

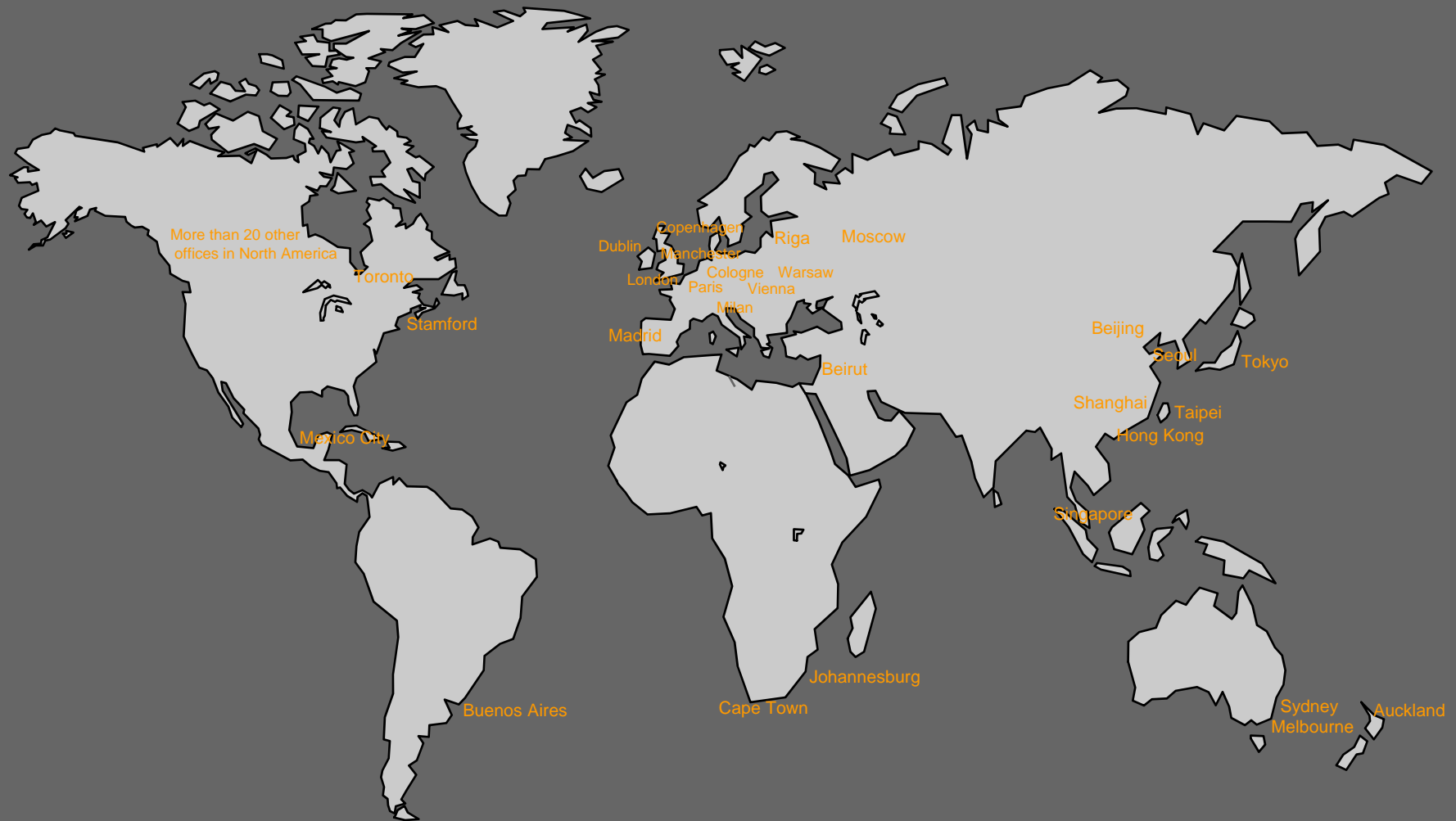
# Examples of construction classifications used in the insurance industry

