
3-(25,8,42s), $s\equiv0$ (mod 11)	Yes		See note (1) with 3-(24,7,105s/11) and 3-(24,8,357s/11)
3-(25,8,42s), all other s	?		
3-(25,9,21s), s=33,330,770,1540,1573	Yes		See note (1) with 3-(24,8,63s/11) and 3-(24,9,168s/11)
3-(25,9,21s), all other s	?		
3-(25,10,24s), $1\leq s\leq10$	?		
3-(25,10,264)	Yes		See note (1) with 3-(24,9,84) and 3-(24,10,180)
3-(25,10,24s), $12\leq s\leq3553$	?		
3-(25,11,495)	Yes		See note (1) with 3-(24,10,180) and 3-(24,11,315)
3-(25,11,495s), $2\leq s\leq323$	?		
3-(25,12,110)	Yes		See note (1) with 3-(24,11,45) and 3-(24,12,65)
3-(25,12,110s), $2\leq s\leq4$	Yes		See Permutation Lemma with 3-(25,12,110)
3-(25.12,110s), $5\leq s\leq2261$	?		
3-(26.4,1)	Yes		[Hanani60]
3-(26,4,s), $2\leq s\leq11$	Yes		Derived design of 4-(27,5,s)
3-(26.5,1)	Yes		Derived design of 4-(27,6,1)
3-(26,5,s), $s\equiv0$ (mod 11) and $s\geq22$	Yes		Derived design of 4-(27,6,s)
3-(26,5,s), all other s	?		
3-(26,6,7)	Yes		Derived design of 4-(27,7,7)
3-(26,6,s), s=253,506,759	Yes		See note (1) with 3-(25,5,3s/23) and 3-(25,6,20s/23)
3-(26,6,s), $s\equiv0$ (mod 77) and $s\geq154$	Yes		Residual design of 4-(27,6,s/7)
3-(26,6,s), all other s	?		
3-(26,7,35)	Yes		Residual design of 4-(27,7,7)
3-(26,7,35s), $2\leq s\leq126$	?		
3-(26,8,7s), $s\equiv0$ (mod 253)	Yes		See note (1) with 3-(25,7,35s/23) and 3-(25,8,126s/23)
3-(26,8,7s), all other s	?		
3-(26,9.21s), $1\leq s\leq2403$	?		

$t-(v,k,\lambda)$	Existence		Remarks
3-(26,10,3)	No		[Cameron73]
3-(26,10,3s), 2≤s≤40859	?		
3-(26,11,33s), 1≤s≤22	?		
3-(26,11,759)	Yes		See note (1) with 3-(25,10,264) and 3-(25,11,495)
3-(26,11,33s), 24≤s≤7429	?		
3-(26,12,55s), 1≤s≤7429	?		
3-(26,13,11s), s=23,46,69,92	Yes		See note (2) with 3-(25,12,110s/23)
3-(26,13,11s), all other s	?		
3-(27,4,12)	Yes	LS	[Teirlinck84]
3-(27,5,6s), s≡0 (mod 2) and s≥4	Yes		4-(27,5,s/2) as a 3-design
3-(27,5,138)	Yes		Residual design of 4-(28,5,12)
3-(27,5,6s), all other s	?		
3-(27,6,4s), s=2,253	Yes		Derived design of 4-(28,7,4s)
3-(27,6,4s), s≡0 (mod 22) and s≥44	Yes		4-(27,6,s/2) as a 3-design
3-(27,6,4s), all other s	?		
3-(27,7,21s), s=2,253	Yes		Residual design of 4-(28,7,4s)
3-(27,7,21s), all other s	?		
3-(27,8,168s), 1≤s≤126	?		
3-(27,9,28s), 1≤s≤2403	?		
3-(27,10,72s), 1≤s≤2403	?		
3-(27,11,99s), 1≤s≤3714	?		
3-(27,12,44s), 1≤s≤14858	?		
3-(27,13,66s), 1≤s≤14858	?		
3-(28,4,s), 1≤s≤12	Yes		[Lindner77]
3-(28,5,30)	?		
3-(28,5,60)	Yes		Residual design of 4-(29,5,5)
3-(28,5,30s), 3≤s≤4	?		
3-(28,5,150)	Yes		Derived design of 4-(29,6,150)
3-(28,6,10s), s≡0 (mod 5) and s≥20	Yes		4-(28,6,6s/5) as a 3-design
3-(28,6,1150)	Yes		Derived design of 4-(29,7,1150)
3-(28,6,10s), all other s	?		
3-(28,7,5s), 1≤s≤9	?		
3-(28,7,50)	Yes		4-(28,7,8) as a 3-design
3-(28,7,5s), 10≤s≤1264	?		
3-(28,7,6325)	Yes		Residual design of 4-(29,7,1150)
3-(28,8,42s), 1≤s≤632	?		
3-(28,9,28s), 1≤s≤3162	?		
3-(28,10,20s), 1≤s≤10	?		
3-(28,10,220)	Yes		Derived design of 4-(29,11,220)
3-(28,10,20s), 12≤s≤12017	?		
3-(28,11,495)	Yes		Derived design of 4-(29,12 495)
3-(28,11,495s), 2≤s≤1092	?		
3-(28,12,55s), 1≤s≤16	?		
3-(28,12,935)	Yes		Residual design of 4-(29,12,495)

t-(v, k, λ)	Existence		Remarks
3-(28,12,55s), 18≤s≤97	?		
3-(28,12,5390)	Yes		Derived design of 4-(29,13,5390)
3-(28,12,55s), 99≤s≤1024	?		
3-(28,12,56375)	Yes		Derived design of 4-(29,13,56375)
3-(28,12,55s), 1026≤s≤18572	?		
3-(28,13,22s), 1≤s≤391	?		
3-(28,13,8624)	Yes		Derived design of 4-(29,14,8624)
3-(28,13,22s), 393≤s≤4099	?		
3-(28,13,90200)	Yes		Derived design of 4-(29,14,90200)
3-(28,13,22s), 4101≤s≤74290	?		
3-(28,14,6s), 1≤s≤1959	?		
3-(28,14,11760)	Yes		Residual design of 4-(29,14,8624)
3-(28,14,6s), 1961≤s≤20499	?		
3-(28,14,123000)	Yes		Residual design of 4-(29,14,90200)
3-(28,14,6s), 20502≤s≤371450	?		
3-(29,4,2s), 1≤s≤6	Yes		[Kreher89]
3-(29,5,5s), 1≤s≤12	?		
3-(29,5,65)	Yes		4-(29,5,5) as a 3-design
3-(29,5,5s), 14≤s≤32	?		
3-(29,6,20s), 1≤s≤64	?		
3-(29,6,1300)	Yes		Derived design of 4-(30,7,1300)
3-(29,7,5s), 1≤s≤1494	?		
3-(29,7,7475)	Yes		4-(29,7,1150) as a 3-design
3-(29,8,4s), 1≤s≤8222	?		
3-(29,9,14s), 1≤s≤8222	?		
3-(29,10,40s), 1≤s≤8222	?		
3-(29,11,55s), 1≤s≤12	?		
3-(29,11,715)	Yes		Derived design of 4-(30,12,715)
3-(29,11,55s), 14≤s≤14202	?		
3-(29,12,110s), 1≤s≤12	?		
3-(29,12,1430)	Yes		4-(29,12,495) as a 3-design
3-(29,12,110s), 14≤s≤14202	?		
3-(29,13,143s), 1≤s≤97	?		
3-(29,13,14014)	Yes		Derived design of 4-(30,14,14014)
3-(29,13,143s), 99≤s≤1024	?		
3-(29,13,146575)	Yes		Derived design of 4-(30,14,146575)
3-(29,13,143s), 1026≤s≤18572	?		
3-(29,14,52s), 1≤s≤391	?		
3-(29,14,20384)	Yes		4-(29,14,8624) as a 3-design
3-(29,14,52s), 393≤s≤4099	?		
3-(29,14,213200)	Yes		4-(29,14,90200) as a 3-design
3-(29,14,52s), 4101≤s≤74290	?		
3-(30,4,3s), 1≤s≤4	Yes	LS	[Teirlinck84]
3-(30,5,3s), 1≤s≤58	?		

t–(v, k, λ)	Existence		Remarks
3-(30,6,5s), 1≤s≤292	?		
3-(30,7,15s), 1≤s≤584	?		
3-(30,7,8775)	Yes		4-(30,7,1300) as a 3-design
3-(30,8,6s), 1≤s≤6727	?		
3-(30,9,6s), 1≤s≤24667	?		
3-(30,10,18s), 1≤s≤24667	?		
3-(30,11,495s), 1≤s≤2242	?		
3-(30,12,55s), 1≤s≤38	?		
3-(30,12,2145)	Yes		4-(30,12,715) as a 3-design
3-(30,12,55s), 40≤s≤42607	?		
3-(30,13,429s), 1≤s≤9832	?		
3-(30,14,39s), 1≤s≤881	?		
3-(30,14,34398)	Yes		4-(30,14,14014) as a 3-design
3-(30,14,39s), 883≤s≤9224	?		
3-(30,14,359775)	Yes		4-(30,14,146575) as a 3-design
3-(30,14,39s), 9226≤s≤167152	?		
3-(30,15,13s), 1≤s≤3527	?		
3-(30,15,45864)	Yes		See note (2) with 3-(29,14,20384)
3-(30,15,13s), 3529≤s≤36899	?		
3-(30,15,479700)	Yes		See note (2) with 3-(29,14,213200)
3-(30,15,13s), 36901≤s≤668610	?		

t–(v, k, λ)	Existence		Remarks
4-(11,5,1)	Yes		[Witt38]
4-(11,5,2)	Yes	NLS	[Kramer74a]
4-(11,5,3)	Yes		[Brouwer86]
4-(12,5,4)	Yes	LS	[Denniston83]
4-(12,6,2)	No		Extend 3-(11,5,2)
4-(12,6,4)	Yes		5-(12,6,1) as a 4-design
4-(12,6,6)	?		
4-(12,6,8)	Yes		5-(12,6,2) as a 4-design
4-(12,6,10)	Yes		[Kreher87b]
4-(12,6,12)	Yes		5-(12,6,3) as a 4-design
4-(12,6,14)	Yes		Extension of 3-(11,5,14)
4-(13,5,3)	Yes		Derived design of 5-(14,6,3)
4-(13,6,6)	?		
4-(13,6,12)	Yes		[Kramer76]
4-(13,6,18)	Yes		5-(13,6,4) as a 4-design
4-(14,6,15)	Yes	LS	[Chee89]
4-(14,7,20)	Yes		[Brouwer86]
4-(14,7,40)	Yes		5-(14,7,12) as a 4-design
4-(14,7,60)	Yes		Extension of 3-(13,6,60)

