



# Alvenarias de tijolos maciços comuns: materiais, técnicas e plástica.

Prof.<sup>a</sup> Dr.<sup>a</sup> Maria Augusta Justi Pisani

Faculdade de Arquitetura e Urbanismo da Universidade Presbiteriana  
Mackenzie  
Programa de Pós-graduação em Arquitetura e Urbanismo

Grupo de Pesquisa Arquitetura e Construção  
São Paulo  
Agosto de 2021



- **ABNT NBR 15270-1: 2017 Componentes cerâmicos – Blocos e tijolos para alvenaria Parte 1: Requisitos;**
- **ABNT NBR 15270-2:2017 Componentes cerâmicos – Blocos e tijolos para alvenaria Parte 2: Métodos de ensaios.**

**Dimensões mais comuns: 20cm (comprimento) x 10 cm. (largura) x 5 cm. (altura) - dependendo do fabricante – varia muito**  
**Peso: em torno de 2,5 kg por peça**



## Antigas Olarias do Estado de São Paulo Museu Virtual do Tijolo Cerâmico Antigo.



Identificadas na pesquisa - no Estado de São Paulo mais de **1.200 olarias**.

Porém esse número é muito, muito maior, por exemplo na região do grande ABC que compreende as cidades de São Caetano do Sul, São Bernardo do Campo, Santo André, Diadema, Ribeirão Pires e Rio Grande da Serra acredita-se que haviam mais de **800 olarias**.

Fonte:

<https://historiadasolariasdesaopaulo.blogspot.com/2019/09/a-lista-abaixo-das-antigas-olarias-da.html>

## Tijolos antigos - SP

Fonte: <https://historiadasolariasdesaopaulo.blogspot.com/2019/09/a-lista-abaixo-das-antigas-olarias-da.html>

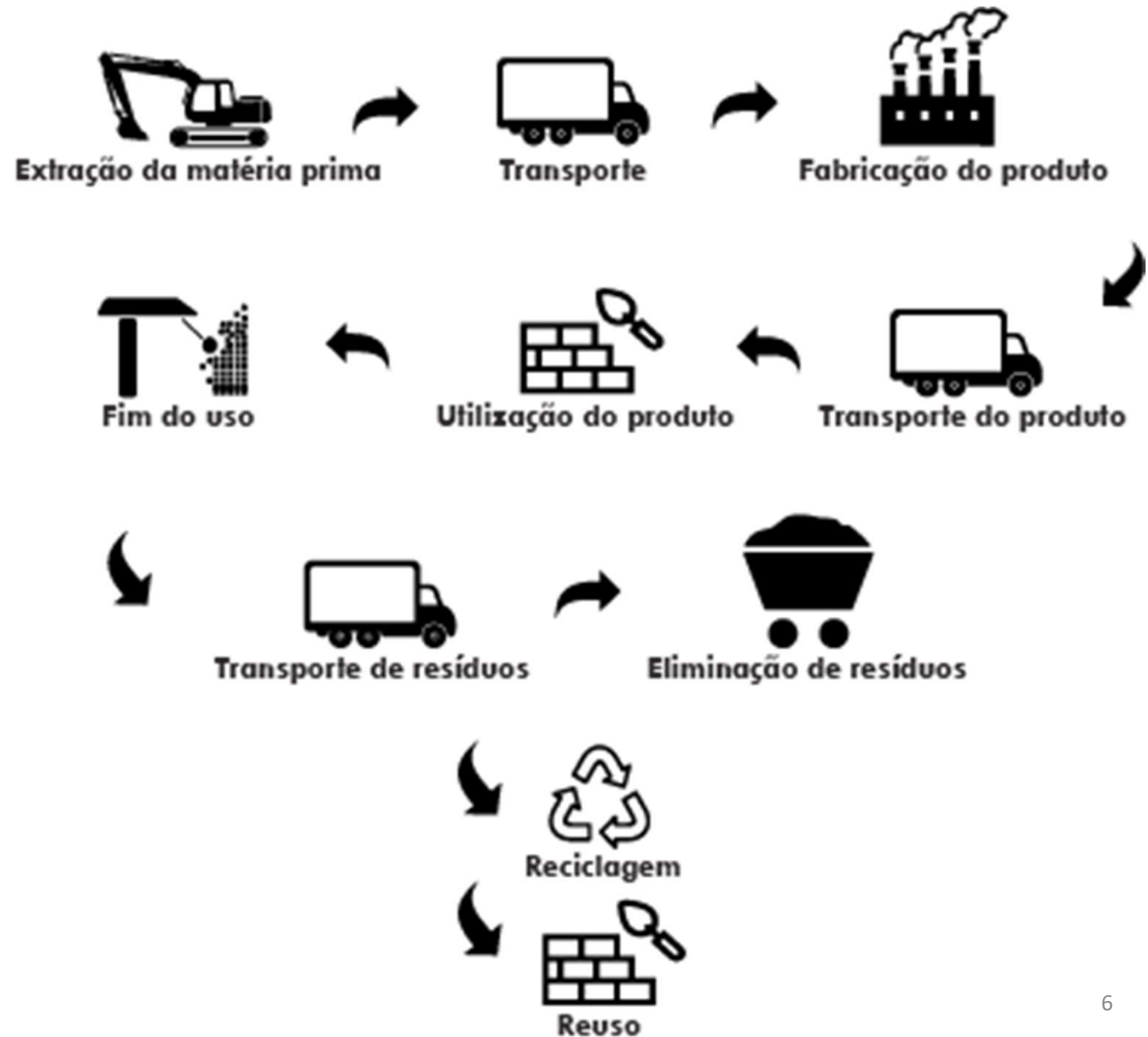


## OLARIAS ARTESANAIS E RÚSTICAS

Olaria em Guapó – Goiás Fonte: <https://www.rotajuridica.com.br/donos-de-olarias-sao-condenados-por-trabalho-analogo-ao-de-escravo/>

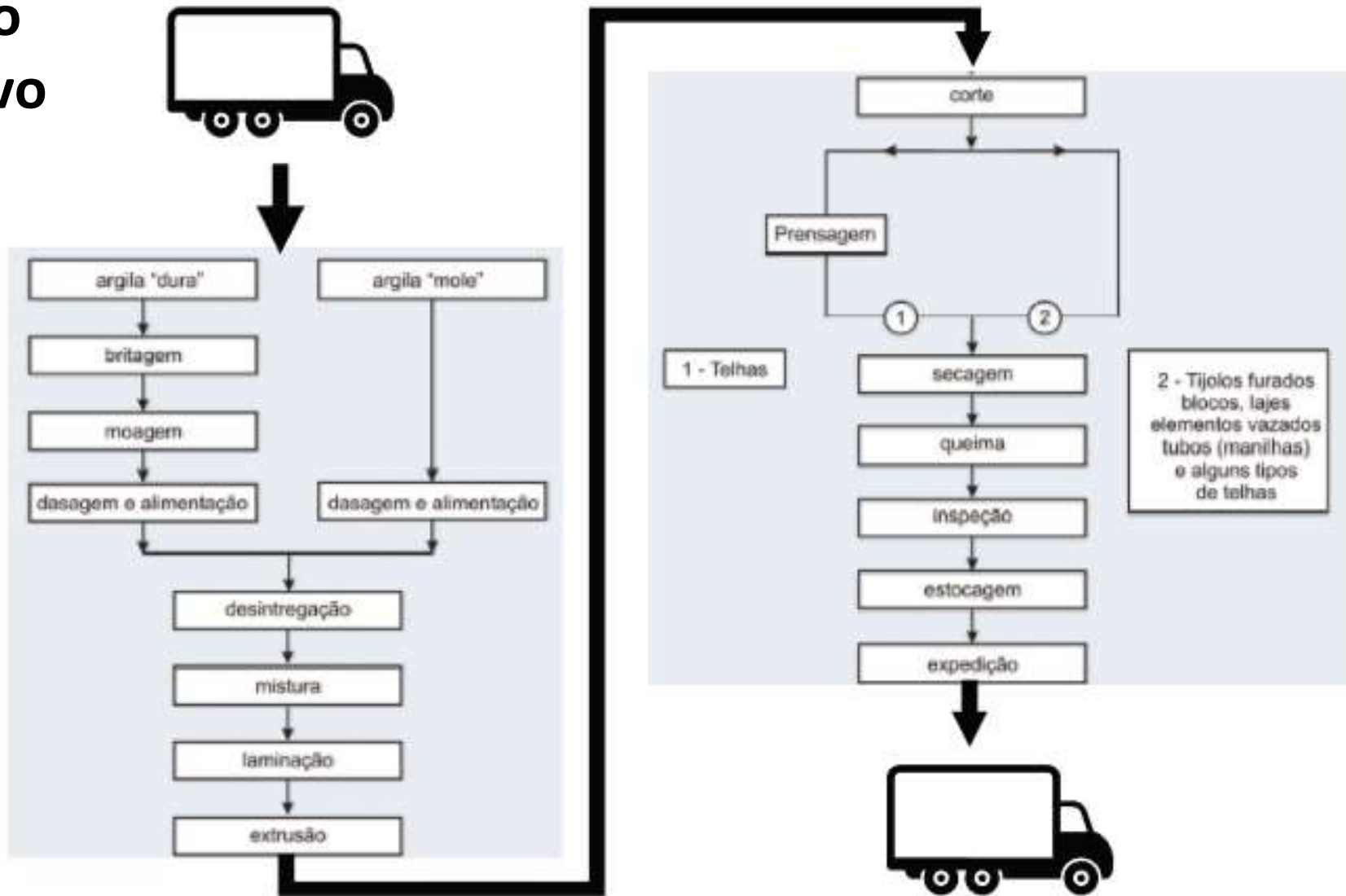


# Fluxograma Ciclo de Vida da cerâmica



Fonte:  
<https://materioteca.paginas.ufsc.br/ceramica-vermelha/>

# Processo Produtivo

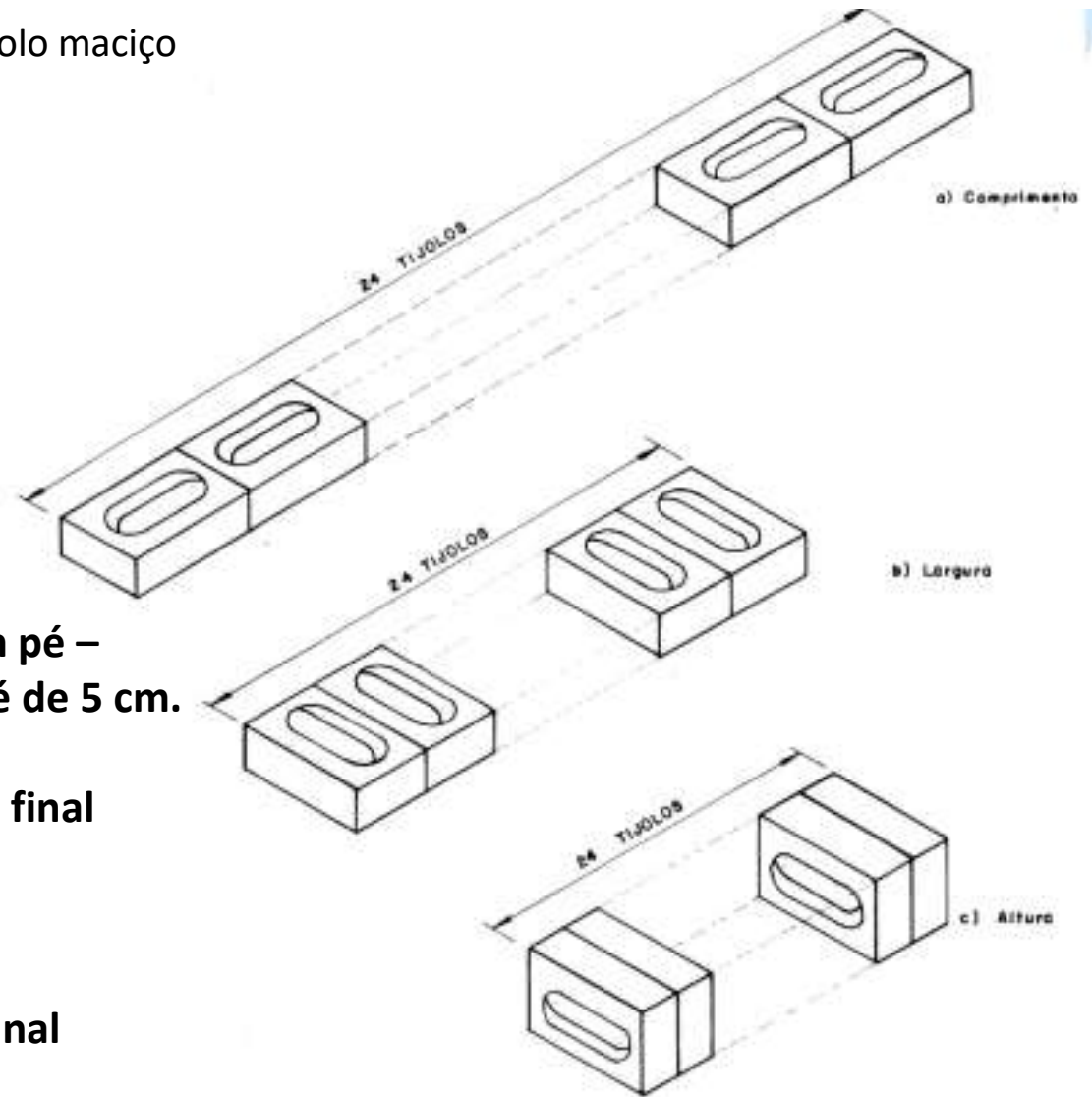


Processo de fabricação 0- Olaria Moretto & Moretto  
S.João Boa Vista – SP – filme.  
Fonte: [https://www.youtube.com/watch?v=f7TrhX\\_rlcw](https://www.youtube.com/watch?v=f7TrhX_rlcw)





Fonte da Imagem: NBR 7170:1983 (substituída) - Tijolo maciço cerâmico para alvenaria