*EPAQ Annual Meeting*

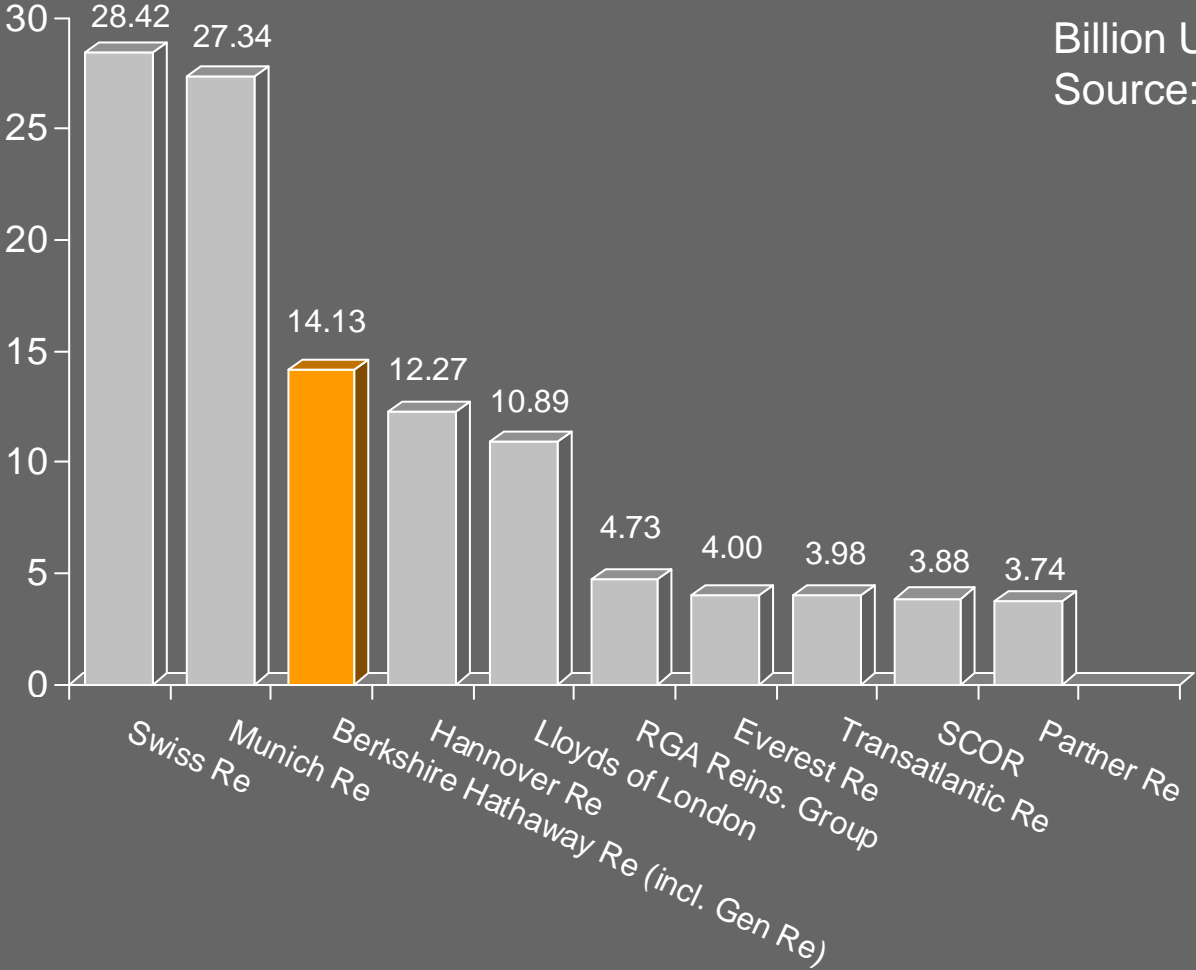
*Budapest 29.-30.11.2007*

*Leo Ronken – General Reinsurance Corporation, Cologne*

# Worldwide presence of Gen Re



# 10 major reinsurance groups worldwide by 2006 gross premium



Billion USD  
Source: A.M. Best 08/2007

## What does Gen Re stand for?

- Core competency: Underwriting, leading to sound and professional risk transfer solutions
- Financial strength: Standard & Poor's AAA-Rating
- Focus on mutually beneficial client relationship
- Global network of offices
- Well balanced portfolio structure
- Competent advisory and consulting services

# Gen Re

## Financial highlights as of December 31, 2006

### Consolidated Financial Data

Assets	USD 41.4 Billion
Liabilities	USD 30.4 Billion
Shareholders' Equity	USD 11.0 Billion
2006 Net Premium Written*)	USD 6.0 Billion
A.M. Best Financial Strength Rating	A++
S&P Financial Strength Rating	AAA
Moody's Financial Strength Rating	Aaa

\*) Excludes the effect of intercompany transactions with Berkshire Affiliates

Source: General Re Corporation - Consolidated Quarterly Financials

## Core competency underwriting

- Gen Re employs more than 900 highly skilled and experienced underwriting professionals in more than 50 locations around the world
- Underwriting skills are constantly enhanced through state-of-the art training and development
- Matrix organization and extensive use of information technology enables implementation of high quality solutions anywhere in the world.
- Berkshire Hathaway ownership enables us to meet any capacity requirements.