t–(v, k, λ)	Existence		Remarks
4-(15,5,1)	No		[Mendelsohn72]
4-(15,5,2)	?		
4-(15,5,s), $3 \leq s \leq 4$	Yes		[Brouwer86]
4-(15,5,5)	Yes		[Kreher88]
4-(15,6,5)	?		
4-(15,6,5s), $2 \leq s \leq 3$	Yes		[Brouwer86]
4-(15,6,20)	?		
4-(15,6,25)	Yes		Residual design of 5-(16,6,5)
4-(15,7,5s), $1 \leq s \leq 5$	?		
4-(15,7,5s), $6 \leq s \leq 16$	Yes		[Brouwer86]
4-(16,6,6)	?		
4-(16,6,6s), $2 \leq s \leq 4$	Yes		Derived design of 5-(17,7,6s)
4-(16,6,30)	Yes		[Brouwer86]
4-(16,7,20s), $1 \leq s \leq 3$	Yes		[Brouwer86]
4-(16,7,80)	Yes		Derived design of 5-(17,8,80)
4-(16,7,100)	Yes		[Brouwer86]
4-(16,8,15s), $1 \leq s \leq 4$	?		
4-(16,8,75)	Yes		[Brouwer86]
4-(16,8,15s), $6 \leq s \leq 15$	Yes		5-(16,8,5s) as a 4-design
4-(16,8,240)	Yes		[Brouwer86]
4-(17,5,s), $1 \leq s \leq 3$	?		
4-(17,5,s), $4 \leq s \leq 5$	Yes		[Kramer75]
4-(17,5,6)	?		
4-(17,6,6s), $1 \leq s \leq 6$	Yes		Derived design of 5-(18,7,6s)
4-(17,7,2)	No		Extend 3-(16,6,2)
4-(17,7,4)	?		
4-(17,7,6)	Yes		Derived design of 5-(18,8,6)
4-(17,7,2s), $4 \leq s \leq 5$	?		
4-(17,7,2s), $6 \leq s \leq 71$	Yes		[Brouwer86]
4-(17,8,5)	No		[Haemers74]
4-(17,8,10)	?		
4-(17,8,15)	Yes		[Hubaut74]
4-(17,8,5s), $4 \leq s \leq 5$	?		
4-(17,8,5s), $6 \leq s \leq 31$	Yes		[Brouwer86]
4-(17,8,160)	Yes		[Kramer75]
4-(17,8,165)	Yes		Residual design of 5-(18,8,66)
4-(17,8,170)	?		
4-(17,8,175)	Yes		[Kramer75]
4-(17,8,5s), $36 \leq s \leq 39$	Yes		Derived design of 5-(18,9,5s)
4-(17,8,200)	Yes		[Kramer75]
4-(17,8,5s), $41 \leq s \leq 45$	Yes		Derived design of 5-(18,9,5s)
4-(17,8,230)	Yes		Residual design of 5-(18,8,92)

t–(v, k, λ)	Existence		Remarks
4-(17,8,5s), $47\leq s\leq 54$	Yes		Derived design of 5-(18,9,5s)
4-(17,8,5s), $55\leq s\leq 56$	Yes		[Kramer75]
4-(17,8,285)	Yes		Derived design of 5-(18,9,285)
4-(17,8,290)	?		
4-(17,8,295)	Yes		[Kramer75]
4-(17,8,5s), $60\leq s\leq 63$	Yes		Derived design of 5-(18,9,5s)
4-(17,8,320)	Yes		[Kramer75]
4-(17,8,5s), $65\leq s\leq 66$	Yes		Derived design of 5-(18,9,5s)
4-(17,8,5s), $67\leq s\leq 68$	Yes		[Kramer75]
4-(17,8,345)	Yes		Derived design of 5-(18,9,345)
4-(17,8,350)	Yes		Residual design of 5-(18,8,140)
4-(17,8,355)	Yes		[Kramer75]
4-(18,5,2s), $1\leq s\leq 3$	Yes		[Brouwer86]
4-(18,6,1)	No		[Witt38]
4-(18,6,s), $2\leq s\leq 4$	?		
4-(18,6,s), $5\leq s\leq 33$	Yes		[Brouwer86]
4-(18,6,34)	?		
4-(18,6,s), $35\leq s\leq 37$	Yes		[Brouwer86]
4-(18,6,38)	?		
4-(18,6,s), $39\leq s\leq 40$	Yes		[Kramer75]
4-(18,6,41)	?		
4-(18,6,42)	Yes		[Kramer75]
4-(18,6,43)	Yes		[Brouwer86]
4-(18,6,s), $44\leq s\leq 45$	?		
4-(18,7,28s), $1\leq s\leq 6$	Yes		5-(18,7,6s) as a 4-design
4-(18,8,7s), $1\leq s\leq 2$	?		
4-(18,8,21)	Yes		See note (1) with 4-(17,7,6) and 4-(17,8,15)
4-(18,8,28)	?		
4-(18,8,7s), $5\leq s\leq 8$	Yes		[Kramer75]
4-(18,8,7s), $9\leq s\leq 10$	Yes		See note (1) with 4-(17,7,2s) and 4-(17,8,5s)
4-(18,8,77)	Yes		[Kramer75]
4-(18,8,84)	Yes		[Brouwer86]
4-(18,8,7s), $13\leq s\leq 19$	Yes		[Kramer75]
4-(18,8,140)	Yes		See note (1) with 4-(17,7,40) and 4-(17,8,100)
4-(18,8,7s), $21\leq s\leq 71$	Yes		[Kramer75]
4-(18,9,14s), $1\leq s\leq 2$	?		
4-(18,9,42)	Yes		See note (2) with 4-(17,8,15)
4-(18,9,14s), $4\leq s\leq 5$	?		
4-(18,9,14s), $6\leq s\leq 13$	Yes		See note (2) with 4-(17,8,5s)
4-(18,9,14s), $14\leq s\leq 19$	Yes		[Kramer75]
4-(18,9,280)	Yes		See note (2) with 4-(17,8,100)
4-(18,9,14s), $21\leq s\leq 71$	Yes		[Kramer75]

t-(v, k, λ)	Existence		Remarks
4-(19,6,15s), $1\le s\le 2$	Yes		[Brouwer86]
4-(19,6,45)	Yes		See note (1) with 4-(18,5,6) and 4-(18,6,39)
4-(19,7,35s), $1\le s\le 6$	Yes		Derived design of 5-(20,8,35s)
4-(19,8,105s), $1\le s\le 6$	Yes		See note (1) with 4-(18,7,28s) and 4-(18,8,77s)
4-(19,9,21s), $1\le s\le 2$	?		
4-(19,9,63)	Yes		See note (1) with 4-(18,8,21) and 4-(18,9,42)
4-(19,9,21s), $4\le s\le 5$	?		
4-(19,9,21s), $6\le s\le 11$	Yes		See note (1) with 4-(18,8,7s) and 4-(18,9,14s)
4-(19,9,21s), $12\le s\le 13$	Yes		Derived design of 5-(20,10,21s)
4-(19,9,21s), $14\le s\le 71$	Yes		See note (1) with 4-(18,8,7s) and 4-(18,9,14s)
4-(20,5,4)	Yes		[Kreher89]
4-(20,5,8)	Yes		Derived design of 5-(21,6,8)
4-(20,6,30)	Yes		[Kreher89]
4-(20,6,60)	Yes		[Kramer85]
4-(20,7,140)	?		
4-(20,7,280)	Yes		[Kramer85]
4-(20,8,70s), $1\le s\le 13$	Yes		[Kramer85]
4-(20,9,168)	?		
4-(20,9,168s), $2\le s\le 3$	Yes		[Kramer85]
4-(20,9,672)	Yes		See note (1) with 4-(19,8,210) and 4-(19,9,462)
4-(20,9,168s), $5\le s\le 6$	Yes		[Kramer85]
4-(20,9,1176)	?		
4-(20,9,168s), $8\le s\le 9$	Yes		[Kramer85]
4-(20,9,1680)	Yes		See note (1) with 4-(19,8,525) and 4-(19,9,1155)
4-(20,9,168s), $11\le s\le 12$	Yes		[Kramer85]
4-(20,9,2184)	?		
4-(20,10,28s), $1\le s\le 5$	?		
4-(20,10,168)	Yes		See note (2) with 4-(19,9,63)
4-(20,10,28s), $7\le s\le 8$	?		
4-(20,10,252)	Yes		[Kramer85]
4-(20,10,280)	?		
4-(20,10,28s), $11\le s\le 12$	Yes		[Kramer85]
4-(20,10,364)	?		
4-(20,10,28s), $14\le s\le 17$	Yes		[Kramer85]
4-(20,10,504)	Yes		See note (2) with 4-(19,9,168)
4-(20,10,28s), $19\le s\le 22$	Yes		[Kramer85]
4-(20,10,644)	?		
4-(20,10,28s), $24\le s\le 27$	Yes		[Kramer85]
4-(20,10,784)	Yes		See note (2) with 4-(19,9,294)
4-(20,10,28s), $29\le s\le 32$	Yes		[Kramer85]
4-(20,10,924)	?		
4-(20,10,28s), $34\le s\le 37$	Yes		[Kramer85]
4-(20,10,1064)	Yes		See note (2) with 4-(19,9,399)

t–(v, k, λ)	Existence		Remarks
4-(20,10,28s), $39 \leq s \leq 42$	Yes		[Kramer85]
4-(20,10,1204)	?		
4-(20,10,28s), $44 \leq s \leq 47$	Yes		[Kramer85]
4-(20,10,1344)	Yes		See note (2) with 4-(19,9,504)
4-(20,10,28s), $49 \leq s \leq 52$	Yes		[Kramer85]
4-(20,10,1484)	?		
4-(20,10,28s), $54 \leq s \leq 57$	Yes		[Kramer85]
4-(20,10,1624)	Yes		See note (2) with 4-(19,9,609)
4-(20,10,28s), $59 \leq s \leq 62$	Yes		[Kramer85]
4-(20,10,1764)	?		
4-(20,10,28s), $64 \leq s \leq 67$	Yes		[Kramer85]
4-(20,10,1904)	Yes		See note (2) with 4-(19,9,714)
4-(20,10,28s), $69 \leq s \leq 72$	Yes		[Kramer85]
4-(20,10,2044)	?		
4-(20,10,28s), $74 \leq s \leq 77$	Yes		[Kramer85]
4-(20,10,2184)	Yes		See note (2) with 4-(19,9,819)
4-(20,10,28s), $79 \leq s \leq 82$	Yes		[Kramer85]
4-(20,10,2324)	?		
4-(20,10,28s), $84 \leq s \leq 87$	Yes		[Kramer85]
4-(20,10,2464)	Yes		See note (2) with 4-(19,9,924)
4-(20,10,28s), $89 \leq s \leq 92$	Yes		[Kramer85]
4-(20,10,2604)	?		
4-(20,10,28s), $94 \leq s \leq 97$	Yes		[Kramer85]
4-(20,10,2744)	Yes		See note (2) with 4-(19,9,1029)
4-(20,10,28s), $99 \leq s \leq 102$	Yes		[Kramer85]
4-(20,10,2884)	?		
4-(20,10,28s), $104 \leq s \leq 107$	Yes		[Kramer85]
4-(20,10,3024)	Yes		See note (2) with 4-(19,9,1008)
4-(20,10,28s), $109 \leq s \leq 112$	Yes		[Kramer85]
4-(20,10,3164)	?		
4-(20,10,28s), $114 \leq s \leq 117$	Yes		[Kramer85]
4-(20,10,3304)	Yes		See note (2) with 4-(19,9,1239)
4-(20,10,28s), $119 \leq s \leq 122$	Yes		[Kramer85]
4-(20,10,3444)	?		
4-(20,10,28s), $124 \leq s \leq 127$	Yes		[Kramer85]
4-(20,10,3584)	Yes		See note (2) with 4-(19,9,1344)
4-(20,10,28s), $129 \leq s \leq 132$	Yes		[Kramer85]
4-(20,10,3724)	?		
4-(20,10,28s), $134 \leq s \leq 137$	Yes		[Kramer85]
4-(20,10,3864)	Yes		See note (2) with 4-(19,9,1449)
4-(20,10,28s), $139 \leq s \leq 142$	Yes		[Kramer85]
4-(20,10,4004)	Yes		Extension of 3-(19,9,4004)
4-(21,5,s), $1 \leq s \leq 8$	?		