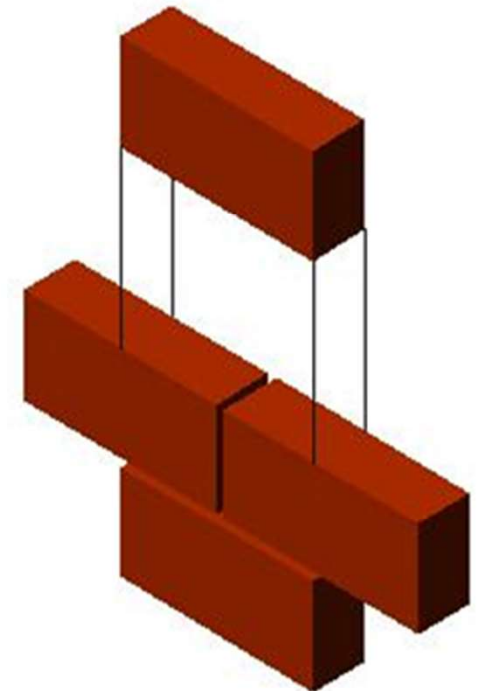
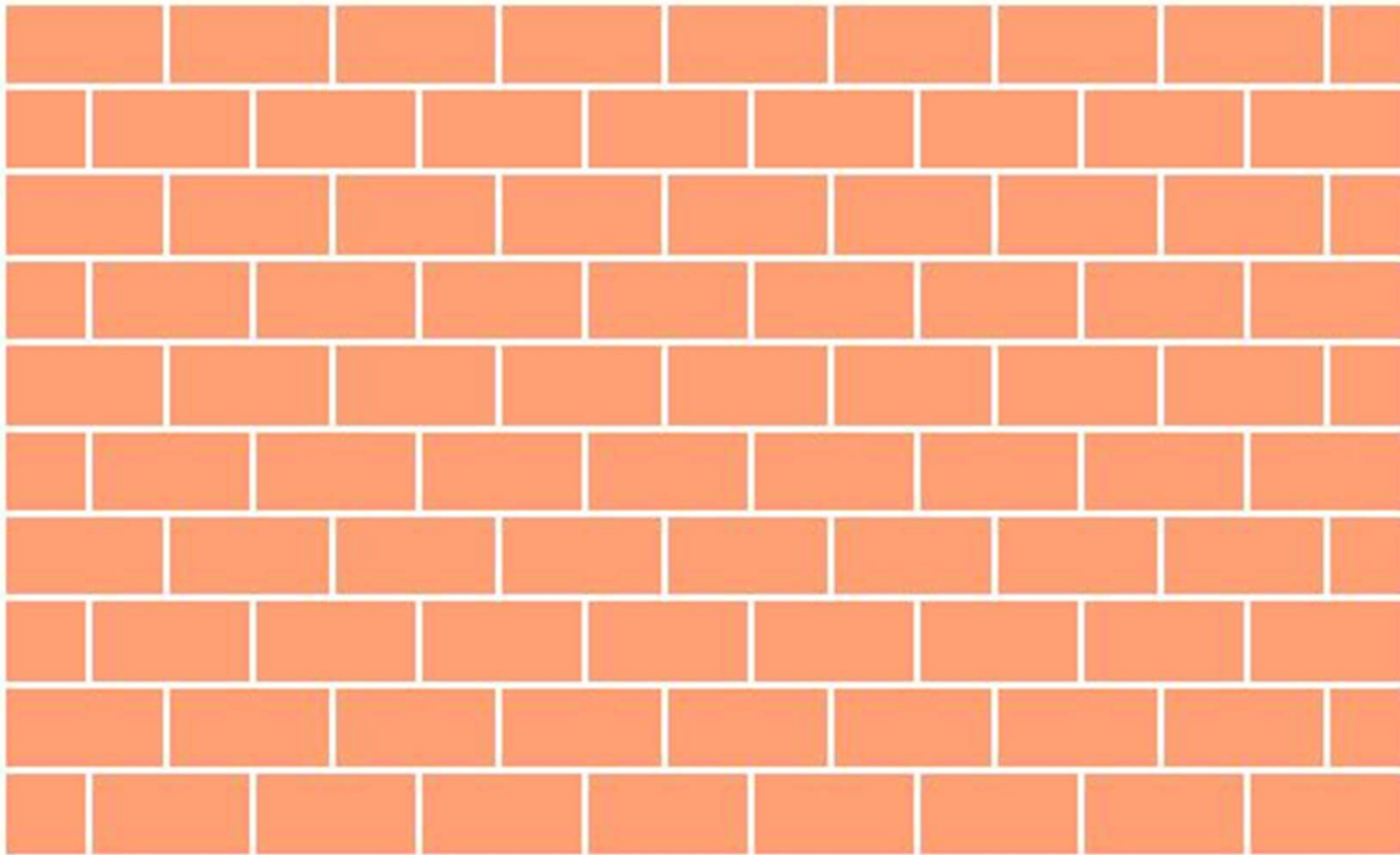


**Paredes de  $\frac{1}{4}$  de tijolo; a cutelo, espelho ou em pé – aquela cuja espessura final sem revestimento é de 5 cm.**

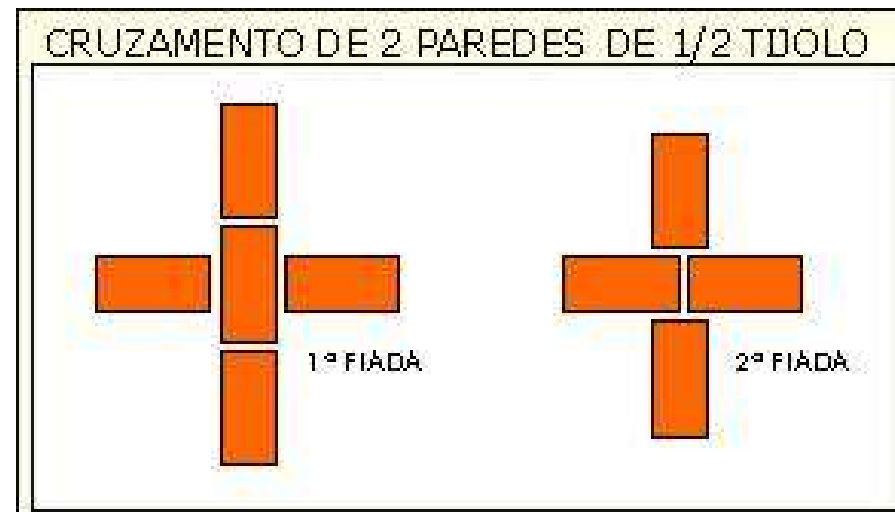
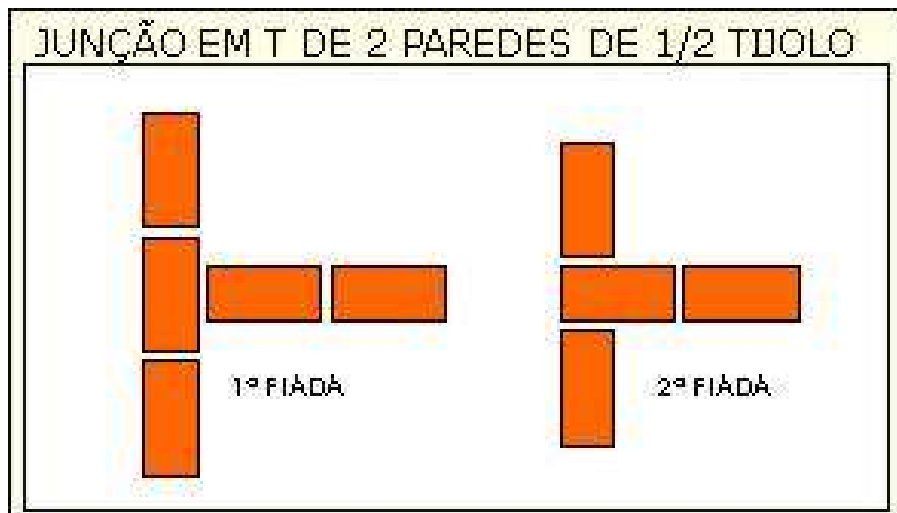
**Paredes de meio tijolo: aquelas com espessura final sem revestimento é de 10 cm.**

**Paredes de um tijolo: aquelas com espessura final Sem revestimento é de 20 cm.**

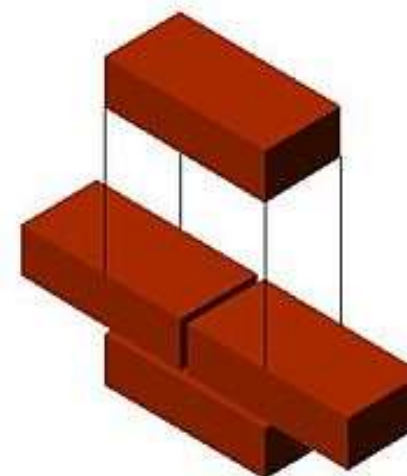
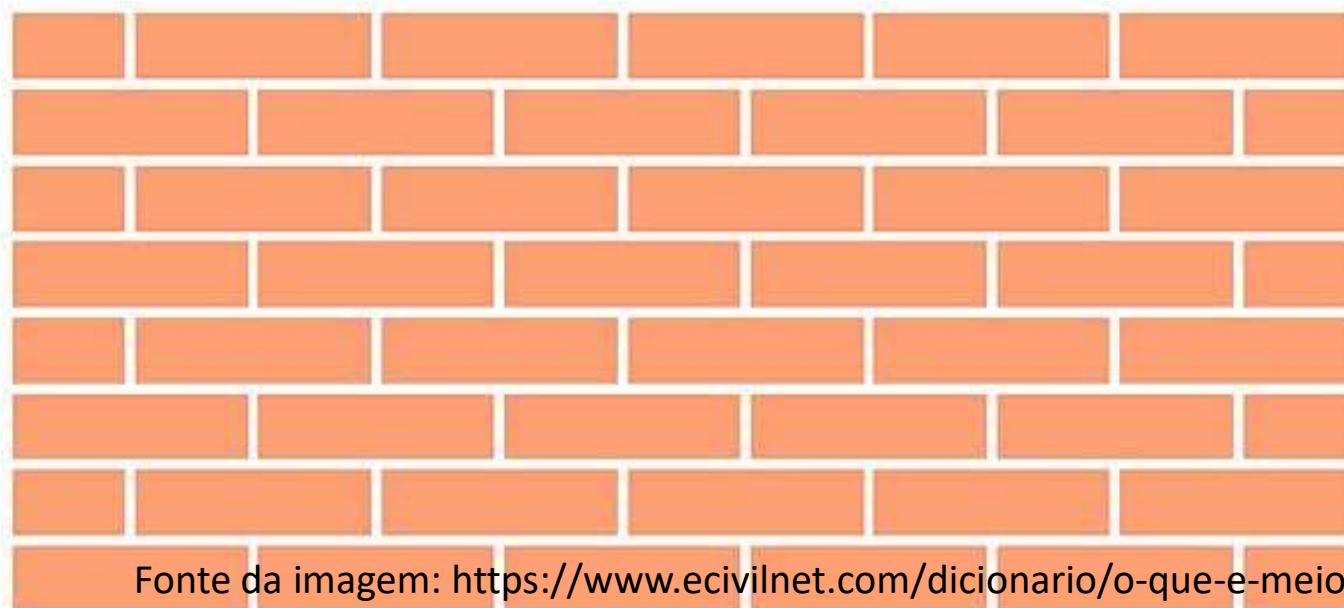
## Paredes de $\frac{1}{4}$ de tijolo; a cutelo, espelho ou em pé



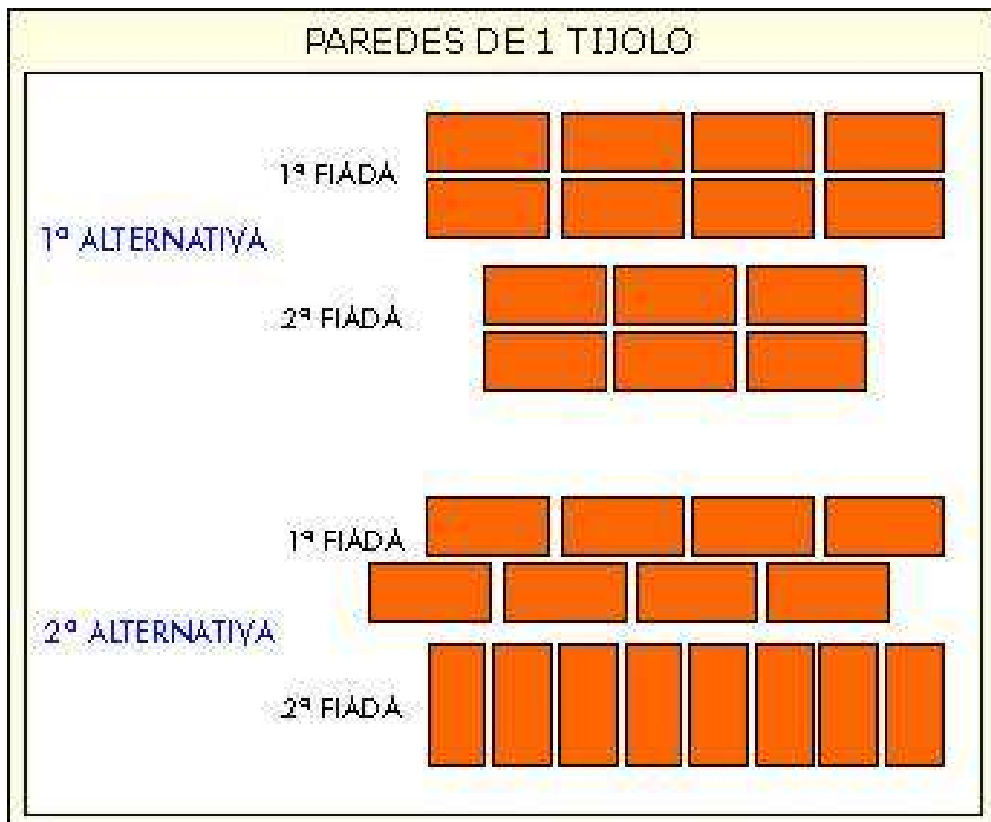
Fonte da imagem: [https://www.wikiwand.com/pt/Aparelho\\_\(arquitetura\)](https://www.wikiwand.com/pt/Aparelho_(arquitetura))

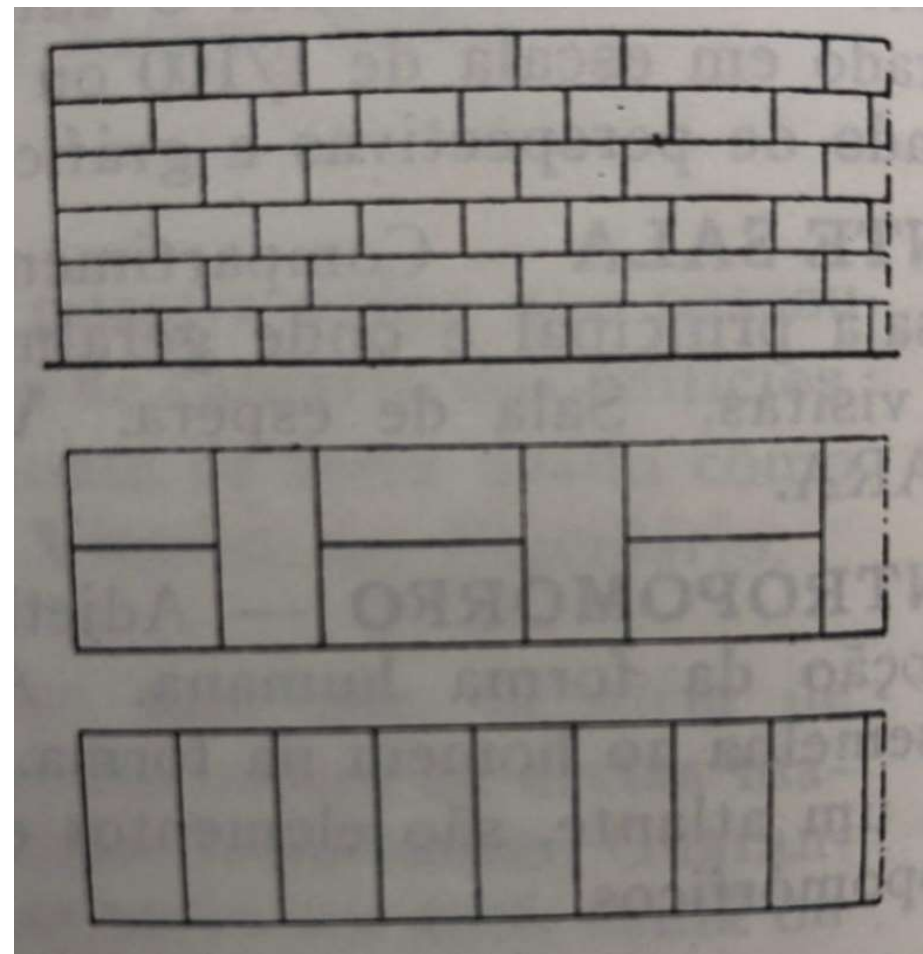
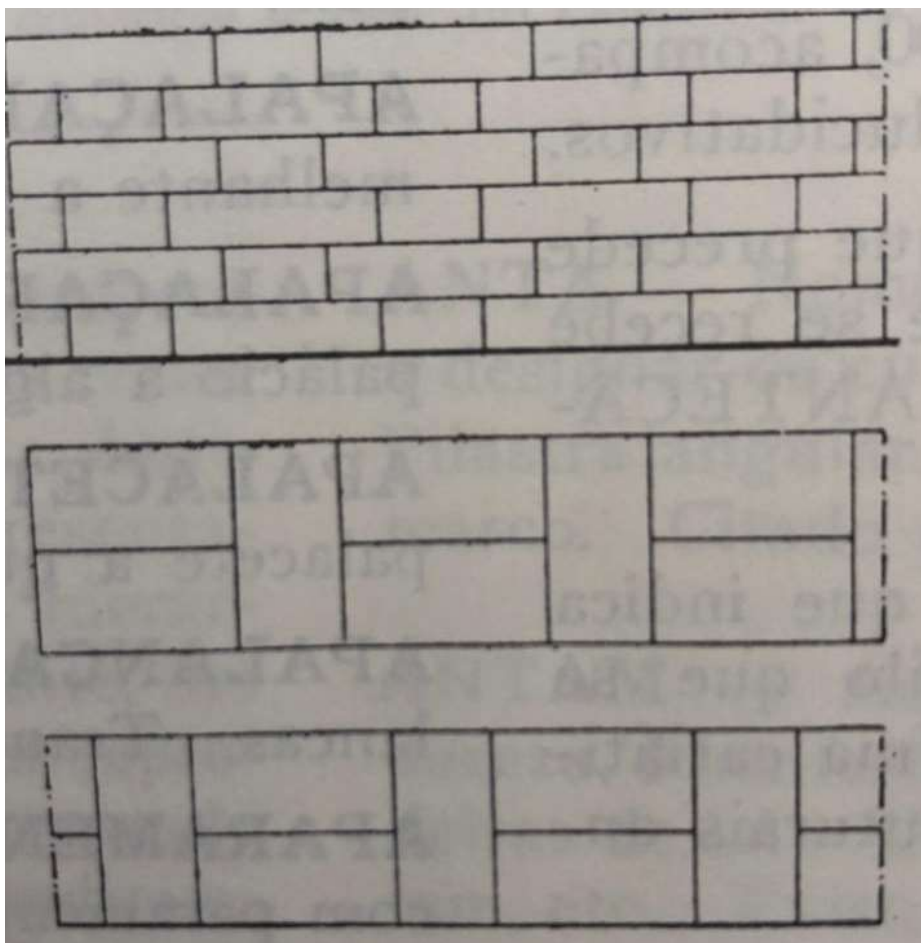