# Preliminary Remarks to Construction Classes

- Worldwide in some countries national insurance associations recommend on how to classify buildings into construction classes
- Some countries/ associations do not give any recommendation
- Normally there is no obligation for an insurer/ reinsurer to follow any recommendation, except the minimum standards set by local authorities and laws
- Examples given in this presentation may not represent the opinion of an individual insurer or reinsurer and may not be used widely even recommended by their association.

# Goal of Underwriting in the insurance industry

- One of the primary goals of underwriting for any property insurer is to determine the **probability and severity of a fire** at a given property risk.
- One of the main considerations in making that determination is:
  - assigning the **proper construction class**
    - What are the materials used?
    - What percentage of the structure consists of each kind of material?
    - How much damage will the building sustain when exposed to fire?
- Properly identifying the construction class can help the underwriter to rate the risk more accurately.
- The evaluation of the building behavior in the case of a fire base on the **fire resistance and the combustibility of the building materials used**.



# Some experiences

Loss experience in the past showed:

- Damage of a building **depends to a large extent on the design of the building**:
  - frame construction, roof frameworks
  - Roofs
  - external walls
  - Floors
- For the evaluation of the buildings the insurers have designed **construction classes** with certain requirements of the individual construction features.
- All construction features **needs to correspond to the minimum requirements** of a building class.
- Partly better construction elements, e.g. a fire-resistant binder on a support without classified fire resistance, does not improve the classification as “ a chain is only so strong as its weakest member”.

# Problems of today

- Often Insurers no longer consider compliance with Building Regulations as being sufficient.
- Often insurer requirements are more stringent than the Building Regulations
  - Primary aim is property protection ensuring that all elements of construction including roofs shall **not significantly contribute to the growth and spread of a fire**, either internally or externally
  - Building Regulations are seen very much as a minimum standard in terms of the requirements of the construction elements and internal fire protection of a building
  - Whilst architects may use building regulations to receive approval from the Building Control Authorities it is unlikely to receive the same degree of approbation from the future building's insurers.
- As a result:
- Some building owners have found themselves in a situation where their building was compliant with all the regulations, but where their insurer significantly increased the premium.

# Overview on constructive key risk factors

- **Passive Fire Protection**

- Non combustible construction or use of insurer approved building products - walls, roof, floors, linings, insulation materials
- Any insulation panels to be non combustible or insurer approved.
- Fire barriers in voids, ducts, cavities and roof spaces
- Fire resisting ducts for cables / services
- Fire resistant cabling
- Fire dampers in air distribution ducts particularly where passing through compartment walls / floors
- Large capacity buildings compartmented into smaller areas using Fire Break Walls with any penetrations appropriately protected

# Overview on additional risk factors influencing building fire behavior

- **Active Fire Protection**

- Appropriate fire extinguishers.
- Automatic Fire Detection with monitored remote signalling to an approved Alarm Receiving Centre. Installed and maintained by an installer accredited to insurance rules.
- Insurance approved fire doors/shutters in compartment walls operated via an Automatic Smoke Alarm and / or a fusible link.
- Automatic Sprinkler Installation to rules of insurer – e.g. FM, VdS, Apsaid
- Smoke ventilation

# European classifications

## Some Common materials and likely Euro classes

### Example Materials

- Concrete, Brick Stone, Wool Glass, Wool
- Plasterboard, Cement particle board, Glass Wool – faced, Rock Wool - faced
- Painted gypsum board, Some fire resistant MDF  
Some Birch plywood
- Most fire resistant MDF, Some European Plywood, **Phenolic foam** (foil faced)
- **Expanded polystyrene type A, Polyisocyanurate foam (foil faced), Extruded polystyrene, Vinyl wall covering (gravure print)**
- **Polyurethane Foam (lamine faced), Polyisocyanurate foam (sprayed), Wood fibre board (vacuum pressed)**
- **Expanded polystyrene type N, Untested or fails Euro class E**

### Euro class/ Flashover Potential

- A1/ No
- A2/ No
- B/ No
- C/ Yes
- D/ Yes
- E/ Yes
- F/ Yes

# Germany (Commercial Tariff)

## Building class 1:

Building with non combustible building materials/ construction units not classified under, those not classified as types 2 or 3. The portion of combustible building materials should not exceed 30% on

- Framework
- External wall surfaces
- floor and/or roof areas (excluded roofing felt)

## Building class 2:

Building (- complex) totally or partly built with combustible materials/ constructions (exception: 30 min fire resistive construction) including isolations and linings and not classified under building class 3.

## Building class 3:

Building (- complex) with external walls predominantly from wood or roof not resistant against flying brands and radiating heat.