t–(v, k, λ)	Existence		Remarks
4-(21,6,2s), $1 \le s \le 5$	?		
4-(21,6,12)	Yes		[Kreher89]
4-(21,6,14)	?		
4-(21,6,16)	Yes		[Kramer84]
4-(21,6,2s), $9 \le s \le 16$	?		
4-(21,6,34)	Yes		See note (1) with 4-(20,5,4) and 4-(20,6,30)
4-(21,6,36)	Yes		[Kreher89]
4-(21,6,38)	?		
4-(21,6,40)	Yes		[Kreher89]
4-(21,6,2s), $21 \le s \le 29$	?		
4-(21,6,60)	Yes		[Kreher89]
4-(21,6,2s), $31 \le s \le 33$	?		
4-(21,6,68)	Yes		Derived design of 5-(22,7,68)
4-(21,7,10s), $1 \le s \le 11$	?		
4-(21,7,120)	Yes		[Kramer84]
4-(21,7,10s), $13 \le s \le 33$	?		
4-(21,7,340)	Yes		5-(21,7,60) as a 4-design
4-(21,8,70s), $1 \le s \le 17$	?		
4-(21,9,14s), $1 \le s \le 129$	?		
4-(21,9,1820)	Yes		[Kramer84]
4-(21,9,14s), $131 \le s \le 135$	?		
4-(21,9,1904)	Yes		See note (1) with 4-(20,8,560) and 4-(20,9,1344)
4-(21,9,14s), $137 \le s \le 153$	?		
4-(21,9,2156)	Yes		[Kramer84]
4-(21,9,14s), $155 \le s \le 191$	?		
4-(21,9,2688)	Yes		[Kramer84]
4-(21,9,14s), $193 \le s \le 203$	?		
4-(21,9,2856)	Yes		See note (1) with 4-(20,8,840) and 4-(20,9,2016)
4-(21,9,14s), $205 \le s \le 215$	?		
4-(21,9,3024)	Yes		[Kramer84]
4-(21,9,14s), $217 \le s \le 221$	?		
4-(21,10,28s), $1 \le s \le 11$	?		
4-(21,10,336)	Yes		[Kramer84]
4-(21,10,28s), $13 \le s \le 15$	?		
4-(21,10,448)	Yes		[Kramer84]
4-(21,10,28s), $17 \le s \le 23$	?		
4-(21,10,672)	Yes		[Kramer84]
4-(21,10,28s), $25 \le s \le 33$	?		
4-(21,10,952)	Yes		[Kramer84]
4-(21,10,980)	?		
4-(21,10,1008)	Yes		[Kramer84]
4-(21,10,28s), $37 \le s \le 39$	?		
4-(21,10,1120)	Yes		[Kramer84]

t–(v, k, λ)	Existence		Remarks
4-(21,10,28s), $41\leq s\leq 45$	?		
4-(21,10,1288)	Yes		[Kramer84]
4-(21,10,28s), $47\leq s\leq 51$	?		
4-(21,10,1456)	Yes		[Kramer84]
4-(21,10,1484)	?		
4-(21,10,1512)	Yes		[Kramer84]
4-(21,10,28s), $55\leq s\leq 59$	?		
4-(21,10,1680)	Yes		[Kramer84]
4-(21,10,28s), $61\leq s\leq 63$	?		
4-(21,10,1792)	Yes		[Kramer84]
4-(21,10,1820)	?		
4-(21,10,1848)	Yes		[Kramer84]
4-(21,10,1876)	?		
4-(21,10,1904)	Yes		See note (1) with 4-(20,9,672) and 4-(20,10,1232)
4-(21,10,1932)	?		
4-(21,10,1960)	Yes		[Kramer84]
4-(21,10,1988)	?		
4-(21,10,2016)	Yes		[Kramer84]
4-(21,10,28s), $73\leq s\leq 77$	?		
4-(21,10,2184)	Yes		[Kramer84]
4-(21,10,28s), $79\leq s\leq 81$	?		
4-(21,10,2296)	Yes		[Kramer84]
4-(21,10,2324)	?		
4-(21,10,2352)	Yes		[Kramer84]
4-(21,10,2380)	Yes		See note (1) with 4-(20,9,840) and 4-(20,10,1540)
4-(21,10,28s), $86\leq s\leq 89$	?		
4-(21,10,2520)	Yes		[Kramer84]
4-(21,10,28s), $91\leq s\leq 93$	?		
4-(21,10,2632)	Yes		[Kramer84]
4-(21,10,2660)	?		
4-(21,10,2688)	Yes		[Kramer84]
4-(21,10,28s), $97\leq s\leq 101$	?		
4-(21,10,2856)	Yes		See note (1) with 4-(20,9,1008) and 4-(20,10,1848)
4-(21,10,28s), $103\leq s\leq 119$	?		
4-(21,10,3360)	Yes		[Kramer84]
4-(21,10,28s), $121\leq s\leq 131$	?		
4-(21,10,3696)	Yes		[Kramer84]
4-(21,10,28s), $133\leq s\leq 135$	?		
4-(21,10,3808)	Yes		See note (1) with 4-(20,9,1344) and 4-(20,10,2464)
4-(21,10,28s), $137\leq s\leq 143$	?		
4-(21,10,4032)	Yes		[Kramer84]
4-(21,10,28s), $145\leq s\leq 152$	?		
4-(21.10.4284)	Yes		See note (1) with 4-(20,9,1512) and 4-(20,10,2772)

t–(v, k, λ)	Existence		Remarks
4-(21,10,28s), 154≤s≤169	?		
4-(21,10,4760)	Yes		See note (1) with 4-(20,9,1680) and 4-(20,10,3080)
4-(21,10,28s), 171≤s≤186	?		
4-(21,10,5236)	Yes		See note (1) with 4-(20,9,1848) and 4-(20,10,3388)
4-(21,10,28s), 188≤s≤201	?		
4-(21,10,5656)	Yes		[Kramer84]
4-(21,10,5684)	?		
4-(21,10,5712)	Yes		See note (1) with 4-(20,9,2016) and 4-(20,10,3696)
4-(21,10,28s), 205≤s≤221	?		
4-(22,5,6)	?		
4-(22,6,3s), 1≤s≤25	?		
4-(22,7,4s), 1≤s≤101	?		
4-(22,7,408)	Yes		5-(22,7,68) as a 4-design
4-(22,8,30s), 1≤s≤51	?		
4-(22,9,252s), 1≤s≤17	?		
4-(22,10,42s), 1≤s≤135	?		
4-(22,10,5712)	Yes		See note (1) with 4-(21,9,1904) and 4-(21,10,3808)
4-(22,10,42s), 137≤s≤203	?		
4-(22,10,8568)	Yes		See note (1) with 4-(21,9,2856) and 4-(21,10,5712)
4-(22,10,42s), 205≤s≤221	?		
4-(22,11,72s), 1≤s≤11	?		
4-(22,11,864)	Yes		See note (2) with 4-(21,10,336)
4-(22,11,72s), 13≤s≤15	?		
4-(22,11,1152)	Yes		See note (2) with 4-(21,10,448)
4-(22,11,72s), 17≤s≤23	?		
4-(22,11,1728)	Yes		See note (2) with 4-(21,10,672)
4-(22,11,72s), 25≤s≤33	?		
4-(22,11,2448)	Yes		See note (2) with 4-(21,10,952)
4-(22,11,2520)	?		
4-(22,11,2592)	Yes		See note (2) with 4-(21,10,1008)
4-(22,11,72s), 37≤s≤39	?		
4-(22,11,2880)	Yes		See note (2) with 4-(21,10,1120)
4-(22,11,72s), 41≤s≤45	?		
4-(22,11,3312)	Yes		See note (2) with 4-(21,10,1288)
4-(22,11,72s), 47≤s≤51	?		
4-(22,11,3744)	Yes		See note (2) with 4-(21,10,1456)
4-(22,11,3816)	?		
4-(22,11,3888)	Yes		See note (2) with 4-(21,10,1512)
4-(22,11,72s), 55≤s≤59	?		
4-(22,11,4320)	Yes		See note (2) with 4-(21,10,1680)
4-(22,11,72s), 61≤s≤63	?		
4-(22,11,4608)	Yes		See note (2) with 4-(21,10,1792)
4-(22,11,4680)	?		

t-(v, k, λ)	Existence		Remarks
4-(22,11,4752)	Yes		See note (2) with 4-(21,10,1848)
4-(22,11,4824)	?		
4-(22,11,4896)	Yes		See note (2) with 4-(21,10,1904)
4-(22,11,4968)	?		
4-(22,11,5040)	Yes		See note (2) with 4-(21,10,1960)
4-(22,11,5112)	?		
4-(22,11,5184)	Yes		See note (2) with 4-(21,10,2016)
4-(22,11,72s), 73≤s≤77	?		
4-(22,11,5616)	Yes		See note (2) with 4-(21,10,2184)
4-(22,11,72s), 79≤s≤81	?		
4-(22,11,5904)	Yes		See note (2) with 4-(21,10,2296)
4-(22,11,5976)	?		
4-(22,11,72s), 84≤s≤85	Yes		See note (2) with 4-(21,10,28s)
4-(22,11,72s), 86≤s≤89	?		
4-(22,11,6480)	Yes		See note (2) with 4-(21,10,2520)
4-(22,11,72s), 91≤s≤93	?		
4-(22,11,6768)	Yes		See note (2) with 4-(21,10,2632)
4-(22,11,6840)	?		
4-(22,11,6912)	Yes		See note (2) with 4-(21,10,2688)
4-(22,11,72s), 97≤s≤101	?		
4-(22,11,7344)	Yes		See note (2) with 4-(21,10,2856)
4-(22,11,72s), 103≤s≤119	?		
4-(22,11,8640)	Yes		See note (2) with 4-(21,10,3360)
4-(22,11,72s), 121≤s≤131	?		
4-(22,11,9504)	Yes		See note (2) with 4-(21,10,3696)
4-(22,11,72s), 133≤s≤135	?		
4-(22,11,9792)	Yes		See note (2) with 4-(21,10,3808)
4-(22,11,72s), 137≤s≤143	?		
4-(22,11,10368)	Yes		See note (2) with 4-(21,10,4032)
4-(22,11,72s), 145≤s≤169	?		
4-(22,11,12240)	Yes		See note (2) with 4-(21,10,4760)
4-(22,11,72s), 171≤s≤186	?		
4-(22,11,13464)	Yes		See note (2) with 4-(21,10,5236)
4-(22,11,72s), 188≤s≤201	?		
4-(22,11,14544)	Yes		See note (2) with 4-(21,10,5656)
4-(22,11,14616)	?		
4-(22,11,14688)	Yes		See note (2) with 4-(21,10,5712)
4-(22,11,72s), 205≤s≤221	?		
4-(23,5,1)	Yes		Derived design of 5-(24,6,1)
4-(23,5,2)	Yes		[Kreher89]
4-(23,5,3)	Yes		Derived design of 5-(24,6,3)
4-(23,5,s), 4≤s≤9	Yes		[Kreher89]
4-(23,6,3s), 1≤s≤28	Yes		Derived design of 5-(24,7,3s)

