QURILISH MATERIALLARINING TURLARI VA ULARNING TASNIFI

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Kirish Turli xil qurilish materiallarning xom ashyo turi va ishlab chiqarish usulini hisobga olgan holda, inshootlarda yoki texnologik asosda materiallarning ishlash sharoitlariga qarab, ularni maqsadlariga muvofiq tasniflanadi.

Maqsadlariga ko'ra, materiallarni shartli ravishda ikki guruhga bo'lish mumkin: qurilish va maxsus materiallar.

Asosan inshootlar uchun ishlatiladigan qurilish materiallari quyidagicha ajralib turadi:

1. Tabiiy tosh materiallari.

2. Anorganik biriktiruvchi moddalar.

3. Sun'iy tosh, olingan:

a) biriktirgichlar bilan bir hil holga keltirish (beton, temirbeton, eritmalar);

b) sinterlash (keramika materiallari);

c) eritish (stakan).

3. Metalllar (po'lat, quyma temir, alyuminiy, qotishmalar).

4. Polimerlar va plastmassalar.

5. Yog'och.

6. Kompozit (asbest tsement, shisha tolali, ...).

Tuzilmalarni atrof-muhitning zararli ta'siridan himoya qilish yoki ish faoliyatini yaxshilash va qulaylik yaratish uchun zarur bo'lgan maxsus qurilish materiallari quyidagilar:

1. Issiqlik izolyatsiyasi.

2. Akustik.

3. Gidroizolyatsiya, tom yopish, muhrlash.

4. Tugatish.

5. Korroziyaga qarshi.

6. Olovga chidamli.

7. Radiatsiyadan himoya qilish uchun materiallar va boshqalar.

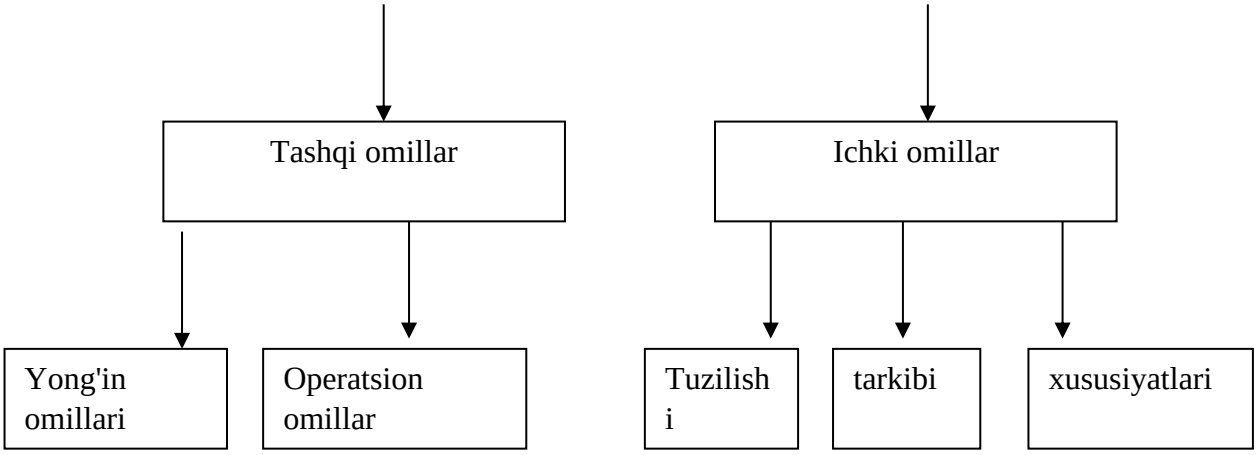
Har bir material uning ko'lamini va boshqa materiallar bilan birikish imkoniyatini aniqlaydigan turli xil xususiyatlarga ega.

Ma'lumki, qurilish materiallarining xususiyatlari ularni qo'llash sohasini belgilaydi. Faqat materiallarning xususiyatlarini to'g'ri va sifatli baholash bilan binolar va inshootlarning mustahkam va mustahkam qurilish inshootlarini olish mumkin.

Xususiyat - materialning alohida yoki aksariyat hollarda boshqa tashqi yoki ichki omillar bilan birgalikda harakat qilishiga ma'lum tarzda ta'sir o'tkazish qobiliyati.

Bu yoki boshqa omillarning ta'siri materialning tarkibi va tuzilishiga, shuningdek binolar va inshootlarni qurishda materialning ishlash sharoitlariga bog'liq.

Yong'in vaqtida qurilish materiallarida ta'sir etuvchi omillar



Operatsion omillar:

Bino yoki inshoot o'z maqsadini bajara olishi va bardoshli bo'lishi uchun ular yasagan har bir inshootning ishlash sharoitlarini aniq tasavvur qilish kerak.