# Germany (Industrial Risks – no longer officially updated )

- **R (Rabattklasse** (Credit class)):
  - pillars, columns supports, interior and exterior load-bearing walls at least 90 minutes fire-resistant and made of non-combustible materials.
  - Roof girders at least 30 minutes fire resistant,
  - Nonbearing exterior walls at least 30 minutes fire resistant or made of non-combustible materials
  - Roof, not including roof girders, at least 30 minutes fire resistant roof sheathing and made of non-combustible material without any combustible materials attached to the lower surface, hard roofing (=fire resistant against flying brands and radiating heat)
- **N (Neutrale Klasse** (Neutral class)):
  - Buildings, which do not meet the specifications of construction class R as long as their load-bearing parts are at least 30 min fire resistant or the buildings are predominately of non-combustible materials, hard roofing.
- **Z (Zuschlagsklasse** (Debit class))
  - Buildings which do not meet the specifications of construction class N

# ISO Properties, Inc. (USA)

ISO defines six construction classes for commercial buildings:

- Frame
- Joisted Masonry
- Noncombustible
- Masonry Noncombustible
- Modified Fire Resistive
- Fire Resistive





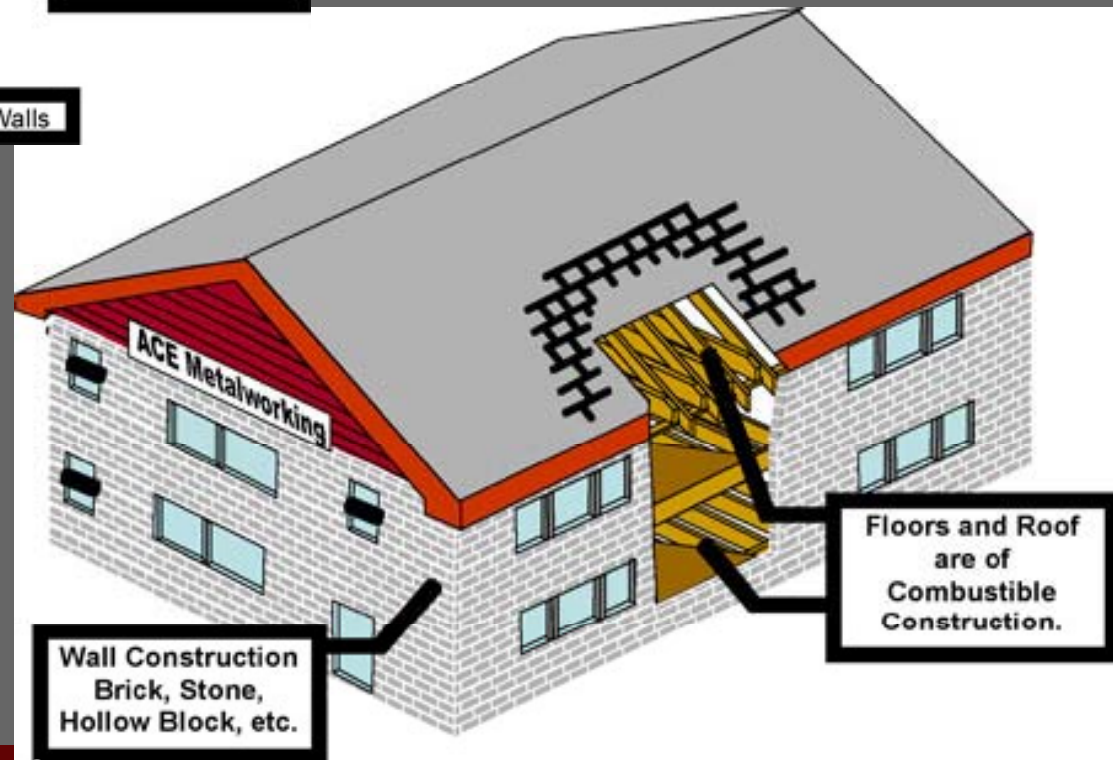
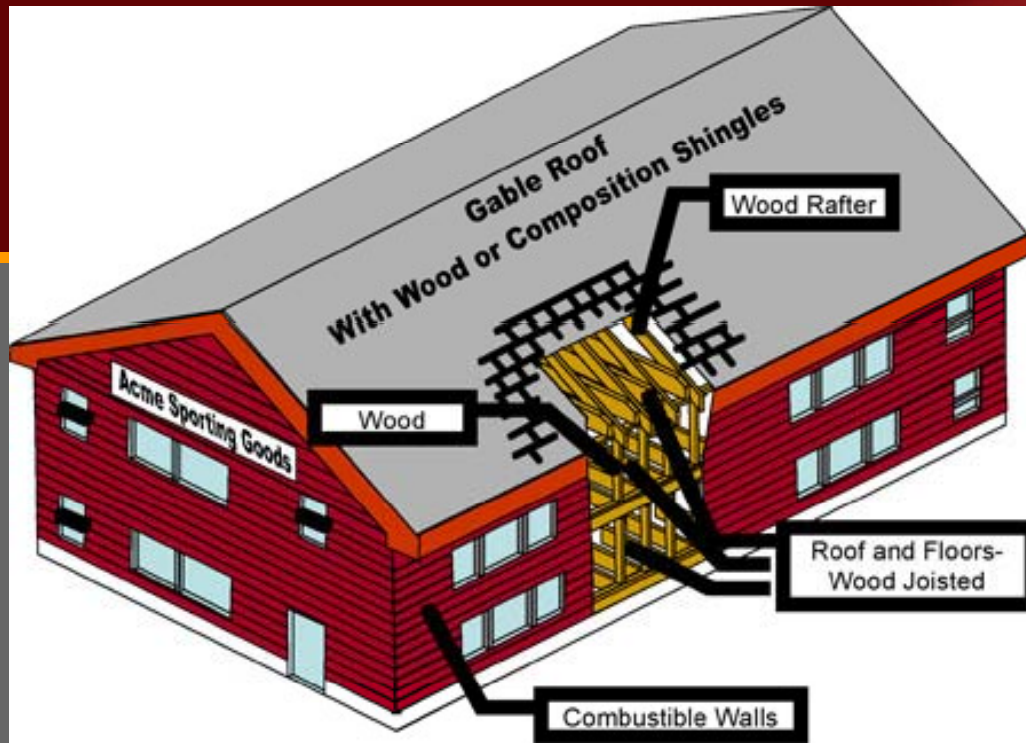
## Frame Construction