$t-(v,k,\lambda)$	Existence		Remarks
4-(23,7,1)	Yes		[Witt38]
4-(23,7,s), $2\leq s\leq 24$	Yes		[Kramer74b]
4-(23,7,s), $s=112,113$	Yes		[Driessen78]
4-(23,7,s), $s=128,129$	Yes		Derived design of 5-(24,8,s)
4-(23,7,s), $s\equiv 0$ (mod 17)	Yes		Residual design of 5-(24,7,$3s/17$)
4-(23,7,s), all other s	?		
4-(23,8,2)	No		[Ray-Chaudhuri75]
4-(23,8,4)	Yes		Residual design of 5-(24,8,1)
4-(23,8,6)	Yes		Derived design of 5-(24,9,6)
4-(23,8,8)	Yes		Residual design of 5-(24,8,2)
4-(23,8,10)	?		
4-(23,8,12)	Yes		Residual design of 5-(24,8,3)
4-(23,8,14)	?		
4-(23,8,16)	Yes		Residual design of 5-(24,8,4)
4-(23,8,18)	?		
4-(23,8,20)	Yes		Residual design of 5-(24,8,5)
4-(23,8,22)	?		
4-(23,8,24)	Yes		Residual design of 5-(24,8,6)
4-(23,8,26)	?		
4-(23,8,28)	Yes		Residual design of 5-(24,8,7)
4-(23,8,30)	?		
4-(23,8,32)	Yes		Residual design of 5-(24,8,8)
4-(23,8,34)	?		
4-(23,8,36)	Yes		Residual design of 5-(24,8,9)
4-(23,8,$2s$), $19\leq s\leq 179$	?		
4-(23,8,360)	Yes		Derived design of 5-(24,9,360)
4-(23,8,$2s$), $181\leq s\leq 255$	?		
4-(23,8,512)	Yes		Residual design of 5-(24,8,128)
4-(23,8,514)	?		
4-(23,8,516)	Yes		Residual design of 5-(24,8,129)
4-(23,8,$2s$), $259\leq s\leq 839$	?		
4-(23,8,1680)	Yes		Derived design of 5-(24,9,1680)
4-(23,8,$2s$), $841\leq s\leq 855$	?		
4-(23,8,1712)	Yes		Union of 4-(23,8,32) and 4-(23,8,1680)
4-(23,8,1714)	?		
4-(23,8,1716)	Yes		Derived design of 5-(24,9,1716)
4-(23,8,$2s$), $859\leq s\leq 969$	?		
4-(23,9,18)	Yes		Residual design of 5-(24,9,6)
4-(23,9,$18s$), $2\leq s\leq 5$	?		
4-(23,9,108)	Yes		Residual design of 5-(24,9,36)
4-(23,9,$18s$), $7\leq s\leq 23$	?		
4-(23,9,432)	Yes		[Driessen78]
4-(23,9,$18s$), $25\leq s\leq 29$	?		

t-(v, k, λ)	Existence		Remarks
4-(23,9,540)	Yes		Derived design of 5-(24,10,540)
4-(23,9,18s), 31≤s≤59	?		
4-(23,9,1080)	Yes		Residual design of 5-(24,9,360)
4-(23,9,18s), 61≤s≤279	?		
4-(23,9,5040)	Yes		Residual design of 5-(24,9,1680)
4-(23,9,18s), 281≤s≤285	?		
4-(23,9,5148)	Yes		Residual design of 5-(24,9,1716)
4-(23,9,18s), 287≤s≤323	?		
4-(23,10,42s), 1≤s≤29	?		
4-(23,10,1260)	Yes		Residual design of 5-(24,10,540)
4-(23,10,42s), 31≤s≤79	?		
4-(23,10,3360)	Yes		[Driessen78]
4-(23,10,42s), 81≤s≤109	?		
4-(23,10,4620)	Yes		Derived design of 5-(24,11,4620)
4-(23,10,42s), 111≤s≤323	?		
4-(23,11,6s), 1≤s≤2	No		[Haemers74]
4-(23,11,6s), 3≤s≤7	?		
4-(23,11,48)	Yes		Derived design of 5-(24,12,48)
4-(23,11,6s), 9≤s≤95	?		
4-(23,11,576)	Yes		Derived design of 5-(24,12,576)
4-(23,11,6s), 97≤s≤1429	?		
4-(23,11,8580)	Yes		Residual design of 5-(24,11,4620)
4-(23,11,6s), 1431≤s≤2583	?		
4-(23,11,15504)	Yes		See note (1) with 4-(22,10,5712) and 4-(22,11,9792)
4-(23,11,6s), 2585≤s≤3875	?		
4-(23,11,23256)	Yes		See note (1) with 4-(22,10,8568) and 4-(22,11,14688)
4-(23,11,6s), 3877≤s≤4199	?		
4-(24,6,10s), 1≤s≤9	Yes		5-(24,6,s) as a 4-design
4-(24,7,20s), 1≤s≤28	Yes		5-(24,7,3s) as a 4-design
4-(24,8,5s), 1≤s≤9	Yes		5-(24,8,s) as a 4-design
4-(24,8,5s), 10≤s≤127	?		
4-(24,8,5s), 128≤s≤129	Yes		5-(24,8,s) as a 4-design
4-(24,8,5s), 130≤s≤484	?		
4-(24,9,24)	Yes		5-(24,9,6) as a 4-design
4-(24,9,24s), 2≤s≤5	?		
4-(24,9,144)	Yes		5-(24,9,36) as a 4-design
4-(24,9,24s), 7≤s≤59	?		
4-(24,9,1440)	Yes		5-(24,9,360) as a 4-design
4-(24,9,24s), 61≤s≤279	?		
4-(24,9,6720)	Yes		5-(24,9,1680) as a 4-design
4-(24,9,24s), 281≤s≤285	?		
4-(24,9,6864)	Yes		5-(24,9,1716) as a 4-design
4-(24,9,24s), 287≤s≤323	?		

t–(v, k, λ)	Existence		Remarks
4-(24,10,60s), $1\leq s\leq 29$	?		
4-(24,10,1800)	Yes		5-(24,10,540) as a 4-design
4-(24,10,60s), $31\leq s\leq 323$	?		
4-(24,11,120s), $1\leq s\leq 109$	?		
4-(24,11,13200)	Yes		5-(24,11,4620) as a 4-design
4-(24,11,120s), $111\leq s\leq 323$	?		
4-(24,12,15)	No		[Haemers74]
4-(24,12,15s), $2\leq s\leq 7$	?		
4-(24,12,120)	Yes		5-(24,12,48) as a 4-design
4-(24,12,15s), $9\leq s\leq 95$	?		
4-(24,12,1440)	Yes		5-(24,12,576) as a 4-design
4-(24,12,15s), $97\leq s\leq 571$	?		
4-(24,12,21450)	Yes		5-(24,12,8580) as a 4-design
4-(24,12,15s), $573\leq s\leq 1429$	?		
4-(24,12,21450)	Yes		See note (2) with 4-(23,11,8580)
4-(24,12,15s), $1431\leq s\leq 2583$	?		
4-(24,12,38760)	Yes		5-(24,12,15504) as a 4-design
4-(24,12,15s), $2585\leq s\leq 4199$	?		
4-(25,5,3s), $1\leq s\leq 3$	?		
4-(25,6,30s), $1\leq s\leq 3$	?		
4-(25,7,70s), $1\leq s\leq 6$	?		
4-(25,7,490)	Yes		5-(25,7,70) as a 4-design
4-(25,7,70s), $8\leq s\leq 9$	?		
4-(25,8,105s), $1\leq s\leq 28$	?		
4-(25,9,63s), $1\leq s\leq 2$	?		
4-(25,9,189)	Yes		See note (1) with 4-(24,8,45) and 4-(24,9,144)
4-(25,9,63s), $4\leq s\leq 161$	?		
4-(25,10,84s), $1\leq s\leq 323$	?		
4-(25,11,180s), $1\leq s\leq 323$	?		
4-(25,12,45s), $1\leq s\leq 769$	?		
4-(25,12,34650)	Yes		See note (1) with 4-(24,11,13200) and 4-(24,12,21450)
4-(25,12,45s), $771\leq s\leq 2261$	?		
4-(26,5,2s), $1\leq s\leq 5$	?		
4-(26,6,3s), $1\leq s\leq 38$	?		
4-(26,7,140s), $1\leq s\leq 5$	?		
4-(26,8,35s), $1\leq s\leq 104$	?		
4-(26,9,126s), $1\leq s\leq 104$	?		
4-(26,10,21s), $1\leq s\leq 1776$	?		
4-(26,11,264s), $1\leq s\leq 323$	?		
4-(26,12,495s), $1\leq s\leq 323$	?		
4-(26,13,110s), $1\leq s\leq 769$	?		
4-(26,13,84700)	Yes		See note (2) with 4-(25,12,34650)
4-(26,13,110s), $771\leq s\leq 2261$	?		

$t-(v,k,\lambda)$	Existence		Remarks
4-(27,5,1)	?		
4-(27,5,s), $2\le s\le 11$	Yes		Derived design of 5-(28,6,s)
4-(27,6,1)	Yes		[Denniston76]
4-(27,6,s), $s\equiv 0$ (mod 11) and $s\ge 22$	Yes		Residual design of 5-(28,6,s/11)
4-(27,6,s), all other s	?		
4-(27,7,7)	Yes		Residual design of 5-(28,7,1)
4-(27,7,7s), $2\le s\le 126$	?		
4-(27,8,35s), $1\le s\le 126$	?		
4-(27,9,7s), $1\le s\le 2403$	?		
4-(27,10,21s), $1\le s\le 2403$	?		
4-(27,11,33s), $1\le s\le 3714$	?		
4-(27,12,33s), $1\le s\le 7429$	?		
4-(27,13,55s), $1\le s\le 7429$	?		
4-(28,5,12)	Yes	LS	Derived design of 5-(29,6,12)
4-(28,6,138)	Yes		Derived design of 5-(29,7,138)
4-(28,6,6s), $s\equiv 0$ (mod 2), $s\ge 4$	Yes		5-(28,6,s/2) as a 4-design
4-(28,6,6s), all other s	?		
4-(28,7,4)	?		
4-(28,7,8)	Yes		5-(28,7,1) as a 4-design
4-(28,7,4s), $3\le s\le 252$	?		
4-(28,7,1012)	Yes		Residual design of 5-(29,7,138)
4-(28,8,42s), $1\le s\le 126$	?		
4-(28,9,168s), $1\le s\le 126$	?		
4-(28,10,28s), $1\le s\le 2403$	?		
4-(28,11,792s), $1\le s\le 218$	?		
4-(28,12,99s), $1\le s\le 3714$	?		
4-(28,13,44s), $1\le s\le 14858$	?		
4-(28,14,66s), $1\le s\le 14858$	?		
4-(29,5,5)	Yes		[Kreher89]
4-(29,5,10)	?		
4-(29,6,30s), $1\le s\le 4$	?		
4-(29,6,150)	Yes		Derived design of 5-(30,7,150)
4-(29,7,10s), $1\le s\le 114$	?		
4-(29,7,1150)	Yes		5-(29,7,138) as a 4-design
4-(29,8,10s), $1\le s\le 632$	?		
4-(29,9,42s), $1\le s\le 632$	?		
4-(29,10,140s), $1\le s\le 632$	?		
4-(29,11,220)	Yes		Derived design of 5-(30,12,220)
4-(29,11,220s), $2\le s\le 1092$	?		
4-(29,12,495)	Yes		Residual design of 5-(30,12,220)
4-(29,12,495s), $2\le s\le 1092$	?		
4-(29,13,55s), $1\le s\le 97$	?		
4-(29,13,5390)	Yes		Derived design of 5-(30,14,5390)

t–(v, k, λ)	Existence		Remarks
4-(29,13,55s), 99≤s≤1024	?		
4-(29,13,56375)	Yes		Derived design of 5-(30,14,56375)
4-(29,13,55s), 1026≤s≤18572	?		
4-(29,14,22s), 1≤s≤391	?		
4-(29,14,8624)	Yes		Residual design of 5-(30,14,5390)
4-(29,14,22s), 393≤s≤4099	?		
4-(29,14,90200)	Yes		Residual design of 5-(30,14,56375)
4-(29,14,22s), 4101≤s≤74290	?		
4-(30,5,2s), 1≤s≤6	?		
4-(30,6,5s), 1≤s≤32	?		
4-(30,7,20s), 1≤s≤64	?		
4-(30,7,1300)	Yes		5-(30,7,150) as a 4-design
4-(30,8,10s), 1≤s≤747	?		
4-(30,9,4s), 1≤s≤8222	?		
4-(30,10,14s), 1≤s≤8222	?		
4-(30,11,440s), 1≤s≤747	?		
4-(30,12,55s), 1≤s≤12	?		
4-(30,12,715)	Yes		5-(30,12,220) as a 4-design
4-(30,12,55s), 14≤s≤14202	?		
4-(30,13,1430s), 1≤s≤1092	?		
4-(30,14,143s), 1≤s≤97	?		
4-(30,14,14014)	Yes		5-(30,14,5390) as a 4-design
4-(30,14,143s), 99≤s≤1024	?		
4-(30,14,146575)	Yes		5-(30,14,56375) as a 4-design
4-(30,14,143s), 1026≤s≤18572	?		
4-(30,15,52s), 1≤s≤74290	?		