Fonte das imagens: <http://www.forumdaconstrucao.com.br/conteudo.php?a=7&Cod=97>



Fonte da imagem: <https://www.ecivilnet.com/dicionario/o-que-e-meio-tijolo.html>

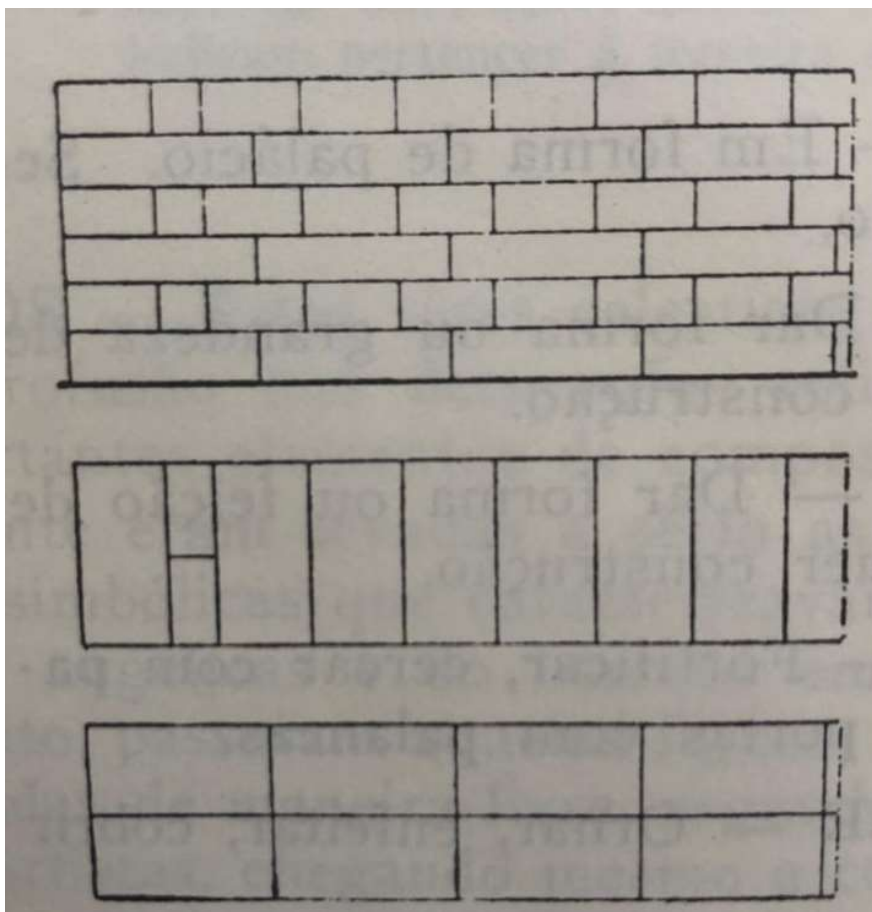




## Aparelho flamengo

Fonte: CORONA, Eduardo; LEMOS, Carlos A.C. **Dicionário da Arquitetura Brasileira**. São Paulo: Artshow Books Ltda., 2ª ed. 1989, p. 43-4

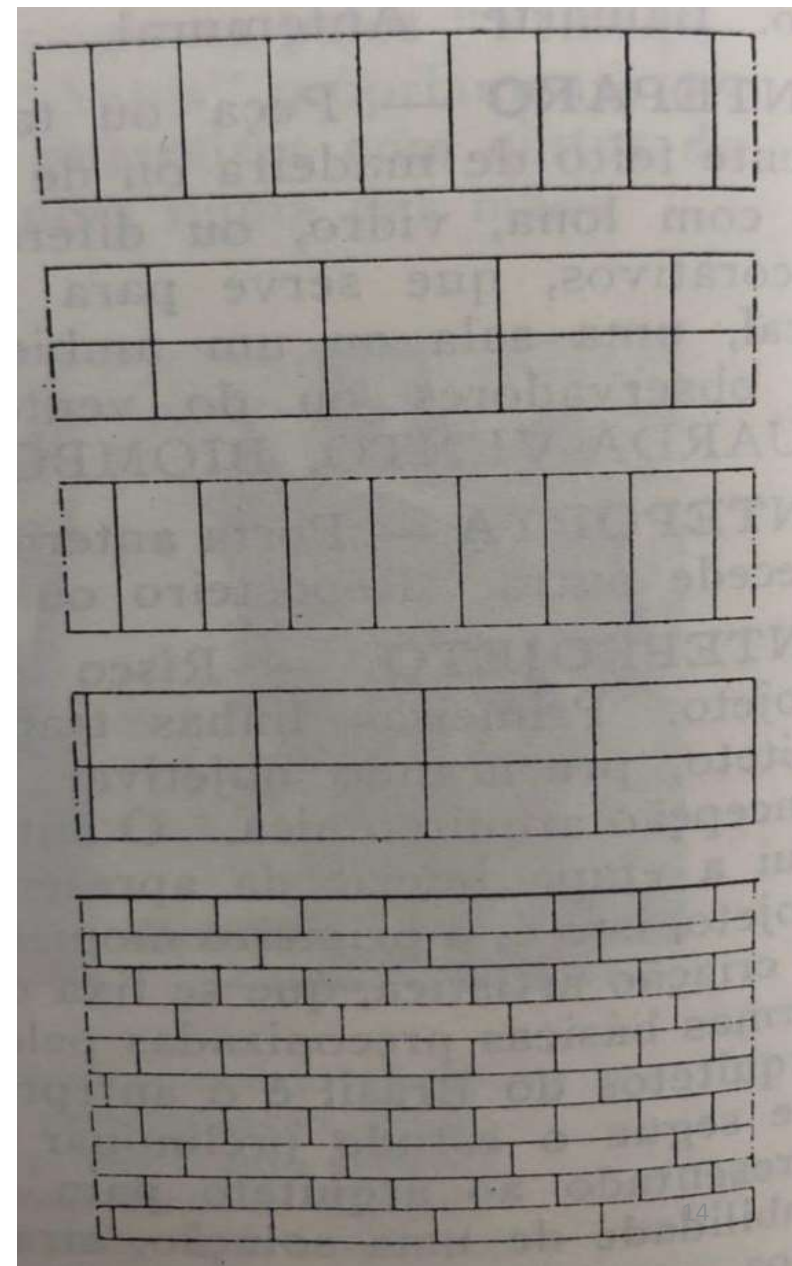
## Aparelho Holandês

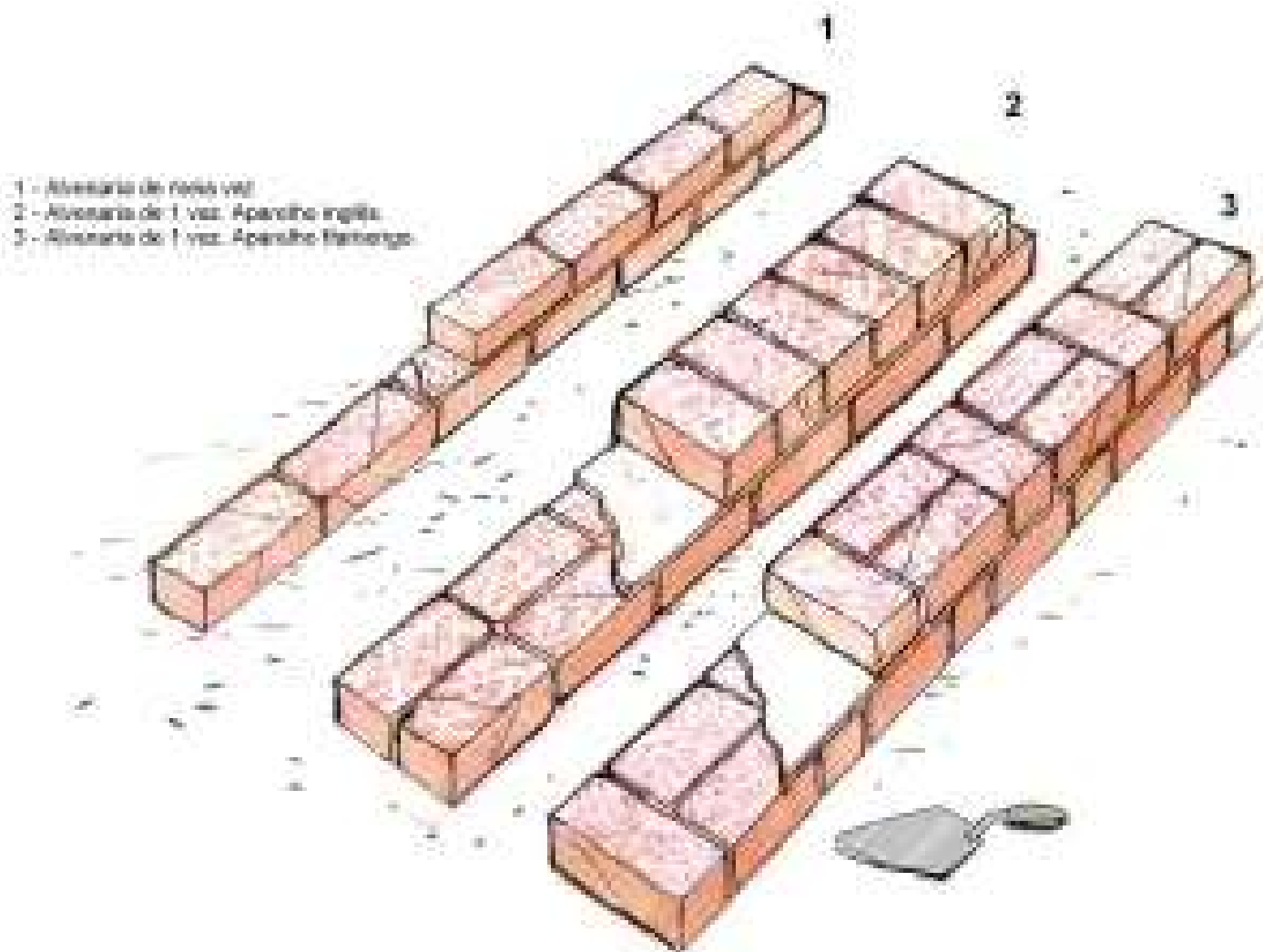


## **Aparelho Inglês**

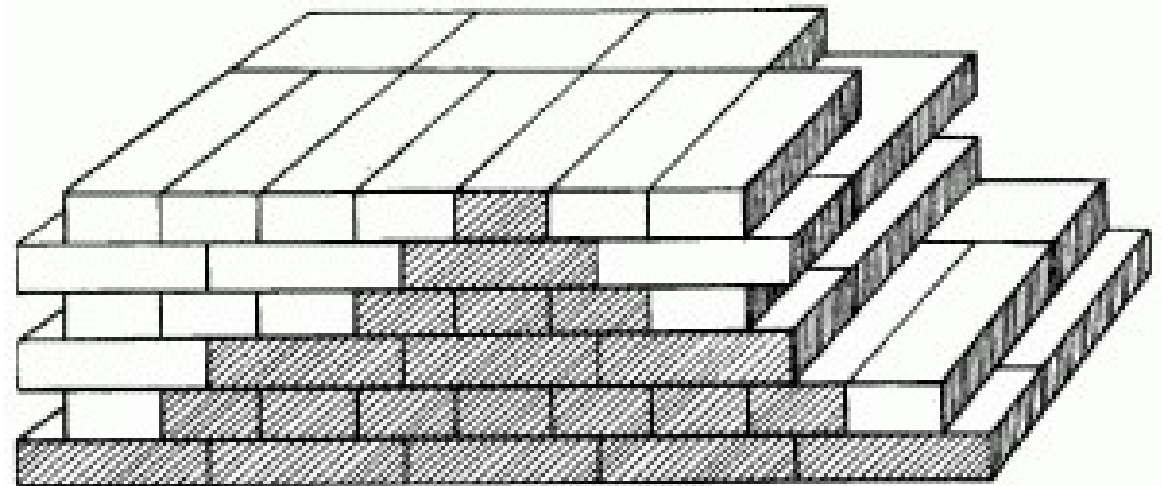
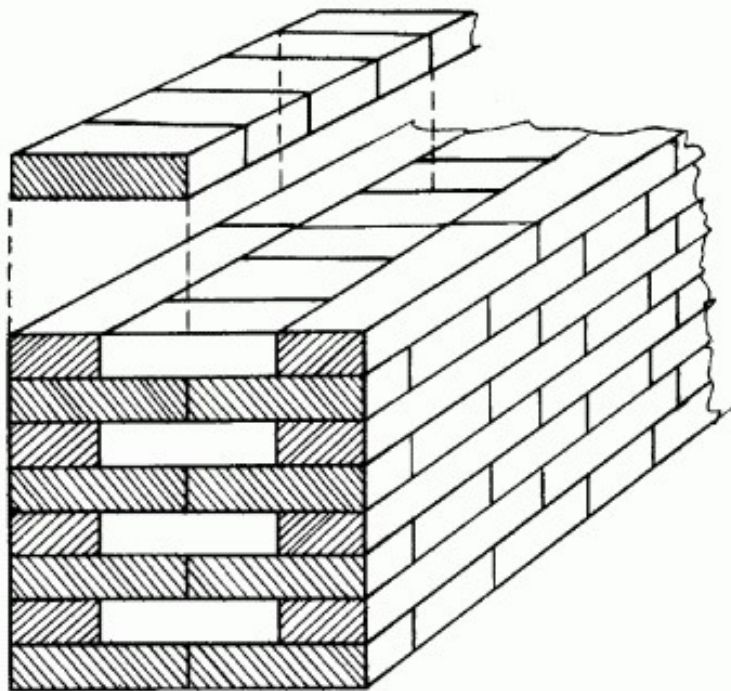
Fonte: CORONA, Eduardo; LEMOS, Carlos A.C. Dicionário da Arquitetura Brasileira. São Paulo: Artshow Books Ltda., 2ª ed. 1989, p. 43-4