- Exterior walls, floors, and roofs of combustible construction — or with exterior walls of noncombustible or slow-burning construction with combustible floors and roofs.
- Generally have roof, floor, and supports of combustible material, usually wood, and combustible interior walls.

## Joisted Masonry Construction

- Exterior walls of masonry or fire-resistive construction rated for not less than one hour and with combustible floors and roofs.

# Frame



JM

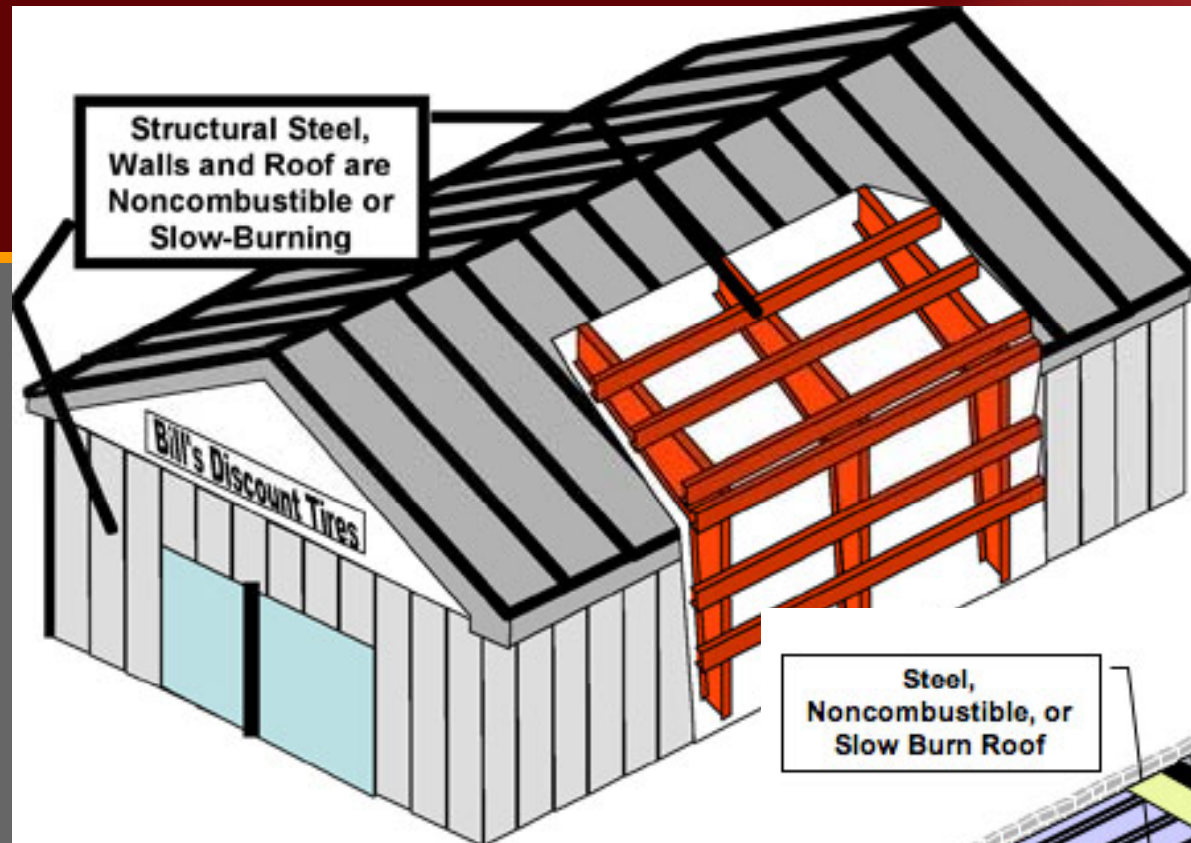
## Noncombustible Construction

- Exterior walls, floors, and roofs of noncombustible or slow-burning materials