t–(v, k, λ)	Existence		Remarks
5-(12,6,s), 1≤s≤3	Yes	NLS	Extension of 4-(11,5,s)
5-(13,6,4)	Yes	LS	[Kreher86a]
5-(14,6,3)	Yes		[Brouwer86]
5-(14,7,6)	?		
5-(14,7,12)	Yes		Extension of 4-(13,6,12)
5-(14,7,18)	Yes		6-(14,7,4) as a 5-design
5-(15,7,15)	Yes		[vanTrung86]
5-(16,6,1)	No		Extend 4-(15,5,1)
5-(16,6,2)	?		
5-(16,6,3)	Yes		[Brouwer86]
5-(16,6,4)	?		
5-(16,6,5)	Yes		[Brouwer86]
5-(16,7,5s), 1≤s≤2	?		
5-(16,7,15)	Yes		[Brouwer86]
5-(16,7,5s), 4≤s≤5	?		
5-(16,8,5s), 1≤s≤5	?		
5-(16,8,5s), 6≤s≤16	Yes		Extension of 4-(15,7,5s)
5-(17,7,6)	?		
5-(17,7,12)	Yes		[Brouwer86]
5-(17,7,18)	Yes		[vanTrung86]
5-(17,7,24)	Yes		[Brouwer86]
5-(17,7,30)	?		
5-(17,8,20s), 1≤s≤2	?		
5-(17,8,60)	Yes		[vanTrung86]
5-(17,8,80)	Yes		[Kramer75]
5-(17,8,100)	?		
5-(18,6,s), 1≤s≤3	?		
5-(18,6,4)	Yes		[Kramer75]
5-(18,6,5)	Yes		[Brouwer86]
5-(18,6,6)	?		
5-(18,7,6s), 1≤s≤6	Yes		[Kramer75]
5-(18,8,2)	No		Extend 4-(17,7,2)
5-(18,8,4)	?		
5-(18,8,6)	Yes		[MacWilliams78]
5-(18,8,2s), 4≤s≤6	?		
5-(18,8,2s), 7≤s≤8	Yes		[Kramer75]
5-(18,8,2s), 9≤s≤14	?		
5-(18,8,2s), 15≤s≤16	Yes		[Kramer75]
5-(18,8,2s), 17≤s≤21	?		
5-(18,8,40)	Yes		[MacWilliams78]
5-(18,8,2s), 22≤s≤24	Yes		[Kramer75]
5-(18,8,2s), 25≤s≤29	?		
5-(18,8,2s), 30≤s≤33	Yes		[Kramer75]

t–(v, k, λ)	Existence		Remarks
5-(18,8,2s), $34\leq s\leq 37$	?		
5-(18,8,2s), $38\leq s\leq 41$	Yes		[Kramer75]
5-(18,8,2s), $42\leq s\leq 45$	?		
5-(18,8,2s), $46\leq s\leq 49$	Yes		[Kramer75]
5-(18,8,2s), $50\leq s\leq 51$	?		
5-(18,8,104)	Yes		See note (1) with 5-(17,7,24) and 5-(17,8,80)
5-(18,8,106)	?		
5-(18,8,2s), $54\leq s\leq 57$	Yes		[Kramer75]
5-(18,8,2s), $58\leq s\leq 61$	?		
5-(18,8,2s), $62\leq s\leq 65$	Yes		[Kramer75]
5-(18,8,2s), $66\leq s\leq 69$	?		
5-(18,8,2s), $70\leq s\leq 71$	Yes		[Kramer75]
5-(18,9,5)	No		Extend 4-(17,8,5)
5-(18,9,10)	?		
5-(18,9,15)	Yes		Extension of 4-(17,8,15)
5-(18,9,5s), $4\leq s\leq 5$	?		
5-(18,9,5s), $6\leq s\leq 27$	Yes		Extension of 4-(17,8,5s)
5-(18,9,140)	Yes		[Kramer75]
5-(18,9,5s), $29\leq s\leq 30$	Yes		Extension of 4-(17,8,5s)
5-(18,9,155)	Yes		[Kramer75]
5-(18,9,5s), $32\leq s\leq 33$	Yes		Extension of 4-(17,8,5s)
5-(18,9,170)	?		
5-(18,9,175)	Yes		Extension of 4-(17,8,175)
5-(18,9,5s), $36\leq s\leq 38$	Yes		[Brouwer86]
5-(18,9,195)	Yes		[Kramer75]
5-(18,9,200)	Yes		Extension of 4-(17,8,5s)
5-(18,9,205)	Yes		[Kramer75]
5-(18,9,5s), $42\leq s\leq 44$	Yes		[Brouwer86]
5-(18,9,225)	Yes		[Kramer75]
5-(18,9,230)	Yes		Extension of 4-(17,8,230)
5-(18,9,235)	Yes		[Kramer75]
5-(18,9,5s), $48\leq s\leq 49$	Yes		[Brouwer86]
5-(18,9,5s), $50\leq s\leq 51$	Yes		[Kramer75]
5-(18,9,260)	Yes		[Brouwer86]
5-(18,9,5s), $53\leq s\leq 54$	Yes		[Kramer75]
5-(18,9,275)	Yes		Extension of 4-(17,8,275)
5-(18,9,5s), $56\leq s\leq 57$	Yes		[Kramer75]
5-(18,9,290)	?		
5-(18,9,5s), $59\leq s\leq 60$	Yes		[Kramer75]
5-(18,9,305)	Yes		[Brouwer86]
5-(18,9,5s), $62\leq s\leq 63$	Yes		[Kramer75]
5-(18,9,320)	Yes		Extension of 4-(17,8,5s)
5-(18,9,5s), $65\leq s\leq 66$	Yes		[Kramer75]

t–(v, k, λ)	Existence		Remarks
5-(18,9,5s), 67≤s≤68	Yes		Extension of 4-(17,8,5s)
5-(18,9,345)	Yes		[Kramer75]
5-(18,9,5s), 70≤s≤71	Yes		Extension of 4-(17,8,5s)
5-(19,6,2s), 1≤s≤3	?		
5-(19,7,7s), 1≤s≤3	?		
5-(19,7,28)	Yes		[vanTrung86]
5-(19,7,35)	Yes		See note (1) with 5-(18,6,5) and 5-(18,7,30)
5-(19,7,42)	Yes		[Brouwer86]
5-(19,8,28)	?		
5-(19,8,28s), 2≤s≤3	Yes		[vanTrung86]
5-(19,8,112)	Yes		Derived design of 6-(20,9,112)
5-(19,8,140)	Yes		[vanTrung86]
5-(19,8,168)	?		
5-(19,9,7)	No		[Kohler85]
5-(19,9,14)	?		
5-(19,9,21)	Yes		[Brouwer86]
5-(19,9,7s), 4≤s≤6	?		
5-(19,9,7s), 7≤s≤8	Yes		[vanTrung86]
5-(19,9,7s), 9≤s≤14	?		
5-(19,9,7s), 15≤s≤16	Yes		[vanTrung86]
5-(19,9,7s), 17≤s≤19	?		
5-(19,9,140)	Yes		[Brouwer86]
5-(19,9,147)	?		
5-(19,9,7s), 22≤s≤24	Yes		[vanTrung86]
5-(19,9,7s), 25≤s≤29	?		
5-(19,9,7s), 30≤s≤33	Yes		[vanTrung86]
5-(19,9,7s), 34≤s≤37	?		
5-(19,9,7s), 38≤s≤41	Yes		[vanTrung86]
5-(19,9,7s), 42≤s≤43	?		
5-(19,9,308)	Yes		Residual design of 6-(20,9,112)
5-(19,9,315)	?		
5-(19,9,7s), 46≤s≤49	Yes		[vanTrung86]
5-(19,9,7s), 50≤s≤51	?		
5-(19,9,364)	Yes		[vanTrung86]
5-(19,9,371)	?		
5-(19,9,7s), 54≤s≤57	Yes		[vanTrung86]
5-(19,9,7s), 58≤s≤61	?		
5-(19,9,7s), 62≤s≤65	Yes		[vanTrung86]
5-(19,9,7s), 66≤s≤69	?		
5-(19,9,7s), 70≤s≤71	Yes		[vanTrung86]
5-(20,8,35s), 1≤s≤6	Yes		[Kramer85]
5-(20,9,105)	Yes		[Kramer85]
5-(20,9,210)	Yes		[vanTrung86]

t–(v, k, λ)	Existence		Remarks
5-(20,9,105s), $3\leq s\leq 4$	Yes		[Kramer85]
5-(20,9,525)	Yes		[vanTrung86]
5-(20,9,630)	Yes		[Kramer85]
5-(20,10,21s), $1\leq s\leq 2$	?		
5-(20,10,63)	Yes		Extension of 4-(19,9,63)
5-(20,10,21s), $4\leq s\leq 5$	?		
5-(20,10,21s), $6\leq s\leq 8$	Yes		[Kramer85]
5-(20,10,189)	Yes		Extension of 4-(19,9,189)
5-(20,10,21s), $10\leq s\leq 13$	Yes		[Kramer85]
5-(20,10,21s), $14\leq s\leq 71$	Yes		Extension of 4-(19,9,21s)
5-(21,6,4)	?		
5-(21,6,8)	Yes		Derived design of 6-(22,7,8)
5-(21,7,30)	?		
5-(21,7,60)	Yes		Residual design of 6-(22,7,8)
5-(21,8,280)	?		
5-(21,9,70)	?		
5-(21,9,140)	Yes		[vanTrung86]
5-(21,9,210)	?		
5-(21,9,280)	Yes		[vanTrung86]
5-(21,9,350)	?		
5-(21,9,420)	Yes		[vanTrung86]
5-(21,9,490)	?		
5-(21,9,560)	Yes		[vanTrung86]
5-(21,9,630)	?		
5-(21,9,700)	Yes		[vanTrung86]
5-(21,9,770)	?		
5-(21,9,840)	Yes		[vanTrung86]
5-(21,9,910)	?		
5-(21,10,168)	?		
5-(21,10,336)	Yes		[Kramer84]
5-(21,10,504)	?		
5-(21,10,672)	Yes		[vanTrung86]
5-(21,10,840)	?		
5-(21,10,1008)	Yes		[vanTrung86]
5-(21,10,1176)	?		
5-(21,10,1344)	Yes		See note (1) with 5-(20,9,420) and 5-(20,10,924)
5-(21,10,1512)	?		
5-(21,10,1680)	Yes		[vanTrung86]
5-(21,10,168s), $11\leq s\leq 13$	?		
5-(22,6,s), $1\leq s\leq 8$	?		
5-(22,7,2s), $1\leq s\leq 33$	?		
5-(22,7,68)	Yes		6-(22,7,8) as a 5-design
5-(22,8,20s), $1\leq s\leq 17$	?		