Ushbu shartlarni bilib, ma'lum bir konstruktsiyani ishlab chiqarish uchun mo'ljallangan material qanday xususiyatlarga ega bo'lishi mumkinligini aniqlash mumkin.

Masalan, qo'llab-quvvatlovchi tuzilmalar ishlab chiqariladigan materiallarga qo'yiladigan asosiy talab, ularning yuklarning ta'sirida shakl o'zgarishi va yo'q qilinishiga qarshi turish qobiliyati, shuningdek, ba'zi hollarda past issiqlik o'tkazuvchanligi va ovoz o'tkazuvchanligi (masalan, yopiq inshootlar).

Operatsion omillarga quyidagilar kiradi:

1. Materiallarning qo’lanilish sohasi
2. Tashqi yuk.
3. Ishlash shartlari.

Yong'in omillari:

1. Yong'inning harorat sharoitlari va davomiyligi.
2. O'chirish vositalari.

3. Yong'in paytida agressiv muhit (yonish mahsulotlarining toksikligi, materiallarni yo'q qilish).

Qurilish materiallarining asosiy xususiyatlarini tasnifi

Qurilish materiallarining asosiy xususiyatlarini quyidagi guruhlarga bo'lish mumkin:

Birinchi guruh - fizik xususiyatlari: massaviy zichlik, zichlik, g'ovaklilik, gigroskopiklik, suv yutish.
Ikkinchi guruh mexanik xususiyatlar: kuch, qattiqlik, plastika, elastiklik
Uchinchi guruh – tashqi munosabatlarni tavsiflovchi xususiyatlar materiallar issiqlik ta'siriga: issiqlik o'tkazuvchanligi, issiqlik quvvati, yong'inga qarshilik, sovuqqa chidamlilik.
To'rtinchi guruh - yong'in sharoitida xulq-atvorni tavsiflovchi xususiyatli materiallar: yuqori harorat, yonuvchanlik, yonuvchanlik va boshqalar.

Jismoniy xususiyatlar.

Jismoniy xususiyatlarga materialning og'irlik xususiyatlari, zichligi, suyuqliklar, gazlar, issiqlik, radioaktiv nurlanish o'tkazuvchanligi, shuningdek materialning tashqi ish muhitining tajovuzkor ta'siriga qarshi turish qobiliyati kiradi.

Haqiqiy zichlik deb mutlaqo zich materialning birlik hajmining massasi tushuniladi va bu quydagi formula bilan aniqlanadi.

$$\rho = m / V,$$

bu erda, m - materialning massasi, kg; V - zich holatdagi material hajmi, m3.

O'rtacha zichlik deganda materialning tabiiy holatidagi birlik hajmining massasi tushuniladi (bo'shliqlar va g'ovaklar bilan):

Bir xil turdagi materiallarning o'rtacha zichligi g'ovakliligi va bo'shligiga qarab har xil

$$\rho_0 = m / V.$$

bo'lishi mumkin.

Ommaviy materiallar (qum, maydalangan tosh, tsement va boshqalar) ommaviy zichlik bilan ifodalanadi - donador va kukunli materiallar massasining ular egallagan butun hajmga nisbati, shu jumladan zarralar orasidagi bo'shliq.

Materialning zichligi uning texnik xususiyatlarini aniqlaydi, masalan, quvvat, issiqlik o'tkazuvchanligi. Zichlik materialning g'ovakliligi va namligiga bog'liq.

Borayotgan namlik bilan materialning zichligi oshadi.

Ba'zi qurilish materiallarining zichligi.

Материал	O'rtacha zichlik ρ_0, кг/м^3	Haqiqiy zichlik ρ, кг/м^3	G'ovaklik P, %

Kengaytirilgan polistirol	15-20	1050	86…81
Yog'och:	-	1550	-
Qarag'ay	400-600	-	74-61
Eman	700-900	-	55-42
Beton:		3000 oshmasligi kerak	
Asal qoliplari	500-1200		84-60
yengil	500-1800		84-40
Og'ir	1800-2500		40-17
Asbest sement	1400-2200	2750	25-40
Qizil g'isht	1600-1900	2500	36-24
Deraza oynasi	2500	до 2500	0
Metall:			
Chelik St3	7800	7800	0
Alyuminiy qotishmalari	2850 oshmasligi kerak	2850 oshmasligi kerak	0

Materialning g'ovakliligi (%) uning hajmini teshiklar bilan to'ldirish darajasidir:

$$\prod = (1 - \rho_0 / \rho)100.$$

Teshiklar - bu havo yoki suv bilan to'ldirilgan materialning kichik hujayralari.

Teshiklar ochiq va yopiq, kichik va katta. G'ovaklik qiymatini taxminiy baholash mumkin, materialning boshqa muhim xususiyatlari: zichligi, mustahkamligi, suvga singishi, chidamliligi va boshqalar.