- Building supports of noncombustible or slow-burning materials
- Noncombustible or slow-burning roof decks on noncombustible or slow-burning supports — regardless of the type of insulation on the roof surface

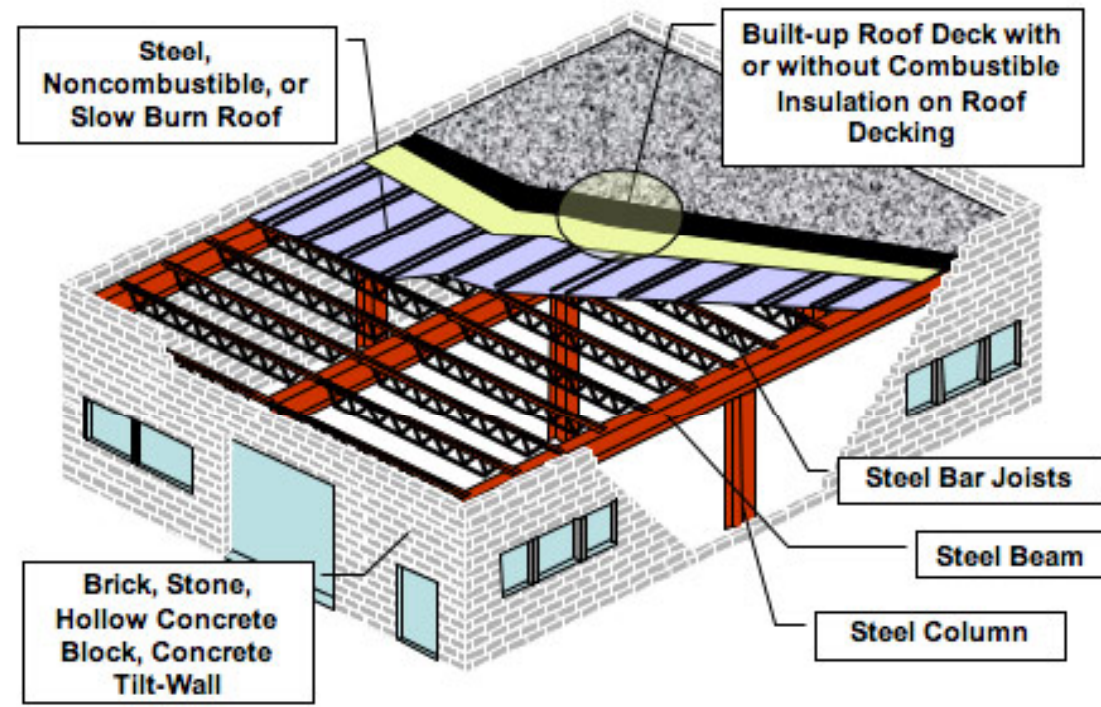
## Masonry Noncombustible Construction

- Exterior walls of masonry — not less than four inches thick, or
- Exterior walls of fire-resistive construction — with a rating of not less than one hour, and
- noncombustible or slow-burning floors and roofs — regardless of the type of insulation on the roof surface