t–(v, k, λ)	Existence		Remarks
5-(22,9,70s), 1≤s≤17	?		
5-(22,10,14s), 1≤s≤67	?		
5-(22,10,952)	Yes		See note (1) with 5-(21,9,280) and 5-(21,10,672)
5-(22,10,14s), 69≤s≤101	?		
5-(22,10,1428)	Yes		See note (1) with 5-(21,9,420) and 5-(21,10,1008)
5-(22,10,14s), 103≤s≤135	?		
5-(22,10,1904)	Yes		See note (1) with 5-(21,9,560) and 5-(21,10,1344)
5-(22,10,14s), 137≤s≤169	?		
5-(22,10,2380)	Yes		See note (1) with 5-(21,9,700) and 5-(21,10,1680)
5-(22,10,14s), 171≤s≤221	?		
5-(22,11,28s), 1≤s≤11	?		
5-(22,11,336)	Yes		Extension of 4-(21,10,336)
5-(22,11,28s), 13≤s≤15	?		
5-(22,11,448)	Yes		Extension of 4-(21,10,448)
5-(22,11,28s), 17≤s≤23	?		
5-(22,11,672)	Yes		Extension of 4-(21,10,672)
5-(22,11,28s), 25≤s≤33	?		
5-(22,11,952)	Yes		Extension of 4-(21,10,952)
5-(22,11,980)	?		
5-(22,11,1008)	Yes		Extension of 4-(21,10,1008)
5-(22,11,28s), 37≤s≤39	?		
5-(22,11,1120)	Yes		Extension of 4-(21,10,1120)
5-(22,11,28s), 41≤s≤45	?		
5-(22,11,1288)	Yes		Extension of 4-(21,10,1288)
5-(22,11,28s), 47≤s≤51	?		
5-(22,11,1456)	Yes		Extension of 4-(21,10,1456)
5-(22,11,1484)	?		
5-(22,11,1512)	Yes		Extension of 4-(21,10,1512)
5-(22,11,28s), 55≤s≤59	?		
5-(22,11,1680)	Yes		Extension of 4-(21,10,1680)
5-(22,11,28s), 61≤s≤63	?		
5-(22,11,1792)	Yes		Extension of 4-(21,10,1792)
5-(22,11,1820)	?		
5-(22,11,1848)	Yes		Extension of 4-(21,10,1848)
5-(22,11,1876)	?		
5-(22,11,1904)	Yes		See note (2) with 5-(21,10,672)
5-(22,11,1932)	?		
5-(22,11,1960)	Yes		Extension of 4-(21,10,1960)
5-(22,11,1988)	?		
5-(22,11,2016)	Yes		Extension of 4-(21,10,2016)
5-(22,11,28s), 73≤s≤77	?		
5-(22,11,2184)	Yes		Extension of 4-(21,10,2184)
5-(22,11,28s), 79≤s≤81	?		

t–(v, k, λ)	Existence		Remarks
5-(22,11,2296)	Yes		Extension of 4-(21,10,2296)
5-(22,11,2324)	?		
5-(22,11,28s), $84\leq s\leq 85$	Yes		Extension of 4-(21,10,28s)
5-(22,11,28s), $86\leq s\leq 89$	?		
5-(22,11,2520)	Yes		Extension of 4-(21,10,2520)
5-(22,11,28s), $91\leq s\leq 93$	?		
5-(22,11,2632)	Yes		Extension of 4-(21,10,2632)
5-(22,11,2660)	?		
5-(22,11,2688)	Yes		Extension of 4-(21,10,2688)
5-(22,11,28s), $97\leq s\leq 101$	?		
5-(22,11,2856)	Yes		See note (2) with 5-(21.10.1008)
5-(22,11,28s), $103\leq s\leq 119$	?		
5-(22,11,3360)	Yes		Extension of 4-(21,10,3360)
5-(22,11,28s), $121\leq s\leq 131$	?		
5-(22,11,3696)	Yes		Extension of 4-(21,10,3696)
5-(22,11,28s), $133\leq s\leq 135$	?		
5-(22,11,3808)	Yes		See note (2) with 5-(21,10,1344)
5-(22,11,28s), $137\leq s\leq 143$	?		
5-(22,11,4032)	Yes		Extension of 4-(21,10,4032)
5-(22,11,28s), $145\leq s\leq 152$	?		
5-(22,11,4284)	Yes		Extension of 4-(21,10,4284)
5-(22,11,28s), $154\leq s\leq 169$	?		
5-(22,11,4760)	Yes		See note (2) with 5-(21,10,1680)
5-(22,11,28s), $171\leq s\leq 186$	?		
5-(22,11,5236)	Yes		Extension of 4-(21,10,5236)
5-(22,11,28s), $188\leq s\leq 201$	?		
5-(22,11,5656)	Yes		Extesnion of 4-(21,10,5656)
5-(22,11,5684)	?		
5-(22,11,5712)	Yes		Extension of 4-(21,10,5712)
5-(22,11,28s), $205\leq s\leq 221$	?		
5-(23,6,6)	?		
5-(23,7,3s), $1\leq s\leq 25$	?		
5-(23,8,8s), $1\leq s\leq 51$	?		
5-(23,9,90s), $1\leq s\leq 17$	?		
5-(23,10,252s), $1\leq s\leq 17$	?		
5-(23,11,42s), $1\leq s\leq 67$	?		
5-(23,11,2856)	Yes		See note (1) with 5-(22,10,952) and 5-(22,11,1904)
5-(23,11,42s), $69\leq s\leq 101$	?		
5-(23,11,4284)	Yes		See note (1) with 5-(22,10,1428) and 5-(22,11,2856)
5-(23,11,42s), $103\leq s\leq 135$	?		
5-(23,11,5712)	Yes		See note (1) with 5-(22,10,1904) and 5-(22,11,3808)
5-(23,11,42s), $137\leq s\leq 169$	?		
5-(23,11,7140)	Yes		See note (1) with 5-(22,10,2380) and 5-(22,11,4760)

$t-(v, k, \lambda)$	Existence		Remarks
5-(23,11,42s), 171≤s≤221	?		
5-(24,6,1)	Yes		[Denniston76]
5-(24,6,2)	Yes		[Kreher89]
5-(24,6,3)	Yes		[Driessen78]
5-(24,6,s), 4≤s≤9	Yes		[Kreher89]
5-(24,7,3)	Yes		[Driessen78]
5-(24,7,3s), 2≤s≤20	Yes		[Kreher89]
5-(24,7,63)	Yes		[Driessen78]
5-(24,7,3s), 22≤s≤28	Yes		[Kreher89]
5-(24,8,1)	Yes		[Witt38]
5-(24,8,s), 2≤s≤9	Yes		[Kramer74b]
5-(24,8,s), 10≤s≤127	?		
5-(24,8,s), 128≤s≤129	Yes		[Driessen78]
5-(24,8,s), 130≤s≤484	?		
5-(24,9,6)	Yes		[Assmus69]
5-(24,9,6s), 2≤s≤5	?		
5-(24,9,36)	Yes		[Driessen78]
5-(24,9,6s), 7≤s≤59	?		
5-(24,9,360)	Yes		[Assmus69]
5-(24,9,6s), 61≤s≤279	?		
5-(24,9,1680)	Yes		Difference of 5-(24,9,1716) and 5-(24,9,36)
5-(24,9,6s), 281≤s≤285	?		
5-(24,9,1716)	Yes		[Driessen78]
5-(24,9,6s), 287≤s≤323	?		
5-(24,10,18s), 1≤s≤29	?		
5-(24,10,540)	Yes		[Driessen78]
5-(24,10,18s), 31≤s≤323	?		
5-(24,11,42s), 1≤s≤109	?		
5-(24,11,4620)	Yes		[Driessen78]
5-(24,11,42s), 111≤s≤323	?		
5-(24,12,6s), 1≤s≤2	No		Extend 4-(23,11,6s)
5-(24,12,6s), 3≤s≤7	?		
5-(24,12,48)	Yes		[Assmus69]
5-(24,12,6s), 9≤s≤95	?		
5-(24,12,576)	Yes		[Assmus69]
5-(24,12,6s), 97≤s≤1291	?		
5-(24,12,7752)	Yes		See note (2) with 5-(23,11,2856)
5-(24,12,6s), 1293≤s≤1429	?		
5-(24,12,8580)	Yes		Extension of 4-(23,11,8580)
5-(24,12,6s), 1431≤s≤1937	?		
5-(24,12,11628)	Yes		See note (2) with 5-(23,11,4284)
5-(24,12,6s), 1939≤s≤2583	?		
5-(24,12,15504)	Yes		See note (2) with 5-(23,11,5712)

t–(v, k, λ)	Existence		Remarks
5-(24,12,6s), 2585≤s≤3229	?		
5-(24,12,19380)	Yes		See note (2) with 5-(23,11,7140)
5-(24,12,6s), 3231≤s≤4199	?		
5-(25,7,10s), 1≤s≤9	?		
5-(25,8,20s), 2≤s≤28	?		
5-(25,9,15s), 1≤s≤2	?		
5-(25,9,45)	Yes		See note (1) with 5-(24,8,9) and 5-(24,9,36)
5-(25,9,15s), 4≤s≤161	?		
5-(25,10,24s), 1≤s≤323	?		
5-(25,11,60s), 1≤s≤323	?		
5-(25,12,120s), 1≤s≤109	?		
5-(25,12,13200)	Yes		See note (1) with 5-(24,11,4620) and 5-(24,12,8580)
5-(25,12,120s), 111≤s≤323	?		
5-(26,6,3s), 1≤s≤3	?		
5-(26,8,70s), 1≤s≤9	?		
5-(26,9,315s), 1≤s≤9	?		
5-(26,10,63s), 1≤s≤161	?		
5-(26,11,84s), 1≤s≤323	?		
5-(26,12,180s), 1≤s≤323	?		
5-(26,13,45s), 1≤s≤769	?		
5-(26,13,34650)	Yes		See note (2) with 5-(25,12,13200)
5-(26,13,45s), 771≤s≤2261	?		
5-(27,6,2s), 1≤s≤5	?		
5-(27,7,21s), 1≤s≤5	?		
5-(27,8,140s), 1≤s≤5	?		
5-(27,9,35s), 1≤s≤104	?		
5-(27,10,126s), 1≤s≤104	?		
5-(27,11,231s), 1≤s≤161	?		
5-(27,12,264s), 1≤s≤323	?		
5-(27,13,495s), 1≤s≤323	?		
5-(28,6,1)	?		
5-(28,6,s), 2≤s≤11	Yes		[Kreher87a]
5-(28,7,1)	Yes		[Denniston76]
5-(28,7,s), 2≤s≤126	?		
5-(28,8,7s), 1≤s≤126	?		
5-(28,9,35s), 1≤s≤126	?		
5-(28,10,7s), 1≤s≤2403	?		
5-(28,11,231s), 1≤s≤218	?		
5-(28,12,33s), 1≤s≤3714	?		
5-(28,13,33s), 1≤s≤7429	?		
5-(28,14,55s), 1≤s≤7429	?		
5-(29,6,12)	Yes	LS	Derived design of 6-(30,7,12)
5-(29,7,6s), 1≤s≤22	?		