## **Aparelho losangular >**



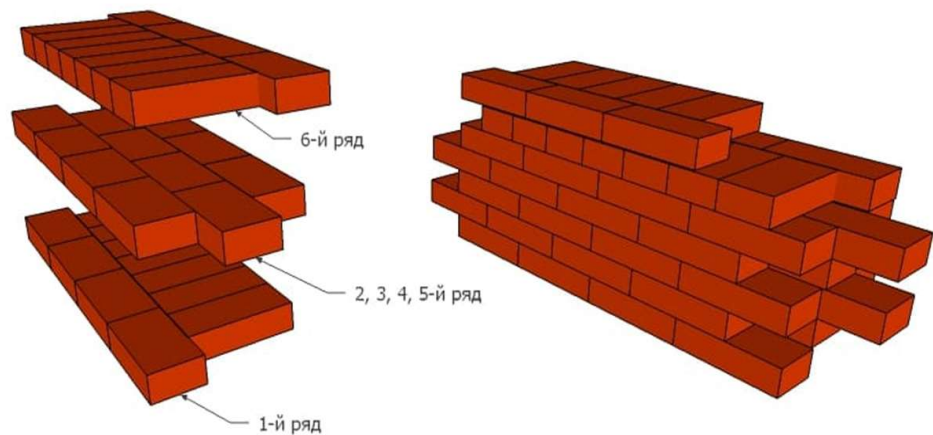


<https://coisasdaarquitectura.wordpress.com/2010/09/06/tecnicas-construtivas-do-periodo-colonial-i/>



Кирпича (tijolos) Tijolo ou fundação de pedra.  
[http://www.dom-spravka.info/\\_dom\\_stroim/fund\\_12.html](http://www.dom-spravka.info/_dom_stroim/fund_12.html)



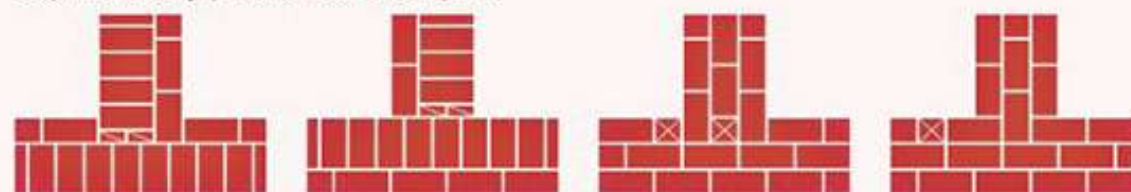


SDVOR. KLADKA KIRPICHA SVOIMI RUKAMI:  
 KAK PRAVIL'NO, 2020 . Disponível em:  
<https://www.sdvor.com/articles/kladka-kirpicha-svoimi-rukami-kak-pravilno/>

Схема многорядной кладки в 1,5 кирпича



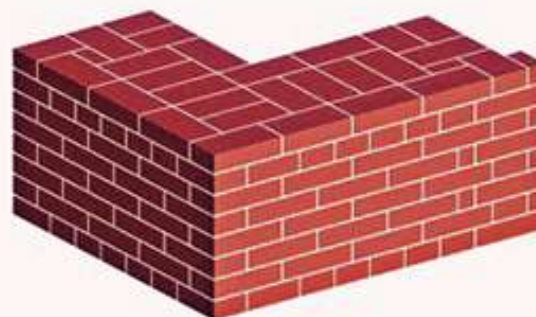
Сопряжение с внутренней стеной в 1,5 кирпича



Сопряжение с внутренней стеной в 1 кирпич

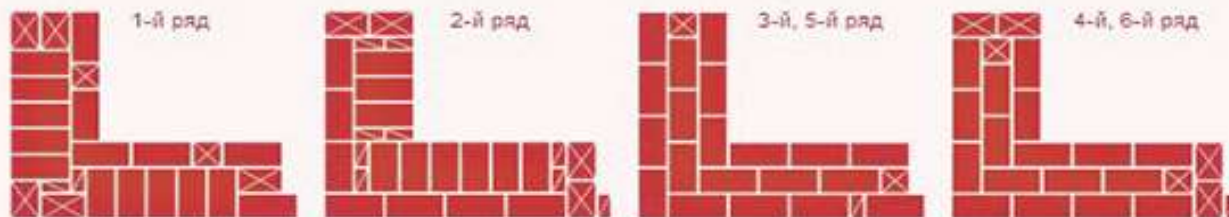


Многорядная кладка в 2 кирпича - 510мм

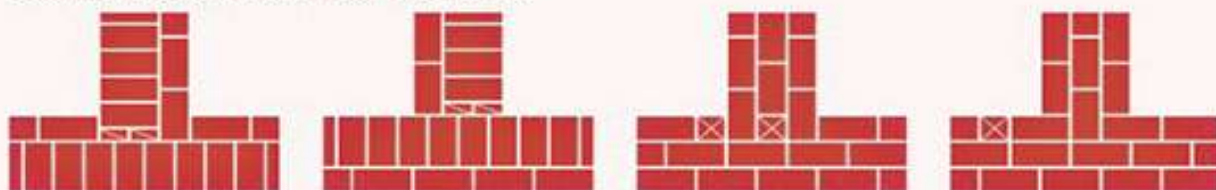


Параметры сплошной кладки в 2 кирпича	
Расход кирпича на м2 кладки	Расход раствора на м2 кладки
Одинарный - 204 шт	Раствор - 0,122 м3
Полуторный - 156 шт	Раствор - 0,113 м3

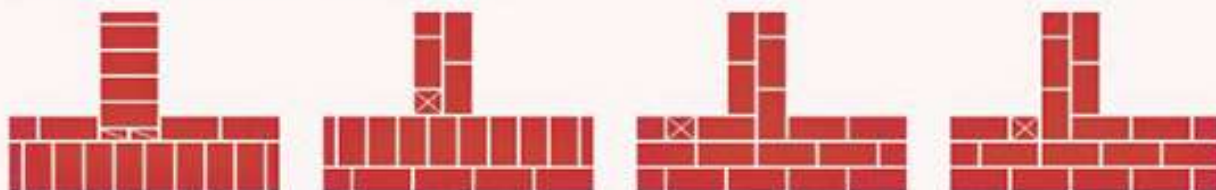
Схема многорядной кладки в 1,5 кирпича



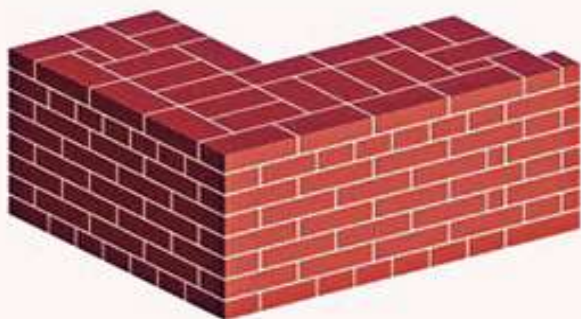
Сопряжение с внутренней стеной в 1,5 кирпича



Сопряжение с внутренней стеной в 1 кирпич



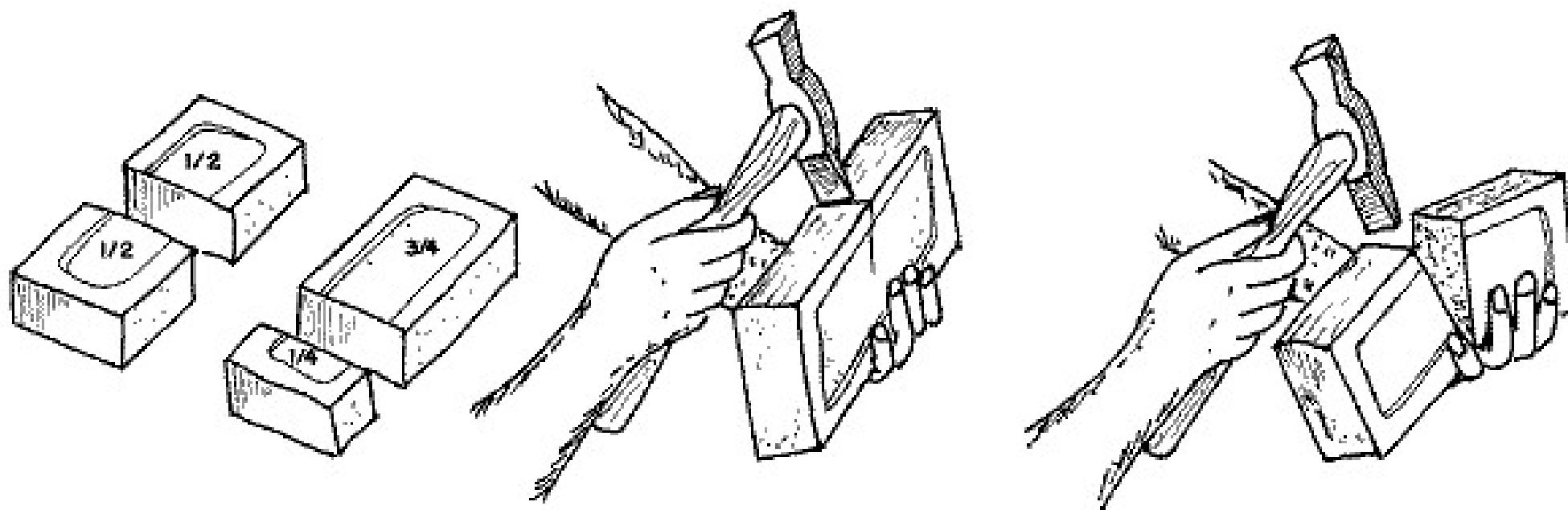
Многорядная кладка в 2 кирпича - 510мм



Параметры сплошной кладки в 2 кирпича

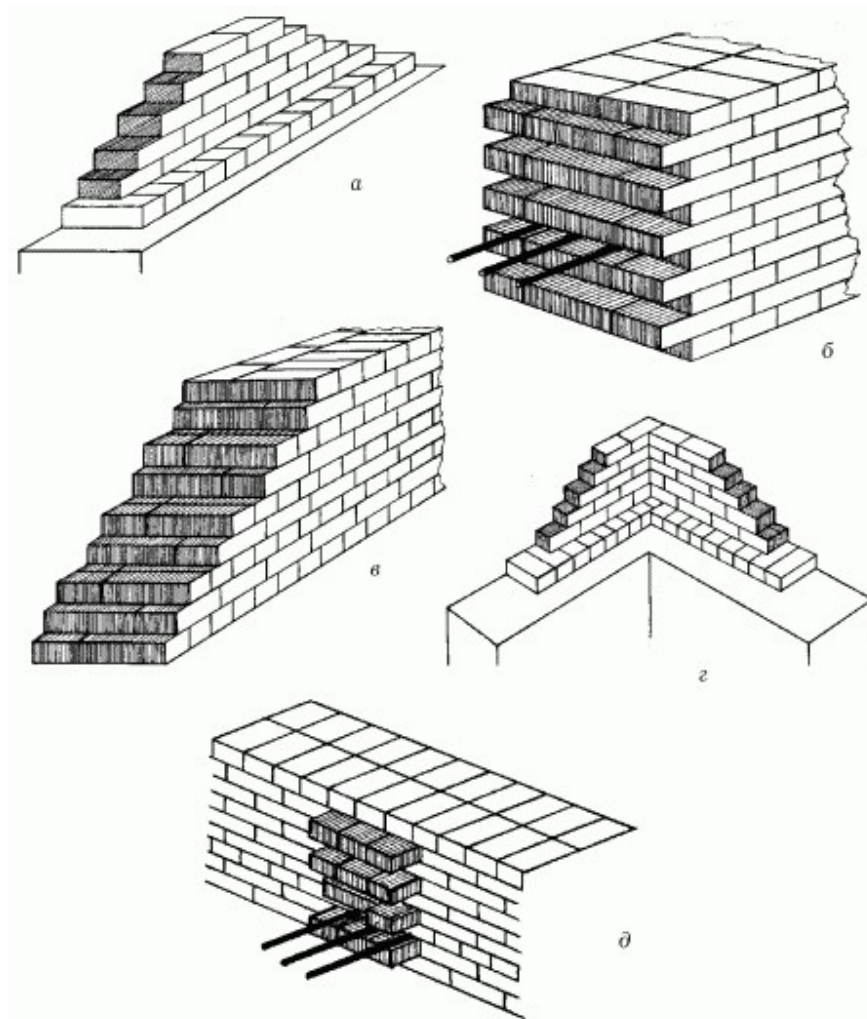
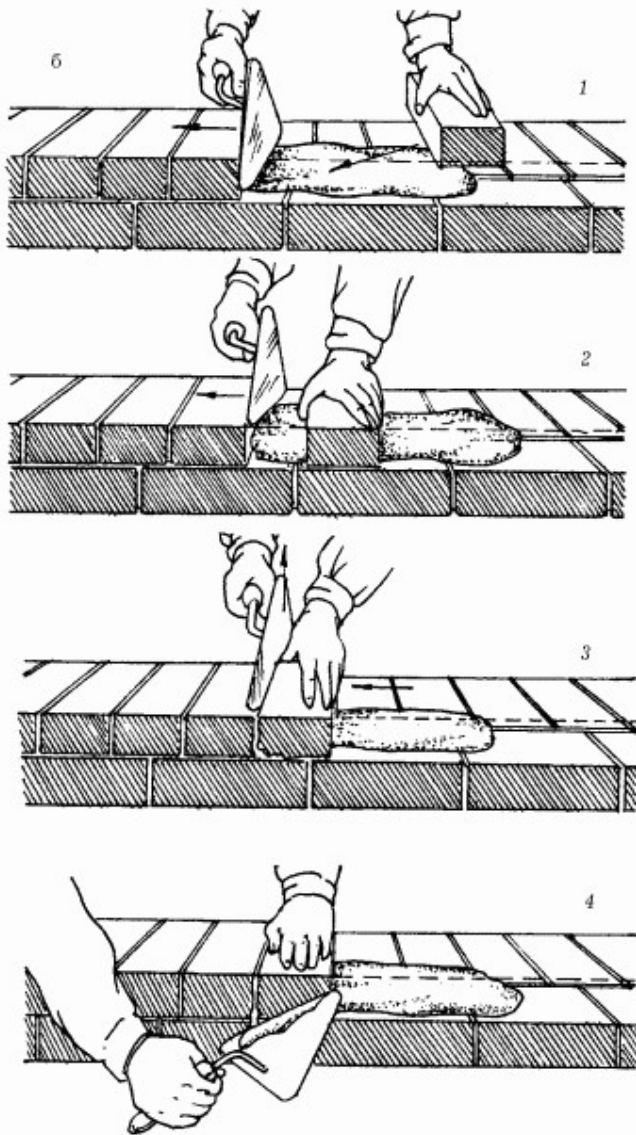
Расход кирпича на м2 кладки	Расход раствора на м2 кладки
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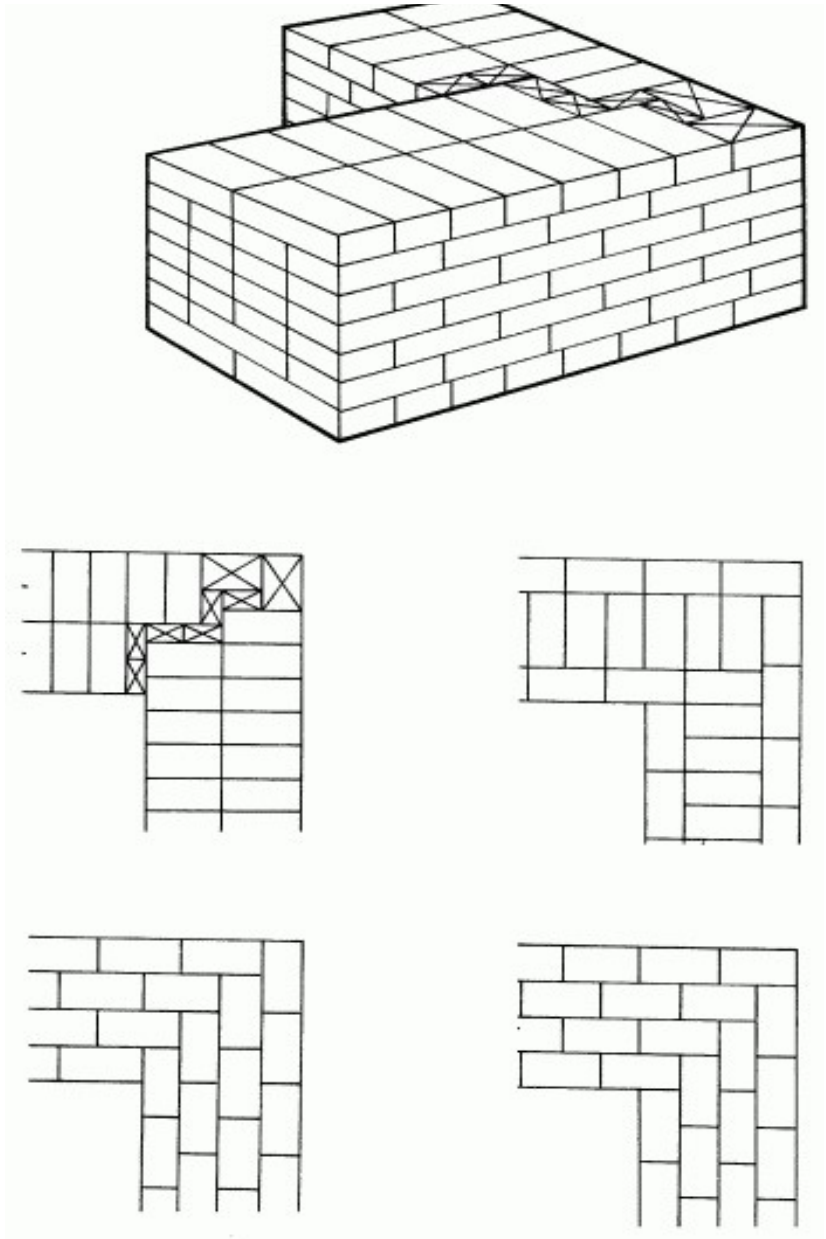
<https://www.sdvor.com/articles/kladk-a-kirpicha-svoimi-rukami-kak-pravilno/>



