1. Periodic Building Unit:

**DFO** can be built using a building unit of 22T atoms (bold in Figure 1(a)) that consists of two sets of 2-fold (1,3)-connected double 4-rings with “handles” (or of two 4-1 and two 1-4-1 units). The T22-unit very much resembles the building unit in **LAU**. T22-units, related by pure translations along \( c \), are connected through 4-rings into chains along \( c \). Chains are connected along a 6-fold axis parallel to \( c \) into the tubular Periodic Building Unit (PerBU) shown in Figure 1(b and c).

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![Diagram](image)

**Figure 1.**
(a): Chain, constructed from T22-units, viewed perpendicular to \( c \) (left) and along \( c \) (right);
(b): Connection mode of two chains in the PerBU viewed perpendicular to the 6-fold axis. 8-Rings are formed. The chain length along \( c \) has been limited to 1½ of the repeat unit for clarity reasons;
(c): Parallel projection of the PerBU along the 6-fold axis.
2. Connection mode:

Neighboring PerBUs, related by pure translations along \(a\) and \(b\), are connected along \(a\) and \(b\) (and \((a + b)\)) through single- and double 4-rings (and 6-rings) as shown in Figure 2. In the perspective drawing only one chain of each PerBU is shown for clarity reasons. 10-Rings are formed.

Figure 2. Connection mode between PerBUs in DFO viewed along \(c\) (left) and perspective view of the connection mode nearly along \([210]\) (right) (or, equivalently, along \([120]\) or \([-110]\)).

3. Projections of the unit cell content:

Figure 3. Cell content seen along \(c\).
4. Channels and/or cages:

There are two types of 12-ring channels parallel to $c$ (see Figure 3). They are interconnected through common 8-rings. The 12-ring channels of type 2 are interconnected through 10-rings. Cavities in both 12-ring channels are shown in Figure 4 together with the pore descriptors.

Pore descriptor cavity A:
\{3 [4^{18}6^{12}8^{6}12^{2}] <100> (8-ring), [001] (12-ring)\}

Pore descriptor cavity B:
\{1 [4^{12}6^{6}12^{2}] [001] (12-ring)\}

Pore descriptor cavity C:
\{3 [4^{3}6^{12}8^{3}12^{2}] <100> (8-ring), [001] (12-ring)\}

Pore descriptor cavity D:
\{3 [4^{6}10^{3}12^{2}] <100> (10-ring), [001] (12-ring)\}

Figure 4. (a): Cavities, with their pore descriptors, in the 12-ring channels parallel to $c$ of type 1 (left) and type 2 (right) viewed along $<010>$ (i.e. along [010] or [100] or [110]). There are 8- and 10-ring channels parallel to $<010>$. [Figure 4 is continued on next page]
Figure 4 [Cont’d]. (b): Fused 12-ring channels viewed along <010> (left) and along c (right). 12-Ring channels of type 1 are interconnected to 12-ring channels of type 2 through common 8-rings (and 4-rings). The 12-ring channels of type 2 are interconnected through 10-rings.

5. Supplementary information:

Other framework types containing (modified) double 4-rings (D4Rs)

Double 4-rings (D4Rs) can be connected in several other ways. In some cases the 4-rings of the D4Rs are not 4-fold connected and/or additional T atoms are needed to build the framework. In the INTRO pages links are given to a detailed description of a sub-set of framework types that contain (modified) D4Rs (choose: Double 4-rings). There is also a link provided to a summary of the PerBUs used in the building schemes of these framework types (choose: Appendix; Figure 5).