t–(v, k, λ)	Existence		Remarks
5-(29,7,138)	Yes		Residual design of 6-(30,7,12)
5-(29,8,8s), 1≤s≤126	?		
5-(29,9,42s), 1≤s≤126	?		
5-(29,10,168s), 1≤s≤126	?		
5-(29,11,308s), 1≤s≤218	?		
5-(29,12,792s), 1≤s≤218	?		
5-(29,13,99s), 1≤s≤3714	?		
5-(29,14,44s), 1≤s≤14858	?		
5-(30,6,5s), 1≤s≤2	?		
5-(30,7,30s), 1≤s≤4	?		
5-(30,7,150)	Yes		6-(30,7,12) as a 5-design
5-(30,8,20s), 1≤s≤57	?		
5-(30,9,10s), 1≤s≤632	?		
5-(30,10,42s), 1≤s≤632	?		
5-(30,11,1540s)), 1≤s≤57	?		
5-(30,12,220)	Yes		[MacWilliams78]
5-(30,12,220s), 2≤s≤1092	?		
5-(30,13,495s), 1≤s≤1092	?		
5-(30,14,55s), 1≤s≤97	?		
5-(30,14,5390)	Yes		[MacWilliams78]
5-(30,14,55s), 99≤s≤1024	?		
5-(30,14,56375)	Yes		[MacWilliams78]
5-(30,14,55s), 1026≤s≤18572	?		
5-(30.15,22s), 1≤s≤74290	?		

t–(v,k,λ)	Existence		Remarks
6-(14,7,4)	Yes	LS	Extension of 5-(13,6,4)
6-(15,7,3)	?		
6-(16,8,15)	?		
6-(17,7,1)	No		Extend 5-(16,6,1)
6-(17,7,s), $2\leq s\leq 5$	?		
6-(17,8,5s), $1\leq s\leq 5$	?		
6-(18,8,6s), $1\leq s\leq 5$	?		
6-(18,9,20s), $1\leq s\leq 5$	?		
6-(19,7,s), $1\leq s\leq 6$	?		
6-(19,8,6s), $1\leq s\leq 6$	?		
6-(19,9,2s), $1\leq s\leq 5$	No		[Haemers74]
6-(19,9,2s), $6\leq s\leq 71$	?		
6-(20,8,7s), $1\leq s\leq 6$	?		
6-(20,9,28s), $1\leq s\leq 3$	?		
6-(20,9,112)	Yes		[Kramer85]
6-(20,9,28s), $5\leq s\leq 6$	?		
6-(20,10,7s), $1\leq s\leq 2$	No		[Haemers74]
6-(20,10,7s), $3\leq s\leq 71$	?		
6-(21,9,35s), $1\leq s\leq 6$	?		
6-(21,10,105s), $1\leq s\leq 6$	?		
6-(22,7,4)	?		
6-(22,7,8)	Yes		[Teirlinck88]
6-(22,8,60)	?		
6-(22,9,280)	?		
6-(22,10,70s), $1\leq s\leq 13$	?		
6-(22,11,168s), $1\leq s\leq 13$	?		
6-(23,7,s), $1\leq s\leq 8$	?		
6-(23,8,4s), $1\leq s\leq 17$	?		
6-(23,9,20s), $1\leq s\leq 17$	?		
6-(23,10,70s), $1\leq s\leq 17$	?		
6-(23,11,14s), $1\leq s\leq 221$	?		
6-(24,7,6)	?		
6-(24,8,3s), $1\leq s\leq 25$	?		
6-(24,9,24s), $1\leq s\leq 17$	?		
6-(24,10,90s), $1\leq s\leq 17$	?		
6-(24,11,252s), $1\leq s\leq 17$	?		
6-(24,12,42s), $1\leq s\leq 221$	?		
6-(25,7,s), $1\leq s\leq 9$	?		
6-(25,8,3s), $1\leq s\leq 28$	?		
6-(25,9,3s), $1\leq s\leq 161$	?		
6-(25,10,6s), $1\leq s\leq 323$	?		
6-(25,11,18s), $1\leq s\leq 323$	?		
6-(25,12,42s), $1\leq s\leq 323$	?		

t–(v, k, λ)	Existence		Remarks
6-(26,8,10s), $1\leq s\leq 9$	?		
6-(26,9,60s), $1\leq s\leq 9$	?		
6-(26,10,15s), $1\leq s\leq 161$	?		
6-(26,11,24s), $1\leq s\leq 323$	?		
6-(26,12,60s), $1\leq s\leq 323$	?		
6-(26,13,120s), $1\leq s\leq 323$	?		
6-(27,9,70s), $1\leq s\leq 9$	?		
6-(27,10,315s), $1\leq s\leq 9$	?		
6-(27,11,63s), $1\leq s\leq 161$	?		
6-(27,12,84s), $1\leq s\leq 323$	?		
6-(27,13,180s), $1\leq s\leq 323$	?		
6-(28,7,2s), $1\leq s\leq 5$	?		
6-(28,8,21s), $1\leq s\leq 5$	?		
6-(28,9,140s), $1\leq s\leq 5$	?		
6-(28,10,35s), $1\leq s\leq 104$	?		
6-(28,11,1386s), $1\leq s\leq 9$	?		
6-(28,12,231s), $1\leq s\leq 161$	?		
6-(28,13,264s), $1\leq s\leq 323$	?		
6-(28,14,495s), $1\leq s\leq 323$	?		
6-(29,7,s), $1\leq s\leq 11$	?		
6-(29,8,s), $1\leq s\leq 126$	?		
6-(29,9,7s), $1\leq s\leq 126$	?		
6-(29,10,35s), $1\leq s\leq 126$	?		
6-(29,11,77s), $1\leq s\leq 218$	?		
6-(29,12,231s), $1\leq s\leq 218$	?		
6-(29,13,33s), $1\leq s\leq 3714$	?		
6-(29,14,33s), $1\leq s\leq 7429$	?		
6-(30,7,12)	Yes	LS	[Teirlinck88]
6-(30,8,12s), $1\leq s\leq 11$	?		
6-(30,9,8s), $1\leq s\leq 126$	?		
6-(30,10,42s), $1\leq s\leq 126$	?		
6-(30,11,1848s), $1\leq s\leq 11$	?		
6-(30,12,308s), $1\leq s\leq 218$	?		
6-(30,13,792s), $1\leq s\leq 218$	?		
6-(30,14,99s), $1\leq s\leq 3714$	?		
6-(30,15,44)	No		[Haemers74]
6-(30,15,44s), $2\leq s\leq 14858$	?		

t–(v,k,λ)	Existence		Remarks
7-(16,8,3)	?		
7-(18,8,1)	No		Extend 6-(17,7,1)
7-(18,8,s), $2 \le s \le 5$	?		
7-(18,9,5s) $1 \le s \le 5$	?		
7-(19,9,6s), $1 \le s \le 5$	?		
7-(20,8,s), $1 \le s \le 6$	?		
7-(20,9,6s), $1 \le s \le 6$	?		
7-(20,10,2s), $1 \le s \le 5$	No		Extend 6-(19,9,2s)
7-(20,10,2s), $6 \le s \le 71$	?		
7-(21,9,7s), $1 \le s \le 6$	?		
7-(21,10,28s), $1 \le s \le 6$	?		
7-(22,10,35s), $1 \le s \le 6$	?		
7-(22,11,105s), $1 \le s \le 6$	?		
7-(23,8,8)	?		
7-(23,9,60)	?		
7-(23,10,280)	?		
7-(23,11,70s), $1 \le s \le 13$	?		
7-(24,8,s), $1 \le s \le 8$	?		
7-(24,9,4s), $1 \le s \le 17$	?		
7-(24,10,20s), $1 \le s \le 17$	?		
7-(24,11,70s), $1 \le s \le 17$	?		
7-(24,12,14s), $1 \le s \le 221$	?		
7-(25,8,6)	?		
7-(25,9,9s), $1 \le s \le 8$	?		
7-(25,10,24s), $1 \le s \le 17$	?		
7-(25,11,90s), $1 \le s \le 17$	?		
7-(25,12,252s), $1 \le s \le 17$	?		
7-(26,8,s), $1 \le s \le 9$	?		
7-(26,9,9s), $1 \le s \le 9$	?		
7-(26,10,3s), $1 \le s \le 161$	?		
7-(26,11,6)	No		[Haemers74]
7-(26,11,6s), $2 \le s \le 323$	?		
7-(26,12,18s), $1 \le s \le 323$	?		
7-(26,13,42s), $1 \le s \le 323$	?		
7-(27,9,10s), $1 \le s \le 9$	?		
7-(27,10,60s), $1 \le s \le 9$	?		
7-(27,11,15s), $1 \le s \le 161$	?		
7-(27,12,24s), $1 \le s \le 323$	?		
7-(27,13,60s), $1 \le s \le 323$	?		
7-(28,10,70s), $1 \le s \le 9$	?		
7-(28,11,315s), $1 \le s \le 9$	?		
7-(28,12,63s), $1 \le s \le 161$	?		
7-(28,13,84s), $1 \le s \le 323$	?		

t–(v, k, λ)	Existence		Remarks
7-(28,14,180s), 1≤s≤323	?		
7-(29,8,2s), 1≤s≤5	?		
7-(29,9,21s), 1≤s≤5	?		
7-(29,10,140s), 1≤s≤5	?		
7-(29,11,385s), 1≤s≤9	?		
7-(29,13,231s), 1≤s≤161	?		
7-(29,14,264s), 1≤s≤323	?		
7-(30,8,s), 1≤s≤11	?		
7-(30,9,s), 1≤s≤126	?		
7-(30,10,7s), 1≤s≤126	?		
7-(30,11,385s), 1≤s≤11	?		
7-(30,12,77s), 1≤s≤218	?		
7-(30,13,231s), 1≤s≤218	?		
7-(30,14,33s), 1≤s≤3714	?		
7-(30,15,33s), 1≤s≤7429	?		
8-(19,9,1)	No		Extend 7-(18,8,1)
8-(19,9,s), 2≤s≤5	?		
8-(20,10,6s), 1≤s≤5	?		
8-(21,9,s), 1≤s≤6	?		
8-(21,10,6s), 1≤s≤6	?		
8-(22,10,7s), 1≤s≤6	?		
8-(22,11,28s), 1≤s≤6	?		
8-(23,11,35s), 1≤s≤6	?		
8-(24,9,8)	?		
8-(24,10,60)	?		
8-(24,11,280)	?		
8-(24,12,70s), 1≤s≤13	?		
8-(25,9,s), 1≤s≤8	?		
8-(25,10,4s), 1≤s≤17	?		
8-(25,11,20s), 1≤s≤17	?		
8-(25,12,70s), 1≤s≤17	?		
8-(26,10,9s), 1≤s≤8	?		
8-(26,11,24s), 1≤s≤17	?		
8-(26,12,90s), 1≤s≤17	?		
8-(26,13,252s), 1≤s≤17	?		
8-(27,9,s), 1≤s≤9	?		
8-(27,10,9s), 1≤s≤9	?		
8-(27,11,3)	No		[Haemers74]
8-(27,11,3s), 2≤s≤161	?		
8-(27,12,6s), 1≤s≤2	No		[Haemers74]
8-(27,12,6s), 3≤s≤323	?		
8-(27,13,18)	No		[Haemers74]
8-(27,13,18s), 2≤s≤323	?		