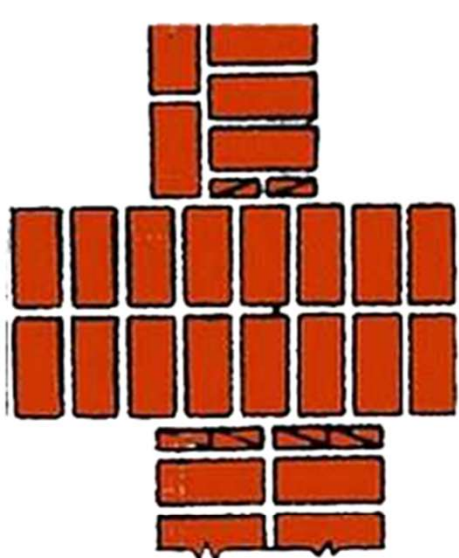
Fonte: CONSTRUÇÃO CIVIL. Paredes de tijolos maciços: Cortes em tijolos maciços, jul. 2011. Disponível em: <https://construcaociviltips.blogspot.com/2011/07/paredes-de-tijolos-macicos-cortes-em.html>

[http://www.dom-spravka.info/\\_dom\\_stroim/fund\\_12.html](http://www.dom-spravka.info/_dom_stroim/fund_12.html)

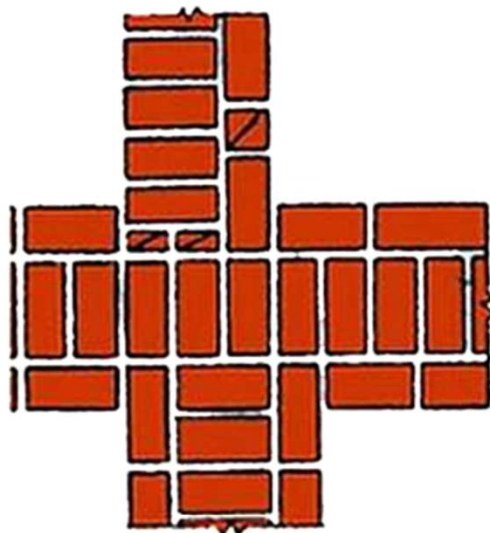




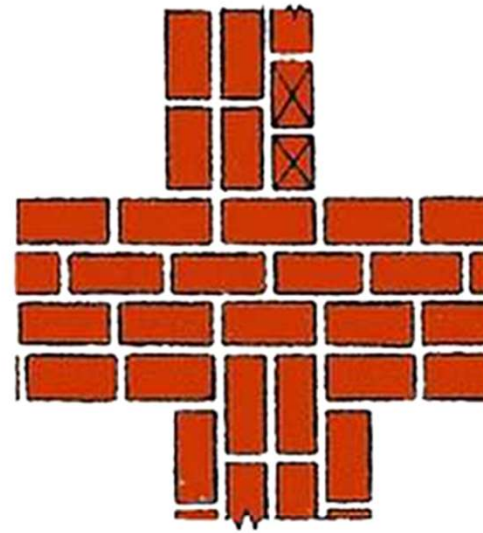
[http://www.dom-spravka.info/\\_dom\\_stroim/fund\\_12.html](http://www.dom-spravka.info/_dom_stroim/fund_12.html)



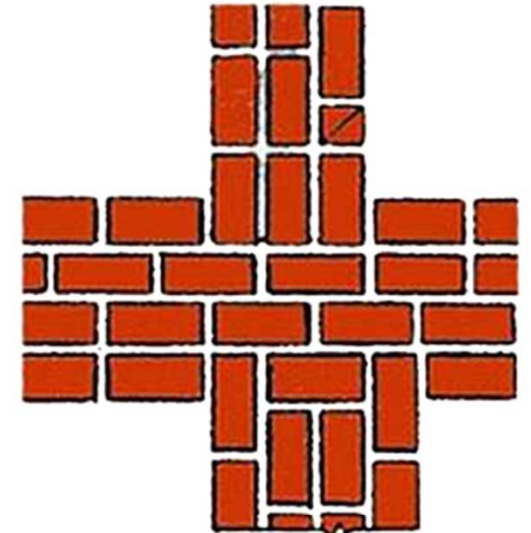
1 ряд



2 ряд

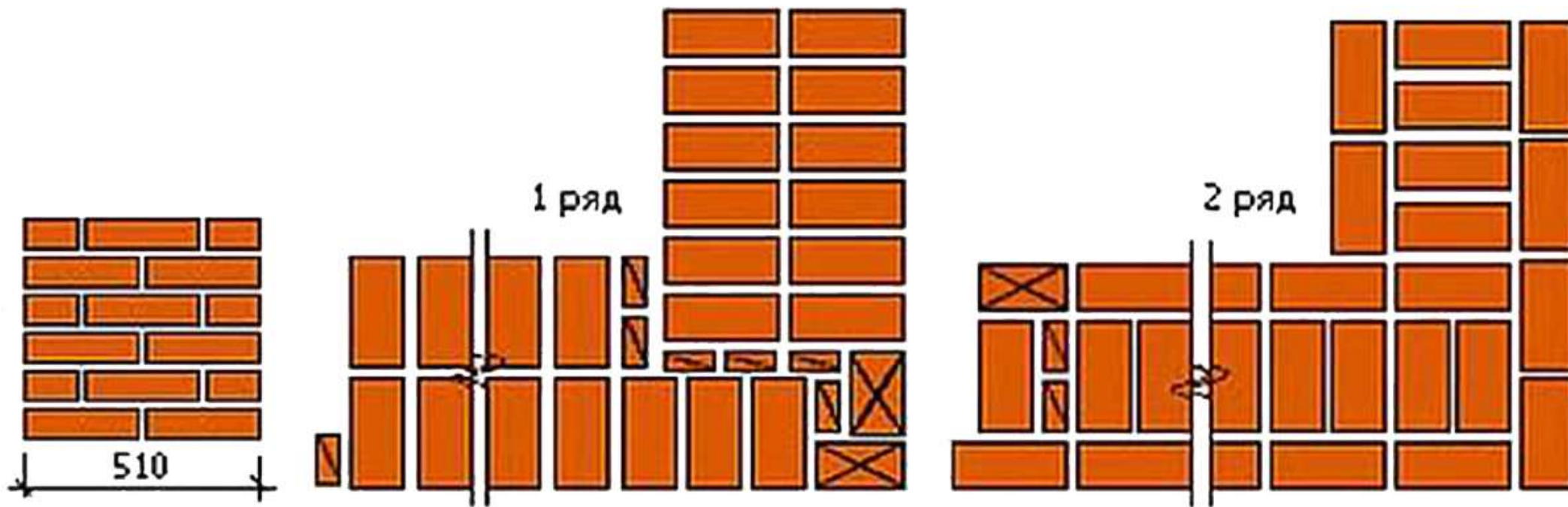


3 и 5 ряды



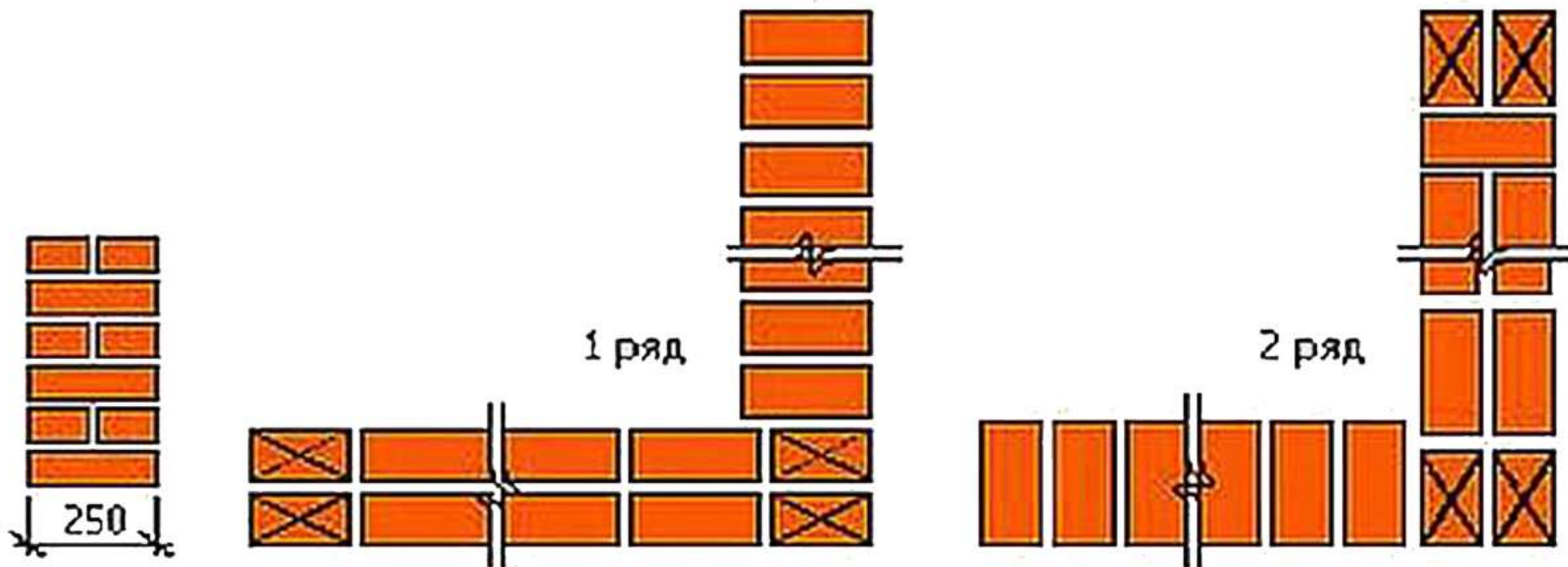
4 и 6 ряды

<https://www.sdvor.com/articles/kladka-kirpicha-svoimi-rukami-kak-pravilno/>



<https://www.sdvor.com/articles/kladka-kirpicha-svoimi-rukami-kak-pravilno/>

<https://www.sdvor.com/articles/kladka-kirpicha-svoimi-rukami-kak-pravilno/>







Tijolos com canto arredondado

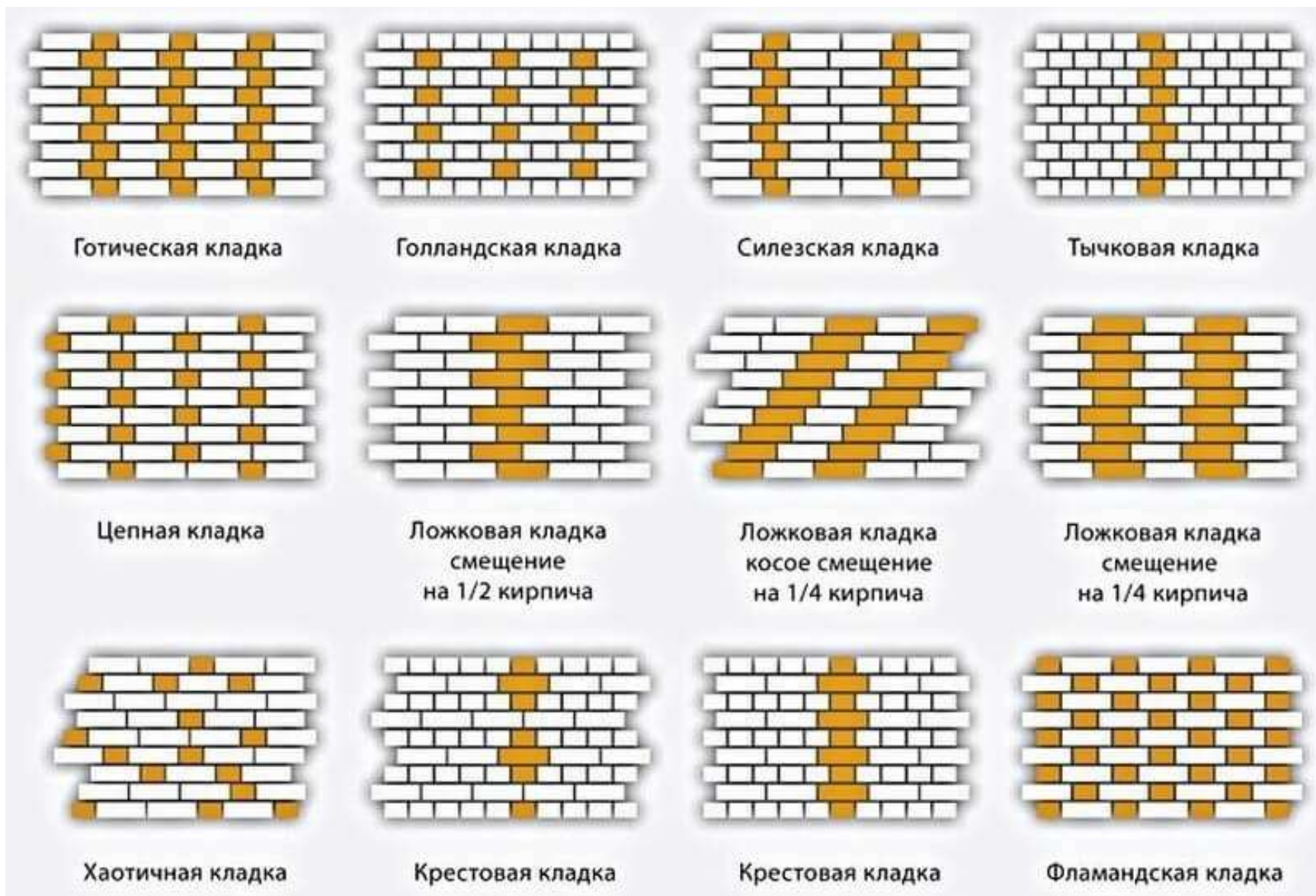
<https://madeigonmaterialconstrucao.com.br/index.php/online-store/material-de-constru%C3%A7%C3%A3o/tijolo-maci%C3%A7o-detail>



padrões diferentes criados alternando os lados e a extremidade. Uma delas é a alvenaria **bávara**, quando se utilizam blocos de cores diferentes.