Bo'shliq - bo'shashgan material (qum, maydalangan tosh va boshqalar) donalari orasida hosil bo'lgan yoki ba'zi mahsulotlarda mavjud bo'lgan bo'shliqlar miqdori.

Ba'zi materiallar namlanganda suvni shimib oladi va quritganda uni bo'shatib yuboradi.

Materialning suv bilan to'yinganligi, uning ustida suyuqlik suyuq holatda yoki bug 'shaklida bo'lganda paydo bo'lishi mumkin. Shu munosabat bilan ikkita moddiy xususiyat ajratiladi: gigroskopiklik va suv yutish.

Gigroskopiklik - materialning suv bug'lari va havosini yutish va ushlab turish xususiyati.

Bu havo haroratiga, uning nisbiy namligiga, teshiklarning turi, soni va hajmiga, shuningdek moddaning tabiatiga bog'liq.

Suvni yutish - bu materialning suvni yutish va ushlab turish qobiliyatidir. U butunlay suvga botgan quruq material tomonidan so'rilgan suv miqdori bilan tavsiflanadi va massaning foizida ifodalanadi.

Suv bilan to'yingan materialning oxirgi bosim kuchining nisbati (R sat) Quruq holatdagi (R quruq) materialning yakuniy bosim kuchiga nisbati yumshatilish koeffitsienti deb ataladi:

$$\kappa_{разм} = R_{нас} / R_{сух}.$$

Ushbu koeffitsient materialning suvga chidamliligini tavsiflaydi. Oson namlangan materiallar (loy) uchun k = 0, suv ta'sirida kuchini to'liq saqlaydigan materiallar (metall, shisha) uchun k = 1. K> 0,8 bo'lgan materiallar suv o'tkazmaydigan deb tasniflanadi; muntazam ravishda namlanadigan joylarda k <0,8 bo'lgan materiallarga yo'l qo'yilmaydi.

Namlikni yo'qotish - materialning namlikni chiqarish qobiliyati.

Havoga chidamliligi - materialning uzoq vaqt davomida muntazam deformatsiyaga va namlanishga va mexanik quvvatni yo'qotmasdan quritilishiga bardosh berish qobiliyati.

Suv o'tkazuvchanligi - materialning bosim ostida suvdan o'tishi. Suv o'tkazuvchanligi 1 MPa bosim ostida sinovdan o'tgan material maydonining 1 m2 dan 1 soat davomida o'tgan suv miqdori bilan tavsiflanadi. Zich materiallar (po'lat, shisha) suv o'tkazmaydigan.

Mexanik xususiyatlari.

Mexanik xususiyatlar materialning siqilish, cho'zish, zarba berish, unga begona jismni bosish va kuch ishlatib materialga ta'sir qilishning boshqa turlariga qarshilik ko'rsatish qobiliyati bilan tavsiflanadi.

Kuch - materialning yukdan kelib chiqadigan stresslar ta'sirida yo'q qilinishiga qarshi turish xususiyati. Strukturada bo'lgan materiallar turli xil yuklarni - siqishni, taranglik, egilish, ta'sirni boshdan kechirishi mumkin.

Qurilish materiallarining mustahkamligi ularning yakuniy quvvati bilan tavsiflanadi. Eng yuqori quvvat (Pa) - bu material namunasini yo'q qilishga olib keladigan yukga mos keladigan stress:

R=N/A

bu erda N - halokat kuchi, H; A - sinovdan oldin namunaning tasavvurlar maydoni, m2.

Qattiqlik - bu materialning boshqa qattiq jismning unga kirib borishiga qarshi turish qobiliyati. Ushbu xususiyat qayta ishlashda, shuningdek uni pollar, yo'l qoplamalari uchun ishlatishda muhim ahamiyatga ega.

Deformatsiya - yuk ostida materiallar hajmi va shakli o'zgarishi.

Elastiklik - bu yukni olib tashlaganidan keyin asl shakli va o'lchamlarini tiklash uchun materialning xususiyati.

Plastisit - bu materialning yuk ostida shaklini yorilmasdan o'zgartirish va yukni olib tashlaganidan keyin bu shaklni saqlab qolish xususiyati. Barcha materiallar egiluvchan va mo'rt bo'linadi. Mo'rt materiallar to'satdan sezilarli deformatsiyasiz qulab tushadi. Mo'rt materiallar faqat siqilishga yaxshi ta'sir qiladi va cho'zish, egilish va zarbaga yomon ta'sir qiladi.