NC



MNC



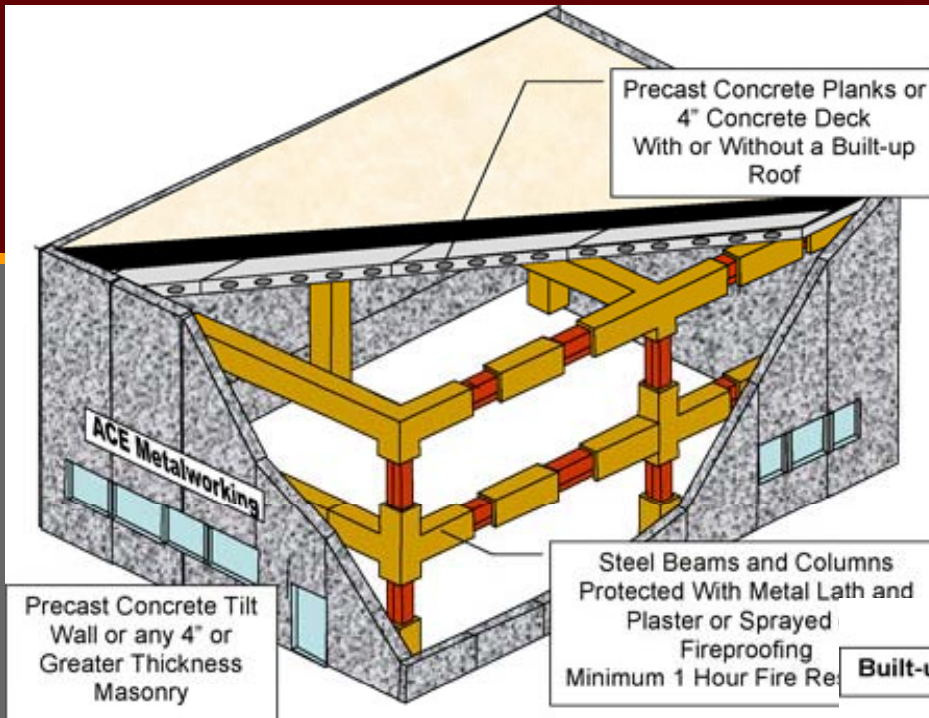
## Modified Fire Resistive Construction

- Exterior walls, floors, and roofs of masonry materials less thick than required for fire-resistive structures but not less than four inches thick, or
- Fire-resistive materials with a fire-resistance rating less than two hours but not less than one hour
- Exterior bearing walls and load-bearing portions of exterior walls must be of noncombustible materials or of masonry, but exterior nonbearing walls and wall panels may be slow-burning, combustible, or with no fire-resistance rating.

## Fire Resistive Construction

- **Walls:** solid masonry, including reinforced concrete not less than four inches thick, hollow masonry not less than 12 inches thick, hollow masonry less than 12 inches thick, but not less than eight inches thick with a listed fire-resistance rating of not less than two hours and assemblies with not less than a two-hour fire-resistance rating
- Exterior bearing walls and load-bearing portions of exterior walls must be of noncombustible materials or of masonry, but exterior nonbearing walls and wall panels may be slow burning, combustible, or with no fire-resistance rating.
- **Floors and roofs:** reinforced concrete not less than four inches thick and assemblies with not less than a two-hour fire-resistance rating
- **Structural metal supports:** Horizontal and vertical load-bearing protected metal supports — including pre-stressed and post-tensioned concrete units — with not less than a two-hour fire-resistance rating

# MXP



Built-up Roof

Roof is Cast-in-Place 4" Thick Concrete or UL Listed 1 Hour Assembly of Precast Concrete or Protected Steel

Floors are 4" Thick Cast-in-Place Concrete or UL Listed 2 or More Hour Assembly of Precast Concrete or Protected Steel

Exterior Skin of Building could be Combustible, Masonry, Noncombustible or Slow Burning

Cast-in-place Reinforced Concrete Columns and Beams

# XP

# Verbond van Verzekeraars (Netherlands)

- Construction classes recommended:
  - FIRE-Resistive
  - SEMI-Fire resistive
  - BASIC CONSTRUCTION
  - Other 1.
  - Other 2.
  - Other 3.
  - Other 4

# Verbond van Verzekeraars (Netherlands)

- **Fire-resistive:** load bearing construction concrete, walls concrete/ masonry and roofs of **concrete with non combustible insulation** in walls and roofs.
- **Semi-fire resistive:** load bearing construction concrete, walls concrete/ masonry and roofs of **concrete with flammable roof insulation** only.
- **Basic construction:** Load bearing construction **steel skeleton or heavy wood columns/ beams** and with **non combustible insulation** in the walls and on the roofs, facade -/roof material sheets of steel, aluminium, zinc (no sandwich panel with flammable heat insulation!).
- **Other 1:** load bearing construction as basic construction, **flammable insulation on the roof**.
- **Other 2:** load bearing construction as basic construction, **flammable insulation under the roof**.
- **Other 3:** load bearing construction such as basic construction, **flammable insulation in outer walls or combustible sandwich panel**.
- **Other 4:** worse constructions as described above.