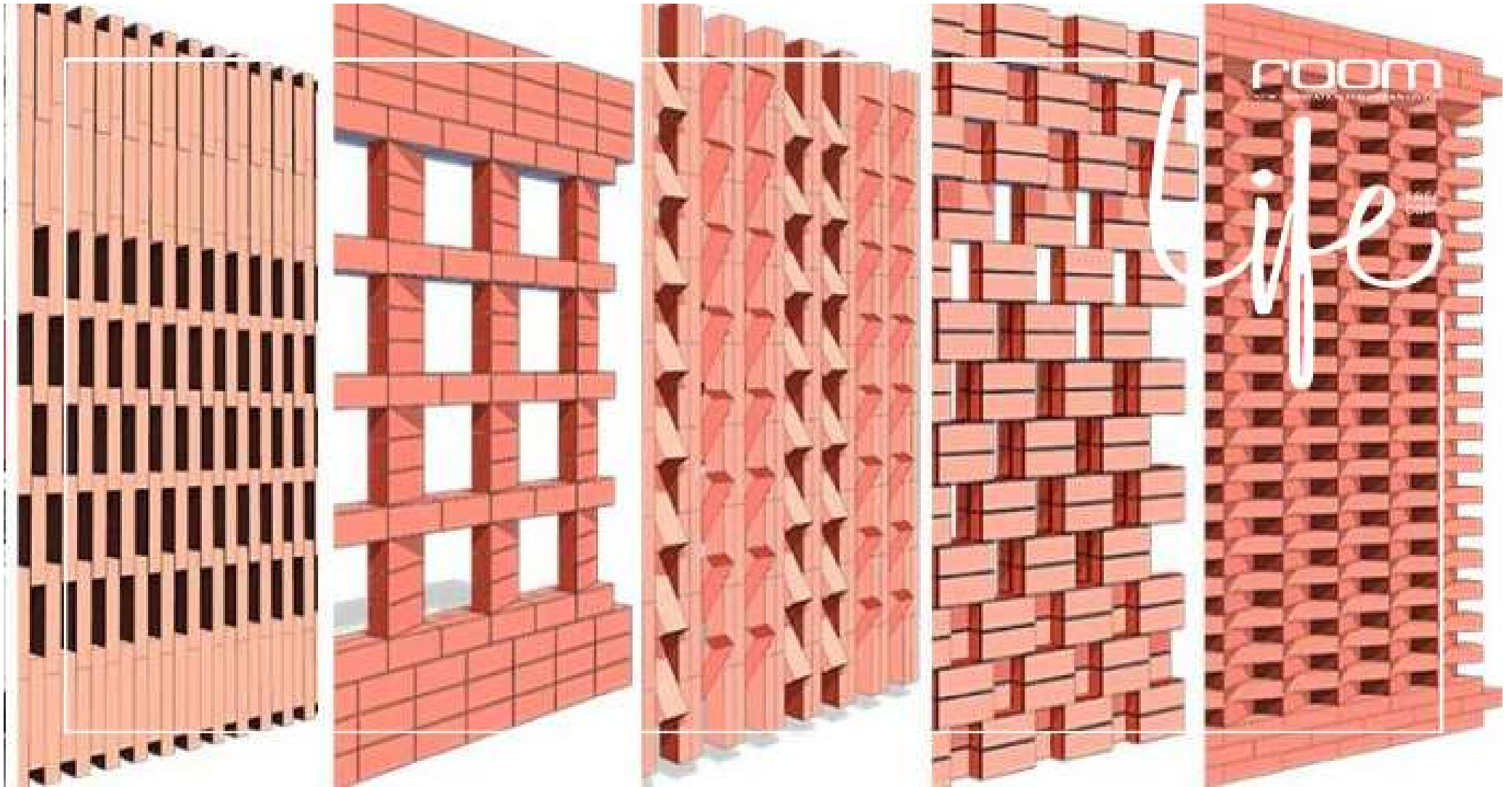
Os bávaros são originários da Alemanha (Boêmia) no território da atual República Tcheca.

<https://xn----btbhikcou3am7k.xn--p1ai/blog/vidyi-kladki-obliczovohnogo-kirpicha/>









<https://www.baanlaesuan.com/10562/ideas/house-ideas/brick-by-brick>



<http://www.valegandara.com/detalheproduto?idproduto=38&idcategoria=7>

A invenção desse muro ondulado é creditada a Thomas Jefferson.

<https://rcmm.ru/stroitelnye-materialy/50662-kirpichgazobeton-kto-kogo.html>





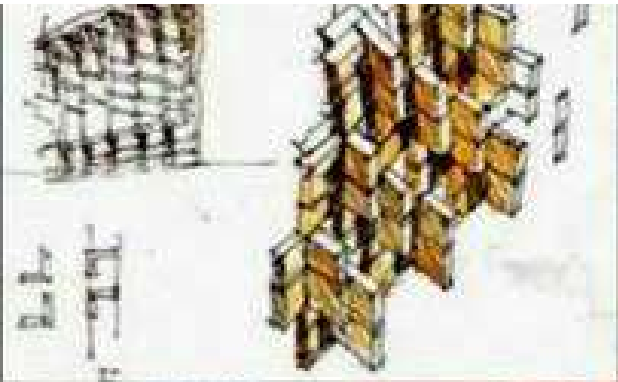


**Posto de Saúde / Estudio ELGUE -San Juan de Villa Oliva,  
Ñeembucú, Paraguai - 2012**

<https://www.baanlaesuan.com/10562/ideas/house-ideas/brick-by-brick>







<https://www.facebook.com/Architecture357/photos/a.1310401639021840.1073741882.1017954584933215/1310402069021797>

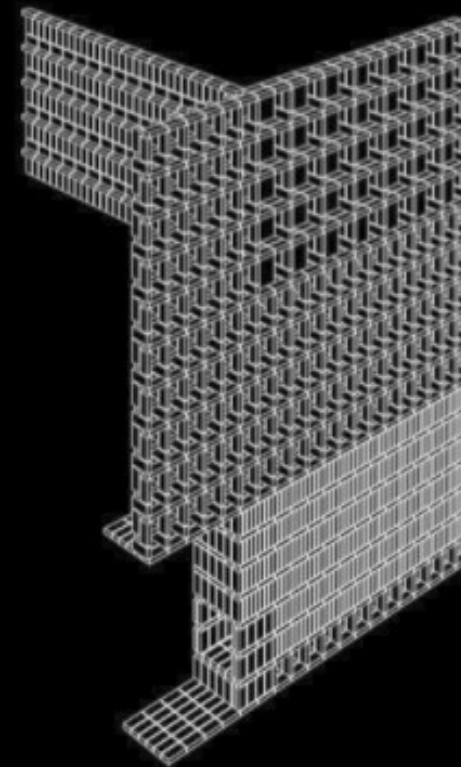
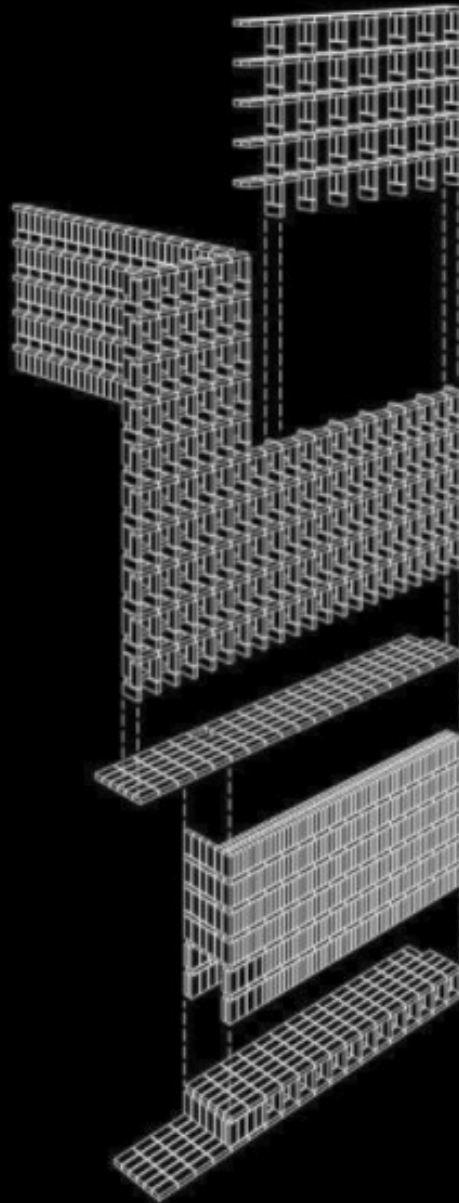
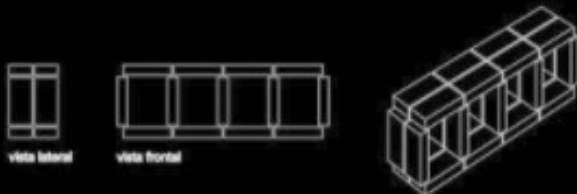
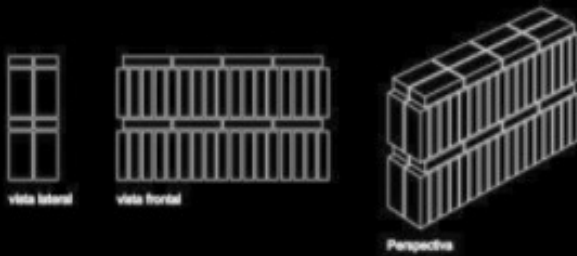
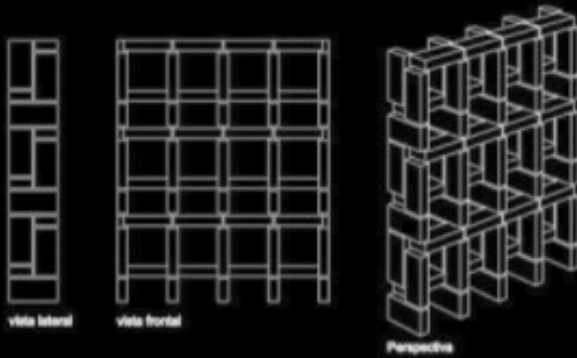
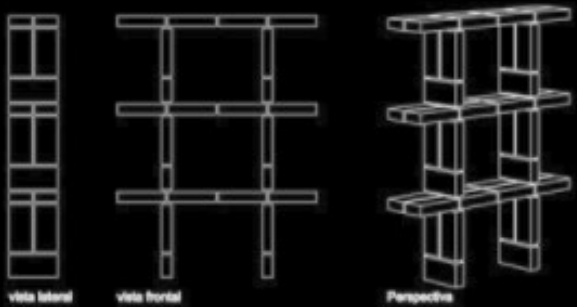


[https://www.flickr.com/photos/picture\\_taker/6248801614/](https://www.flickr.com/photos/picture_taker/6248801614/) <sup>36</sup>



## Detalhes construtivos apresentam 16 formas de assentar tijolos

[https://www.archdaily.com.br/br/797614/16-detalhes-construtivos-de-aparelhamento-de-tijolos/57ffe012e58ece518e0000fd-16-details-of-impressive-brickwork-photo?next\\_project=no](https://www.archdaily.com.br/br/797614/16-detalhes-construtivos-de-aparelhamento-de-tijolos/57ffe012e58ece518e0000fd-16-details-of-impressive-brickwork-photo?next_project=no)



[https://www.archdaily.com.br/br/797614/16-detalhes-construtivos-de-aparelhamento-de-tijolos/57ffe012e58ece518e0000fd-16-details-of-impressive-brickwork-photo?next\\_project=no](https://www.archdaily.com.br/br/797614/16-detalhes-construtivos-de-aparelhamento-de-tijolos/57ffe012e58ece518e0000fd-16-details-of-impressive-brickwork-photo?next_project=no)



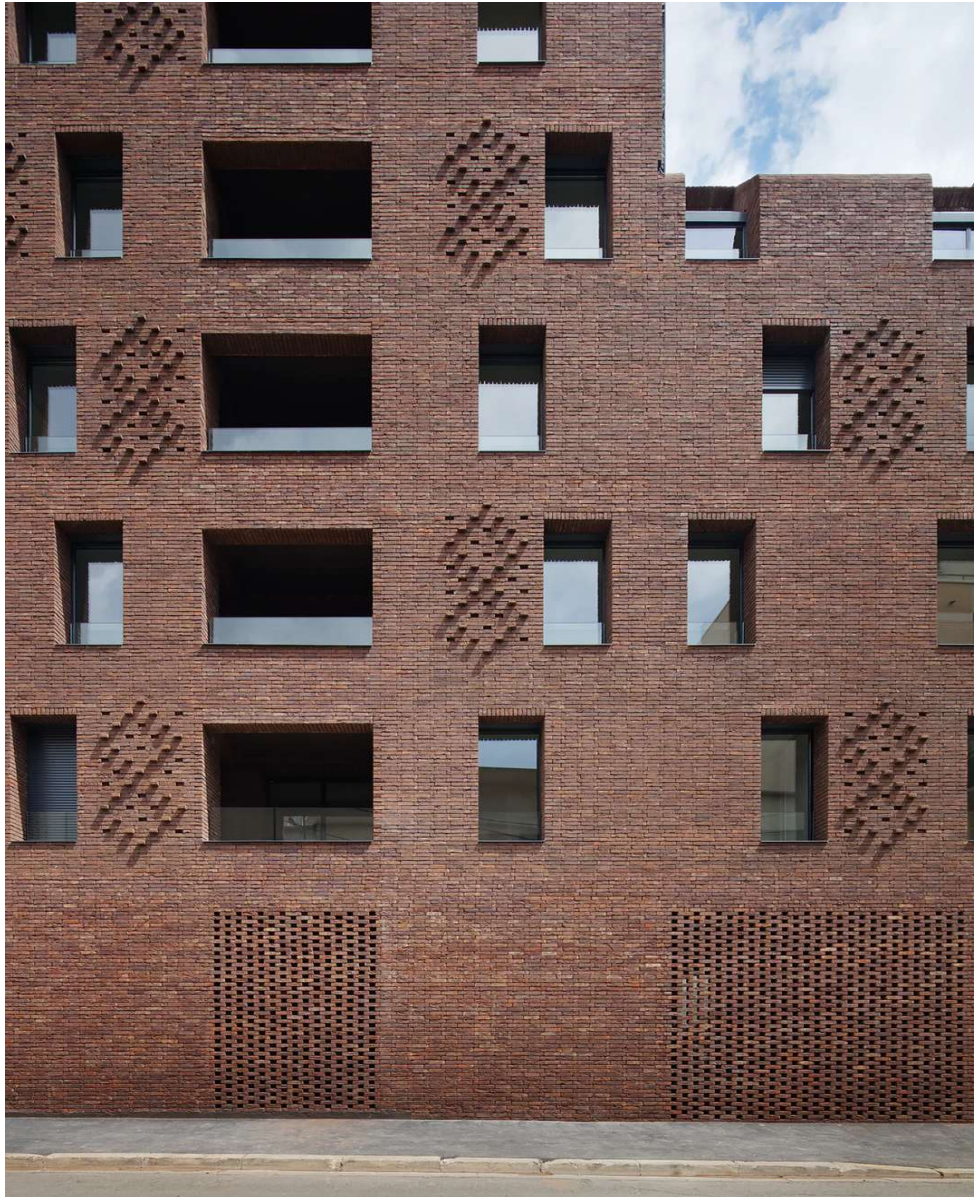
Detalhe de construção Russa (vernacula)