t–(v, k, λ)	Existence		Remarks
8-(28,10,10s), 1≤s≤9	?		
8-(28,11,60s), 1≤s≤9	?		
8-(28,12,15s), 1≤s≤161	?		
8-(28,13,24)	No		[Haemers74]
8-(28,13,24s), 2≤s≤323	?		
8-(28,14,60s), 1≤s≤323	?		
8-(29,11,70s), 1≤s≤9	?		
8-(29,12,315s), 1≤s≤9	?		
8-(29,13,63s), 1≤s≤161	?		
8-(29,14,84s), 1≤s≤323	?		
8-(30,9,2s), 1≤s≤5	?		
8-(30,10,21s), 1≤s≤5	?		
8-(30,14,231s), 1≤s≤161	?		
8-(30,15,264s), 1≤s≤323	?		
9-(20,10,1)	No		Extend 8-(19,9,1)
9-(20,10,s), 2≤s≤5	?		
9-(22,10,s), 1≤s≤6	?		
9-(22,11,6s), 1≤s≤6	?		
9-(23,11,7s), 1≤s≤6	?		
9-(24,12,35s), 1≤s≤6	?		
9-(25,10,8)	?		
9-(25,11,60)	?		
9-(25,12,280)	?		
9-(26,10,s), 1≤s≤8	?		
9-(26,11,4s), 1≤s≤17	?		
9-(26,12,20s), 1≤s≤17	?		
9-(26,13,70s), 1≤s≤17	?		
9-(27,11,9s), 1≤s≤8	?		
9-(27,12,24s), 1≤s≤17	?		
9-(27,13,90s), 1≤s≤17	?		
9-(28,10,s), 1≤s≤9	?		
9-(28,11,9s), 1≤s≤9	?		
9-(28,12,3)	No		[Haemers74]
9-(28,12,3s), 2≤s≤161	?		
9-(28,13,6s), 1≤s≤2	No		[Haemers74]
9-(28,13,6s), 3≤s≤323	?		
9-(28,14,18)	No		[Haemers74]
9-(28,14,18s), 2≤s≤323	?		
9-(29,11,10s), 1≤s≤9	?		
9-(29,12,60s), 1≤s≤9	?		
9-(29,13,15s), 1≤s≤161	?		
9-(29,14,24)	No		[Haemers74]
9-(29,14,24s), 2≤s≤323	?		

t–(v, k, λ)	Existence		Remarks
9-(30,12,70s), 1≤s≤9	?		
9-(30,14,63s), 1≤s≤161	?		
9-(30,15,84s), 1≤s≤323	?		
10-(23,11,s), 1≤s≤6	?		
10-(24,12,7s), 1≤s≤6	?		
10-(26,11,8)	?		
10-(26,12,60)	?		
10-(26,13,280)	?		
10-(27,11,s), 1≤s≤8	?		
10-(27,12,4)	No		[Haemers74]
10-(27,12,4s), 2≤s≤17	?		
10-(27,13,20)	No		[Haemers74]
10-(27,13,20s), 2≤s≤17	?		
10-(28,12,9s), 1≤s≤8	?		
10-(28,13,24s), 1≤s≤17	?		
10-(28,14,90s), 1≤s≤17	?		
10-(29,11,s), 1≤s≤9	?		
10-(29,12,9s), 1≤s≤9	?		
10-(29,13,3s), 1≤s≤3	No		[Haemers74]
10-(29,13,3s), 4≤s≤161	?		
10-(29,14,6s), 1≤s≤8	No		[Haemers74]
10-(29,14,6s), 9≤s≤323	?		
10-(30,12,10s), 1≤s≤9	?		
10-(30,13,60s), 1≤s≤9	?		
10-(30,14,15)	No		[Haemers74]
10-(30,14,15s), 2≤s≤161	?		
10-(30,15,24s), 1≤s≤4	No		[Haemers74]
10-(30,15,24s), 5≤s≤323	?		
11-(24,12,s), 1≤s≤6	?		
11-(27,12,8)	?		
11-(27,13,60)	?		
11-(28,12,s), 1≤s≤8	?		
11-(28,13,4)	No		[Haemers74]
11-(28,13,4s), 2≤s≤17	?		
11-(28,14,20)	No		[Haemers74]
11-(28,14,20s), 2≤s≤17	?		
11-(29,13,9s), 1≤s≤8	?		
11-(29,14,24s), 1≤s≤17	?		
11-(30,12,s), 1≤s≤9	?		
11-(30,13,9s), 1≤s≤9	?		
11-(30,14,3s), 1≤s≤5	No		[Haemers74]
11-(30,14,3s), 6≤s≤161	?		
11-(30,15,6s), 1≤s≤8	No		[Haemers74]
11-(30,15,6s), 9≤s≤323	?		

t–(v, k, λ)	Existence		Remarks
12-(28,13,8)	?		
12-(28,14,60)	?		
12-(29,13,s), 1≤s≤8	?		
12-(29,14,4)	No		[Haemers74]
12-(29,14,4s), 2≤s≤17	?		
12-(30,14,9s), 1≤s≤8	?		
12-(30,15,24)	No		[Haemers74]
12-(30,15,24s), 2≤s≤17	?		
13-(29,14,8)	?		
13-(30,14,s), 1≤s≤8	?		
13-(30,15,4)	No		Extend 12-(29,14,4)
13-(30,15,4s), 2≤s≤17	?		
14-(30,15,8)	?		

Notes

(1) Let $(X, B^{(j)})$ be a $t-(v, k^{(j)}, \lambda^{(j)})$ design for $j = 1, \ldots, s$ and $2 \leq s \leq t$ such that the following conditions hold:

$$k^{(j)} = k^{(j-1)} + 1, \quad 2 \leq j \leq s, \tag{i}$$

$$\sum_{l=1}^{s-m} \binom{s-m-1}{s-m-l} \lambda^{(l)}{}_{(t-m)} = \lambda^{(1)}{}_{(t-s+1)}, \quad 0 \leq m \leq s-2. \tag{ii}$$

Then there exists a $t-(v + s - 1, k^{(s)}, \lambda^{(1)}{}_{(t-s+1)})$ design. See [vanTrung86].

(2) If there exists a $t-(2k + 1, k, \lambda)$ design, then there exists a $t-(2k + 2, k + 1, \lambda \frac{2k + 2 - t}{k + 1 - t})$ design. See [vanTrung86].

(3) If a symmetric block design exists with parameters v, k, λ, then writing $n = k - \lambda$:

1. If v is even, n is a square.

2. If v is odd, $z^2 = nx^2 + (-1)^{(v-1)/2}\lambda y^2$ has a solution in integers x, y, z not all zero.

See [Chowla50].

(4) Let v, k, λ satisfy $k(k - 1) = \lambda(v - 1)$ and suppose we are given a block design D with parameters $v' = v - k$, $k' = k - \lambda$, $\lambda' = \lambda$, and that $\lambda = 1$ or 2. Then D can be embedded as a residual design in a symmetric design with parameters v, k, λ. See [Hall54].

Infinite Families of t-designs , $t \geq 4$

4–$(2^n + 1, 2^m, (2^m - 3)\prod_{i=2}^{m-1} \frac{2^{n-i} - 1}{2^{m-i} - 1})$ designs exist provided $2 < m < n$. See [Hubaut74].

4–$(2^n + 1, 2^{n-1} + 1, (2^{n-1} - 3)(2^{n-2} - 1)(2^{n-1} - 4))$ designs exist provided $n \geq 4$. See [Driessen78].

4–$(2^n + 1, 2^m + 1, (2^m + 1)\prod_{i=2}^{m-1} \frac{2^{n-i} - 1}{2^{m-i} - 1})$ designs exist provided $2 < m < n$ and m does not divide n. See [Hubaut74].

4–$(2^n + 1 + s, 2^{n-1} - 1, \binom{2^n + s - 3}{s}(2^{n-1} - 1)(2^{n-2} - 1)(2^{n-1} - 4))$ designs exist for each $s \geq 2$ such that $n \geq 6$ is large enough so that $\frac{2^{n-1} - 2}{n - 1} > s + 6$. See [Magliveras87].

4–$(2^n + 1 + s, 2^m, \binom{2^n + s - 3}{s}(2^m - 3)\mu)$ designs exist for m sufficiently close to n, with m large enough so that $\binom{v}{k} / \binom{v + s}{s} > \lambda_0(\lambda_0 - \lambda_1)$ where $\mu = \prod_{i=2}^{m-1} \frac{2^{n-i} - 1}{2^{m-i} - 1}$ and λ_0, λ_1 are the number of blocks and replication number respectively. See [Magliveras87].

4–$(2^n + 1 + s, 2^m + 1, \binom{2^n + s - 3}{s}(2^m + 1)\mu)$ designs exist for m sufficiently close to n, with m large enough so that $\binom{v}{k} / \binom{v + s}{s} > \lambda_0(\lambda_0 - \lambda_1)$ where $\mu = \prod_{i=2}^{m-1} \frac{2^{n-i} - 1}{2^{m-i} - 1}$ and λ_0, λ_1 are the number of blocks and replication number respectively. See [Magliveras87].

5–$(2^n + 2, 2^{n-1} + 1, (2^{n-1} - 3)(2^{n-2} - 1))$ designs exist provided $n \geq 4$. See [Alltop72].

5–$(2^n + 3, 2^{n-1} + 1, (2^n - 2)(2^{n-1} - 3)(2^{n-2} - 1))$ designs exist provided $n \geq 5$. See [vanTrung84].

5–$(2^n + 4, 2^{n-1} + 2, (2^n - 1)(2^n - 2)(2^{n-2} - 1))$ designs exist provided $n \geq 5$. See [vanTrung86].

5–$(2^n + 5, 2^{n-1} + 2, 2^n(2^n - 1)(2^n - 2)(2^{n-2} - 1))$ designs exist provided $n \geq 6$. See [vanTrung86].

5–$(2^n + 6, 2^{n-1} + 3, 2^{n-1}(2^n + 1)(2^n - 1)(2^n - 2))$ designs exist provided $n \geq 6$. See [vanTrung86].

5–$(2^n + 2 + s, 2^n + 1, \binom{2^n + s - 3}{s}(2^{n-1} - 3)(2^{n-2} - 1))$ designs exist for each $n \geq N$ such that $s > 0$, $N \geq 4$ and $\frac{2^N - N}{N - 1} > s + 4$. See [Magliveras87].

t–$(v, t + 1, (t + 1)!^{2t+1})$ designs exist provided $v \equiv t \pmod{(t + 1)!^{2t+1}}$ and $v \geq t + 1$. See [Teirlinck87].

Results on the Explicit Enumeration of t-Designs

The following table contains t-designs without repeated blocks for which explicit enumeration had been done. $N(\lambda; t, k, v)$ denotes the number of pairwise non-isomorphic $t-(v, k, \lambda)$ designs.

$t-(v, k, \lambda)$	$N(\lambda; t, k, v)$	Remarks
2-(6,3,2)	1	[Nandi46a]
2-(7,3,1)	1	[Hall67]
2-(7,3,2)	1	[Gibbons76]
2-(7,3,3)	1	[Gibbons76]
2-(8,4,3)	4	[Nandi46b]
2-(9,3,1)	1	[Hall67]
2-(9,3,2)	13	[Gibbons76]
2-(9,3,3)	332	[Harms87]
2-(9,4,3)	11	[Stanton76]
2-(10,3,2)	394	[Colbourn83]
2-(10,4,2)	3	[Nandi46a]
2-(10,5,4)	21	[vanLint77]
2-(11,5,2)	1	[Husain45]
2-(13,3,1)	2	[DePasquale99]
2-(13,4,1)	1	[Gibbons76]
2-(15,3,1)	80	[Cole25]
2-(15,7,3)	5	[Nandi46b]
2-(16,4,1)	1	[Witt38]
2-(16,6,2)	3	[Husain45]
2-(19,9,4)	6	[Gibbons76]
2-(21,5,1)	1	[Witt38]
2-(25,5,1)	1	[MacInnes07]
2-(25,9,3)	78	[Denniston82]
3-(8,4,1)	1	[Barrau08]
3-(8,4,2)	1	[Gibbons76]
3-(8,4,3)	1	[Gibbons76]
3-(10,4,1)	1	[Barrau08]
3-(10,5,3)	7	[Breach79]
3-(14,4,1)	4	[Mendelsohn72]
3-(17,5,1)	1	[Witt38]
3-(22,6,1)	1	[Witt38]
3-(26,6,1)	1	[Chen72]
4-(11,5,1)	1	[Barrau08]
4-(23,7,1)	1	[Witt38]
5-(12,6,1)	1	[Barrau08]
5-(24,8,1)	1	[Witt38]

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