Ba'zi qurilish materiallarining mustahkamligi

Материал	Eng yuqori quvvat, MPa		
	siqilishda Rc	kuchlanishdagi Rt	egilishda Rw
Torf to'lovlari	0,5	-	0,25-0,28
Oddiy beton	5-30	0,6-2	-
Yuqori quvvatli beton	40-80	2,5-7	-
Gil g'isht	7,5-30	-	1,5-3,5
Yog'och (o'rtacha ma'lumotlar)			
Bo’ylama tolalar bo'ylab	50	130	100
Ko’ndalang tolalar	6,5	6,5	75
Shisha plast	420	450-470	410-460
Granit	100-120	2-4,4	-
Po’lat	380-450	380-450	-

Materiallarning issiqlik ta'siriga nisbatini tavsiflovchi xususiyatlar.

Issiqlik o'tkazuvchanligi - materialning namuna (mahsulot) sirtidagi harorat farqidan kelib chiqadigan issiqlik oqimini o'tkazishi.

Bir hil materialning issiqlik o'tkazuvchanlik koeffitsienti J ma'lum bir materialning devoridan qalinligi 1 m, maydoni 1 m bo'lgan vaqt ichida 1 m2, harorat bilan o'tadigan J ning issiqlik miqdoriga teng 1 K devorning qarama-qarshi yuzalaridagi farq.

$$\lambda = \frac{Q \cdot \delta}{A(T_1 - T_2) \cdot \tau}, \quad \left[\frac{Дж \cdot м}{с \cdot м^2 \cdot К}\right] = \left[\frac{Вт}{м \cdot К}\right]$$

λ ko'p omillarga bog'liq:

- kimyoviy tarkibi;
- tuzilish (g'ovaklilik);

- harorat;

- moddiy namlik

Harorat ko'tarilganda, λ o'zgaradi (ko'p materiallar uchun).

$\lambda_t = \lambda_0 \pm \beta_\lambda t$

λ_0 - da 0°C; t –materialning harorati, °C

Ba'zi qurilish materiallarining issiqlik o'tkazuvchanligi

Materialning nomi	Issiqlik o'tkazuvchanligiВт / (м °C)	Materialning nomi	Issiqlik o'tkazuvchanligiВт / (м °C)
Po’lat	58	Suv	0,59
Granit	2,9...3,3	Yengil beton	0,35...0,8
Og'ir beton	1,0...1,6	Issiqlik saqlovchi beton	0,08...0,3
keramika g'ishtlari	0,8...0,9	Ko’pshitilgan shisha	0,06...0,08

Issiqlik sig'imi - materialning qizdirilganda ma'lum miqdorda issiqlikni yutish qobiliyati.

C - o'ziga xos issiqlik (issiqlik quvvati koeffitsienti) - bu 1 K ga 1 kg materialni isitish uchun zarur bo'lgan Jouldagi issiqlik miqdori.

$$C = \frac{Q}{m \cdot (T_1 - T_2)}, \frac{Дж}{кг \cdot К}$$

Haroratning oshishi bilan (ko'p materiallar uchun):

$C_t = C_0 + \beta_C t$

C_0 – при 0°C, t – температура материала, °C

Теплоемкость некоторых строительных материалов

Материал	C, кДж/кг·К
Havo	0,97
Yog'och	2,51
G'isht	≈0,8

Suv	4,2
Og'ir beton	≈0,8
Po’lat	0,42
Granit	0,8

Materiallarning muhim termofizik xususiyati bu materialdagi harorat o'zgarishi tezligini tavsiflovchi issiqlik tarqalishi.:

$$a = \frac{\lambda}{C \cdot \rho_0}, \frac{м^2}{c}.$$

Chunki λ, C - haroratga bog'liq, keyin **a** ham harorat ko'tarilishi bilan o'zgaradi

Og'ir beton uchun harorat oshishi bilan pasayadi.

B55 sinfidagi og'ir beton uchun t=450°C - $\boldsymbol{a} = 1{,}3 \cdot 10^{-3}$ м^2/c.

Beton isitishni hisoblashni soddalashtirish uchun t = 450□S da hisoblab chiqilgan va namlikning isitish tezligiga ta'sirini hisobga olgan holda doimiy ravishda kamaytirilgan issiqlik diffuzivligi ishlatiladi (bu keyingi o'rganish paytida hisoblashda ishlatiladi intizom).

$$a_{red} = \frac{\lambda_t}{(C + 0{,}012w) \cdot \rho_0}.$$

Sovuqqa chidamliligi - suv bilan to'yingan materialning vayronagarchilik belgilari va kuchning sezilarli pasayishisiz takrorlanadigan o'zgaruvchan muzlash va eritishga qarshi turish qobiliyati.

Refrakterlik - bu materialning deformatsiyasiz yoki erimay, uzoq vaqt davomida yuqori harorat ta'siriga dosh berish xususiyati. Olovga chidamlilik darajasi bo'yicha materiallar refrakter, refrakter va past eriydiganlarga bo'linadi.

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