[http://www.nepole.ru/generait/chertji\\_rus\\_got/051\\_foto\\_kvadrata\\_postroennogo\\_v\\_modulnyh\\_razmerah\\_kirpichnoj\\_kladki.html](http://www.nepole.ru/generait/chertji_rus_got/051_foto_kvadrata_postroennogo_v_modulnyh_razmerah_kirpichnoj_kladki.html)



[http://www.nepole.ru/generait/yablako\\_v\\_malahovke/02\\_kirpichnye\\_arki\\_strojatsja\\_s\\_pomoshhju\\_prostyh\\_podporok.html](http://www.nepole.ru/generait/yablako_v_malahovke/02_kirpichnye_arki_strojatsja_s_pomoshhju_prostyh_podporok.html)





38 Housing Units by Avenier  
Cornejo Architectes, Clichy,  
France [https://architizer.com/  
blog/inspiration/collections/f  
acing-brick-extrusion/](https://architizer.com/blog/inspiration/collections/facing-brick-extrusion/)

Ngamwongwan House by Junsekino Architecture & Design,  
Bangkok, Thailand  
<https://architizer.com/blog/inspiration/collections/facing-brick-extrusion/>





<https://www.yellowtrace.com.au/high-rise-brick-masonry-architecture/>

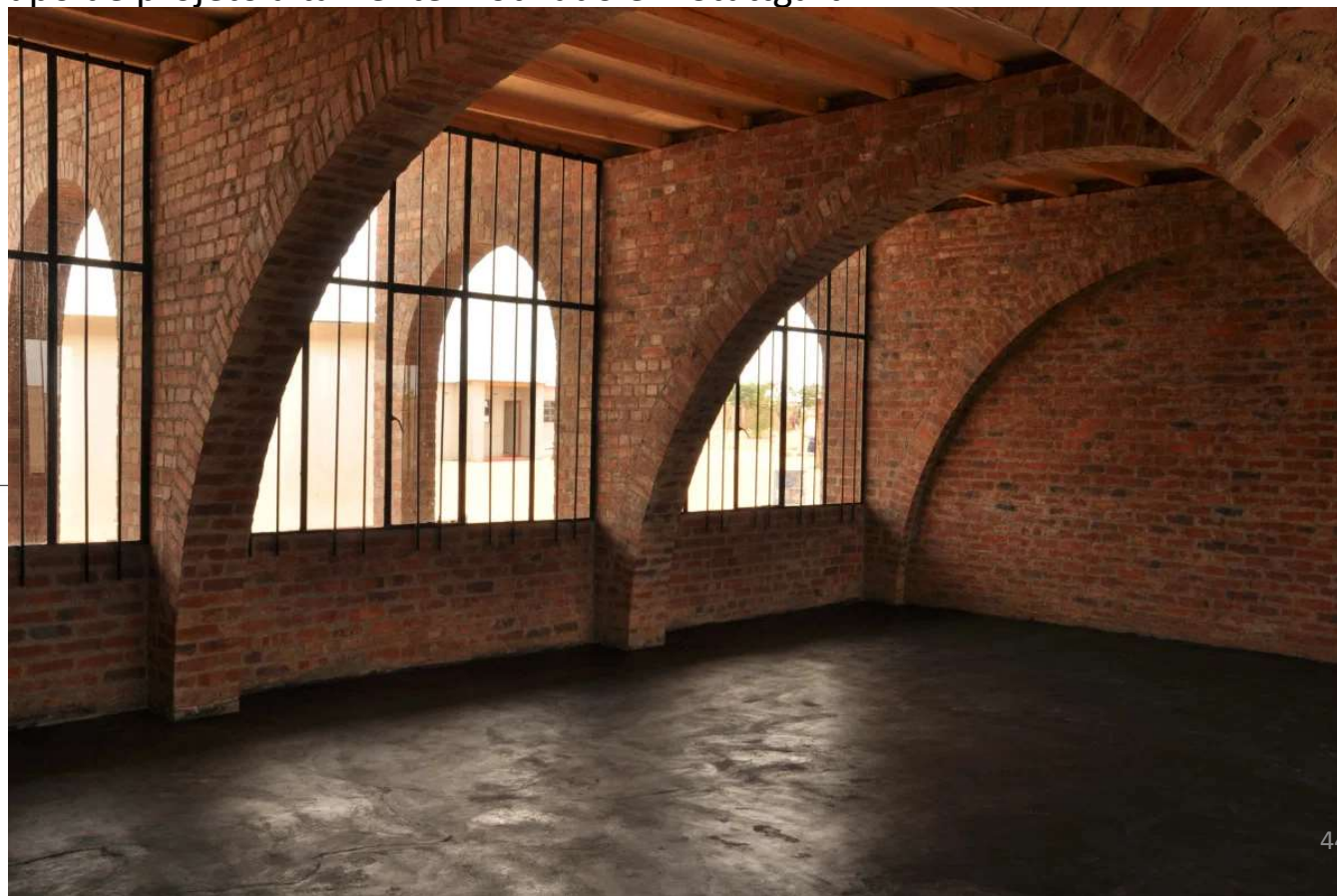
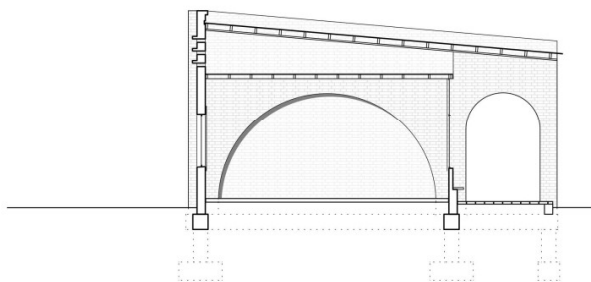
Arc by Crown Group  
em Sydney, projetado  
por Koichi Takada  
Architects



## Projeto do Studio K -

A alvenaria de tijolos é muito difundida no Zimbábue - usado em construções simples de pequenas casas. O projeto emprega métodos tradicionais de construção e incorporando detalhes construtivos, este projeto apresenta uma nova abordagem para o trabalho de alvenaria contemporânea.

Este projeto de construção de escola está sendo desenvolvido pela Engineers without Borders Germany (Ingenieure ohne Grenzen e.V.) e é processado por um grupo de projeto altamente motivado em Stuttgart.



<https://kristinaegbers.com/portfolio/initiative-rising-star/#jp-carousel-314>









<https://kristinaegbers.com/portfolio/initiative-rising-star>



Architects Gottlieb Paludan  
Architects (DK) and Office  
Winhov (NL)

Delft, Netherlands

Construction period  
05/2016 - 10/2017

Purpose Offices, Archive

[https://www.brickaward.com/Winners/BA20\\_Category\\_Winner\\_Working\\_Together\\_City\\_Archive\\_Delft.html](https://www.brickaward.com/Winners/BA20_Category_Winner_Working_Together_City_Archive_Delft.html)





ARCHIEF

Village Center in Sanhe, China  
Type New Construction , Public & Commercial Building , Utility -  
Architect XAUAT and Wall Architects, China  
Photographer Wang Dong  
Completion Date 2018





Village Center in Sanhe, China



Silesia University's  
Radio and TV  
Department  
Architects BAAS  
Arquitectura  
(Spain), Grupa 5  
architekci  
(Poland), Maleccy  
biuro projektowe  
(Poland)

Location  
Katowice, Poland

Construction  
period 2014 -  
2017

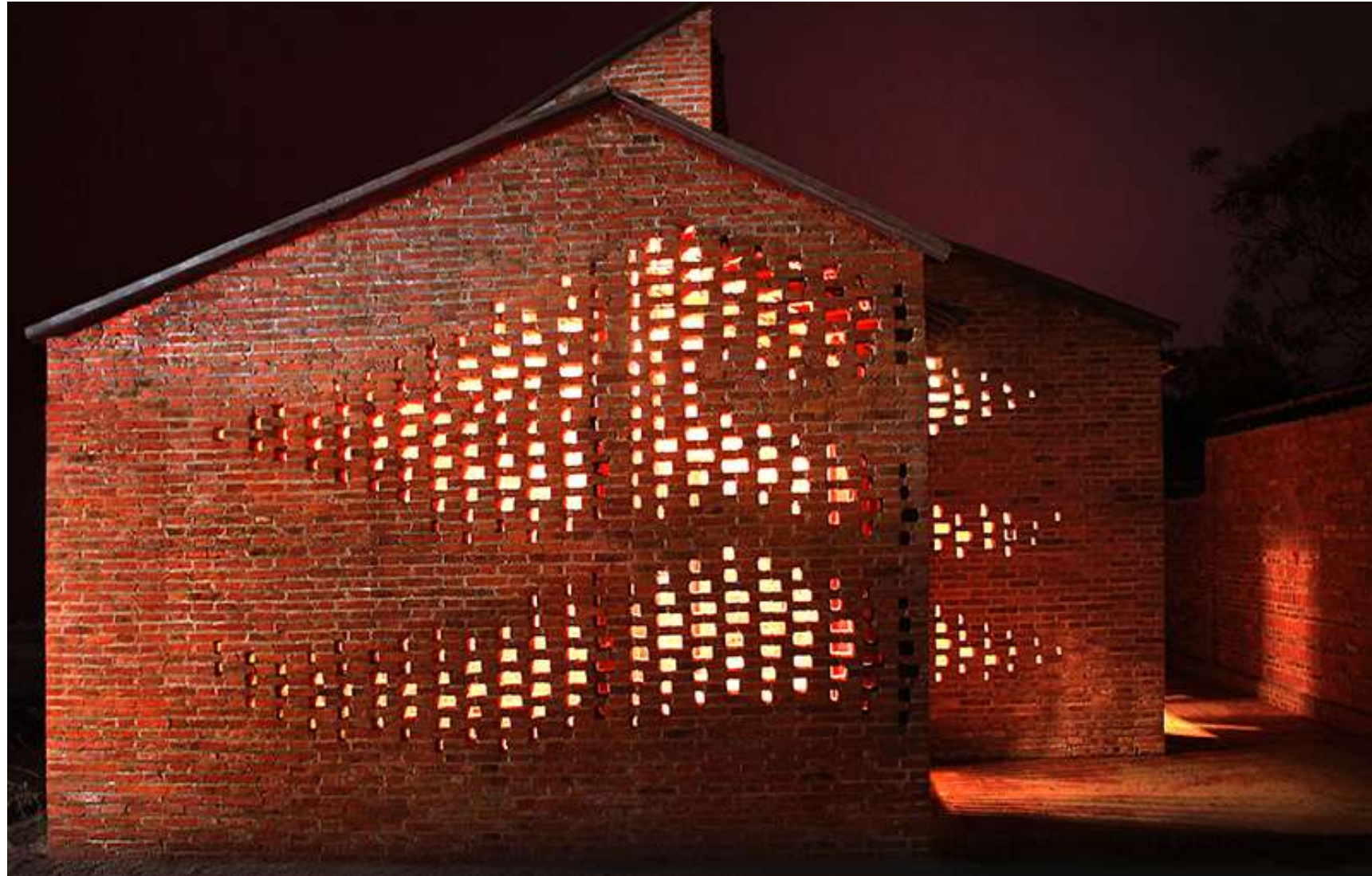
public spaces

Purpose  
Education





Para um projeto na China rural, a empresa M.O.D.E.S de Xangai explorou como os designs digitais podem ser realizados de uma maneira de baixa tecnologia, levando em consideração materiais locais limitados e know-how de mão de obra. Eles inventaram o uso de tijolos de argila que os trabalhadores podem erguer de acordo com uma simples etiquetagem numérica derivada de padrões digitais, em vez de desenhos convencionais de construção



<https://archive.curbed.com/2017/6/28/15887178/brick-architecture-design-buildings>

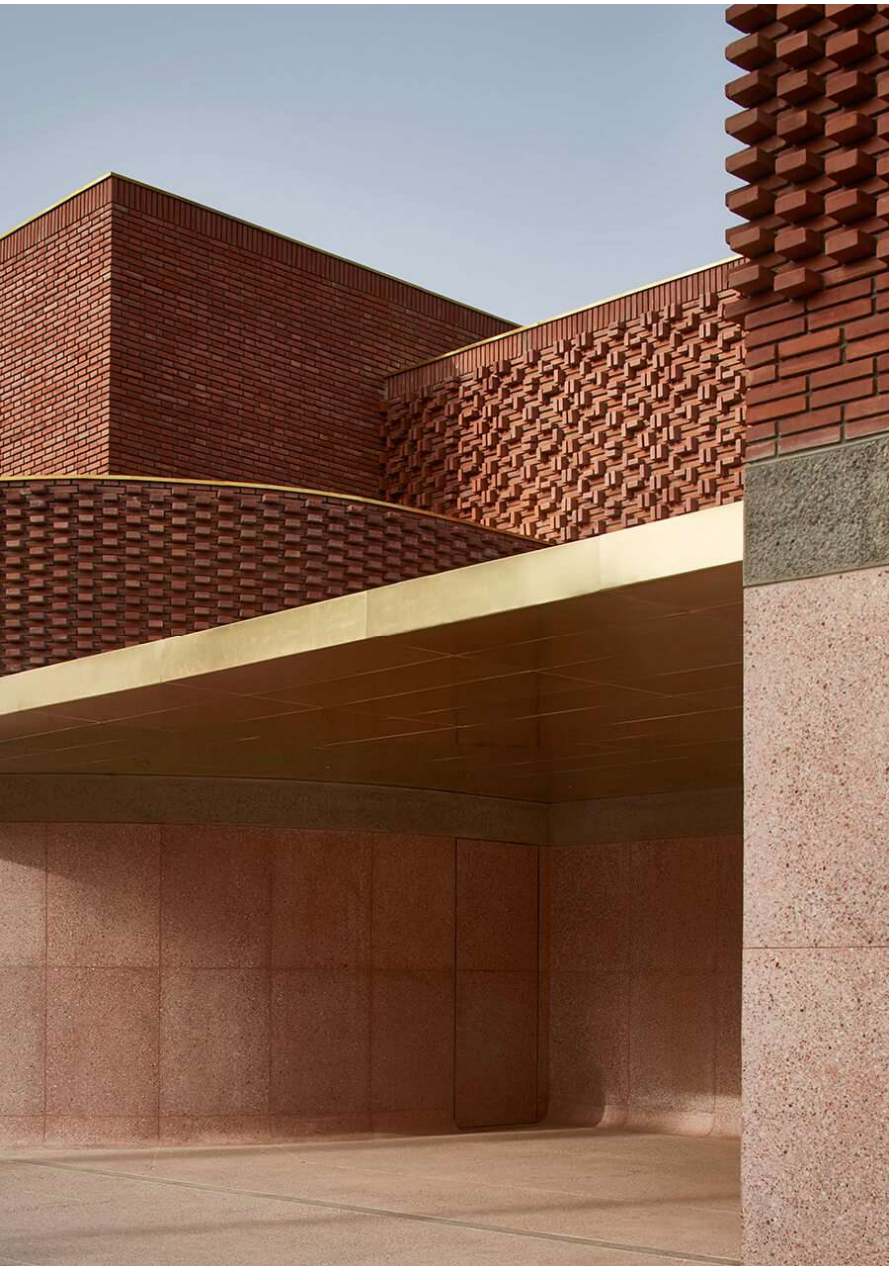




Studio KO - arquitetos Karl Fournier e Olivier Marty  
Museu Yves Saint Laurent – Marrakech - Marrocos

<https://brickarchitecture.com/images/projects/musee-yves-saint-laurent-marrakech-studio-ko/architect.jpg>





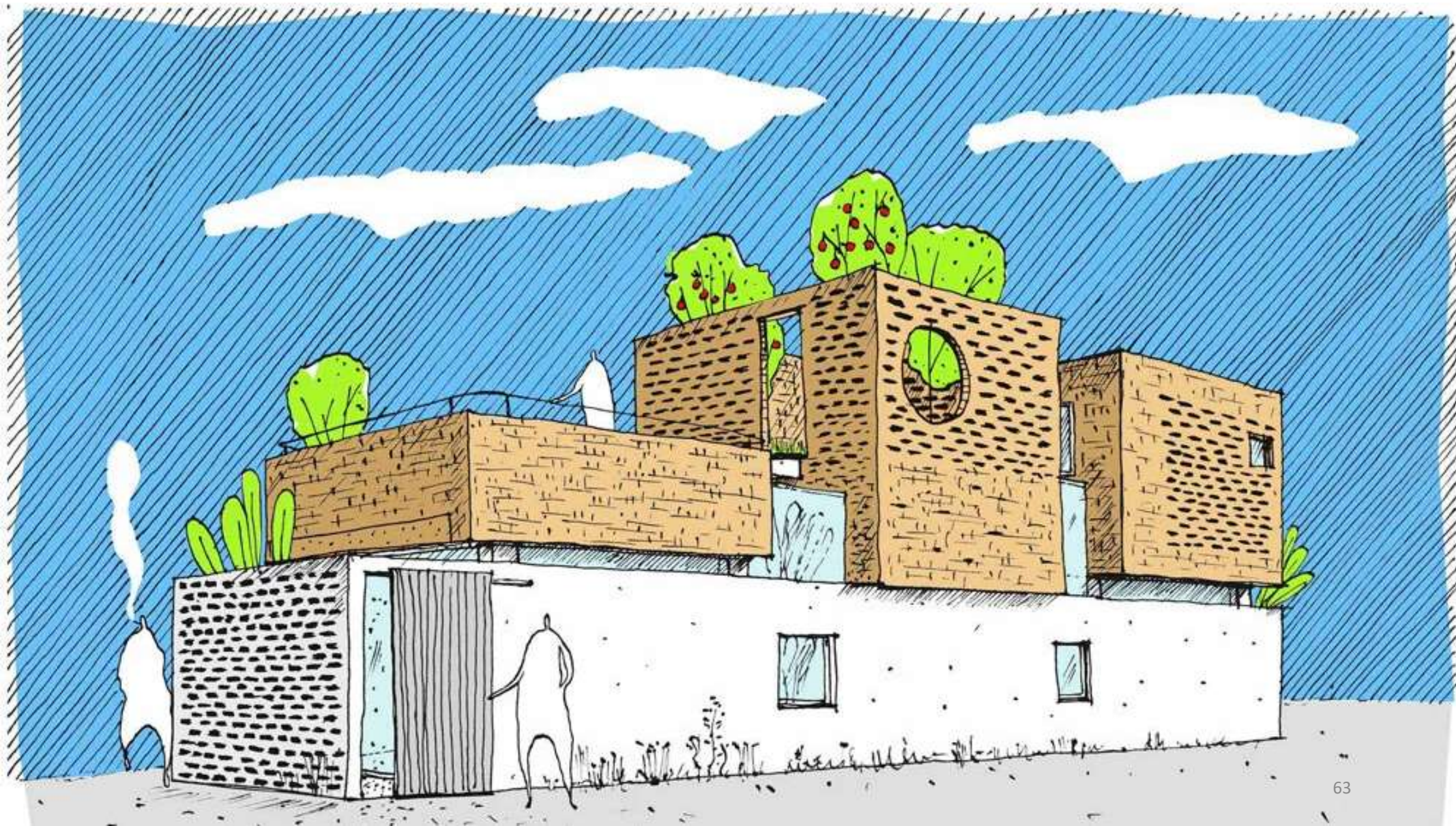




Arquitetos ODDO - casa VH em Hanoi, Vietnã, como três cubos de tijolos separados colocados no topo de um volume alongado que forma o nível do solo.

<https://www.designboom.com/architecture/oddo-architects-round-window-brick-vh-house-hanoi-03-01-2021/>





o estúdio dmva, com sede na Bélgica, revitaliza o centro de artes nOna de Mechelen Bélgica – 2016

<https://www.designboom.com/architecture/dmva-expresses-mechelens-arts-center-nona-with-undulating-fields-of-brickwork-02-20-2021/>









Arquitetos: Sebastian Behmann, Studio Olafur Eliasson - 2018

Fjord House, o projeto encomendado pela KIRK Capital para mostrar a relação do edifício com o porto.

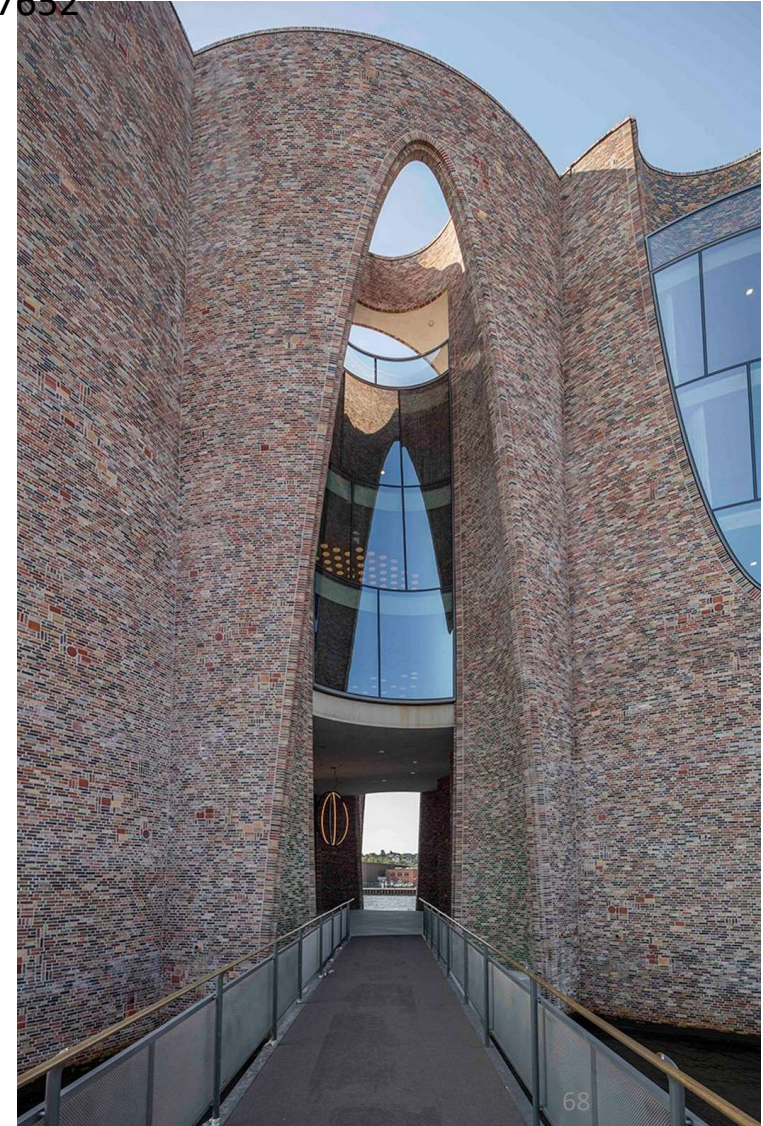
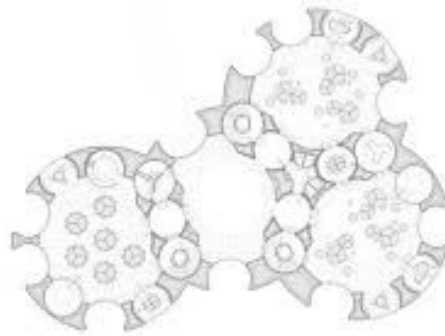
EDIFÍCIOS INSTITUCIONAIS, EDIFÍCIOS DE ESCRITÓRIOS - VEJLE, DINAMARCA

Fotografias: Anders Sune Berg, David de Larrea Remiro -



[https://www.archdaily.com.br/br/896818/fjordenhus-studio-olafur-eliasson-plus-sebastian-behmann/5b1d8d5ff197cc1a81000025-fjordenhus-studio-olafur-eliasson-plus-sebastian-behmann-photo?next\\_project=no](https://www.archdaily.com.br/br/896818/fjordenhus-studio-olafur-eliasson-plus-sebastian-behmann/5b1d8d5ff197cc1a81000025-fjordenhus-studio-olafur-eliasson-plus-sebastian-behmann-photo?next_project=no)

<https://sculpture-network.org/en/view/article/7652>







<https://www.galeriadaarquitectura.com.br/slideshow/newslideshow.aspx?idproject=3354&index=0>

## Terra Cotta Studio

Quang Nam Province, Vietnã  
escritório Tropical Space  
2016





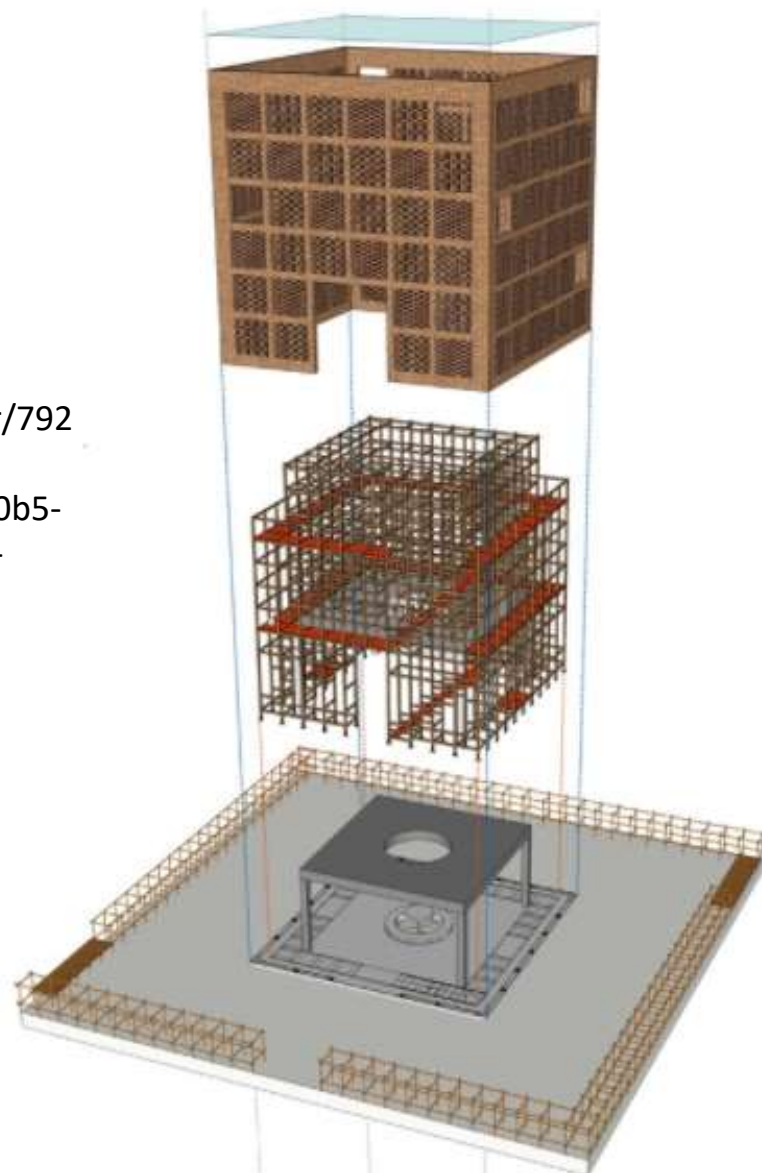
<https://www.galeriadaarquitectura.com.br/slideshow/newslideshow.aspx?idproject=3354&index=0>



Slide 69 e 70

Fonte:

[https://www.archdaily.com.br/br/792742/terra-cotta-studio-tropical-space/5788629ae58ece866d0000b5-terra-cotta-studio-tropical-space-photo?next\\_project=no](https://www.archdaily.com.br/br/792742/terra-cotta-studio-tropical-space/5788629ae58ece866d0000b5-terra-cotta-studio-tropical-space-photo?next_project=no)





# ARQ. AFFONSO RISI

Residência dos Padres  
Claretianos

local: Batatais/SP

projeto: 1981/82

construção: 1983/84

arquitetura: arqs. José  
Mario Nogueira e  
Affonso Risi

colaboração: Renato  
Kaida

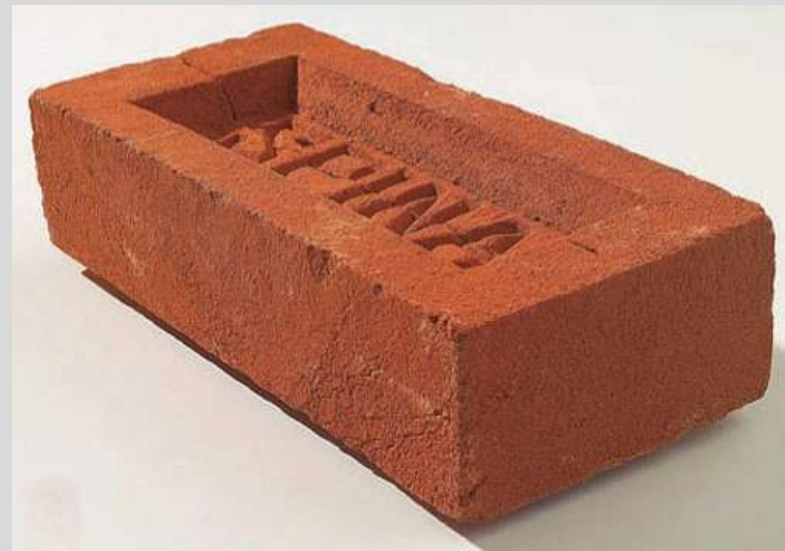
estrutura: engs. Ugo  
Tedeschi e Haruo  
Hashimoto

<https://www.affonsorisi.com.br/fwProjetos/2.php>





<https://casa.abril.com.br/construcao/23-modelos-de-tijolos/>



# Como referenciar

PISANI, Maria Augusta Justi. **Alvenaria de tijolos maciços comuns: materiais, técnicas e plástica**. Faculdade de Arquitetura e Urbanismo da Universidade Presbiteriana Mackenzie, São Paulo, ago. 2021, 78 p. Disponível em: <http://www.gparqcon.com.br/> materiais didáticos - arquitetura e estrutura.

**Os links de todas as imagens e textos estão referenciados nas páginas.**