# LPC (Great Britain)

- **Grade 1:** Building construction, which should resist a fire for a considerable period of time thus allowing fire fighters adequate time to extinguish the fire before the building suffers severe structural damage.
- **Grade 2:** Building of non-combustible construction which would not add fuel to any fire but would only resist the fire for a short period.

	UK
Grade 1	2 Hour Fire Resistance (Masonry Non-Combustible)
Grade 2	1/2 Hour Fire Resistance (Light Non-Combustible)
Non-grade	Combustible Elements (ordinary or Frame)

# LPC (Great Britain)

- **Grade 1:**

- Walls including any columns and beams, non-load bearing in-fill panels and internal load bearing walls constructed of **non combustible materials with a fire resistance of not less than 2 hours**
- Roofs: non combustible materials with special provisions made for external combustible weather proofing and/ or insulation on decks of hollow blocks, concrete or concrete slabs or of materials listed. Any columns/ beams or trusses support the roof must be **made of incombustible materials and a fire resistance of not less than 2 hours**
- Floors: according fire break floors with protected openings
- Linings and ceilings must be constructed of **non combustible materials** etc.

- **Grade 2:**

- External walls of **non combustible materials and have a fire resistance of not less than half an hour**. Beams and columns built into external walls and internal load bearing walls all be constructed of non combustible materials
- Roofs: **non combustible materials as allowed for Grade 1 buildings or materials listed** e.g. profiled aluminum or galvanized steel coated
- Floors: constructed of **non combustible materials** and any structure which supports the floors must be non combustible with a proviso that aluminum is not allowed

# FOC (Great Britain)

Fire Officers Committee	UK
Standard I	Heavy non-combustible construction with good vertical and horizontal fire separation
Standard II	NC walls and floors. Combustible elements may be laid on the floors and may line walls, though there must be no air space between the floor and combustible layer. Floor openings are fire stopped. Horizontal fire separation is not strict.
Standard III	NC walls, floors and roofs but combustible elements may be laid on floors and may line walls. Floor openings are fire-stopped. Horizontal fire separation is not strict.
Standard IV	NC walls, floors and roofs but combustible elements may be laid on floors and may line walls. Vertical and horizontal fire separation is not strict.
Standard V	NC walls but floors and roofs have combustible elements. No fire-stopping openings exist.
BSST	Usually used for private dwellings and sometimes small businesses. Usually brick walls with frame floors and roof joists.

# South Korea

Grade	Column/ beam/ floor	Roof, Roof Frame	Walls
1st	Fire Proof Construction	Fire Proof Construction	Fire Proof Construction
2nd	Fire Proof Construction	Noncombustible Material	Fire Proof Construction
3rd	Noncombustible Material	Noncombustible Material	Noncombustible Material
4th	Other Materials than Grade 1, 2, 3		

- The grade of building with sandwich panel walls is the 3rd grade without reference to other main structures. But, grade is the 2nd grade if the building was authenticated as fire proof construction

# Japan

Special Grade	Columns, beams, floors, roofs and roof trusses are <b>all constructed of concrete</b> , Walls are constructed of non-combustible materials
First Grade - Category 1	Columns, beams and floors are constructed of either <b>concrete or steel frame covered by fire-resistive covering materials</b> , Roof, roof truss and walls are constructed of non-combustible materials
First Grade - Category 2	<b>Columns, beams and floors</b> are constructed of either bricks, rocks or steel frame covered by <b>fire resistive covering materials</b> . <b>Roof and roof truss</b> are constructed of <b>non-combustible materials</b> . Walls are constructed of non-combustible materials.
First Grade - Category 3	<b>Columns, beams, floors, roof and roof truss</b> are constructed of steel frame <b>covered by fireproofing covering materials</b> . Walls are constructed of <b>semi-noncombustible</b> materials.
Second Grade - Category 1	<b>Columns, beams, floors, roof and roof truss</b> are constructed of <b>non-combustible materials</b> other than those categorized in the special grade or the first grade, Wall are constructed of either concrete, concrete blocks, bricks or rocks
Second Grade - Category 2	All structures are constructed of <b>wooden frame</b> covered by clay
Second Grade - Category 3	Columns, beams, floors, roof and roof truss are constructed of <b>steel frame</b> . <b>Walls</b> are constructed of either <b>noncombustible or semi-noncombustible materials</b>
Second Grade - Category 4	Columns, beams, floors, roof and roof truss are constructed of either wood or steel frame covered by fireproofing covering materials. Walls are constructed of semi-noncombustible materials
Third Grade	All buildings other than those categorized in special, first and second grades. Mainly <b>wood frame construction</b> .

# Canada

IBC	Canada
6 -Frame and All Other	Includes rough case, metal clad, frame and others not more specifically classified.
5 -Masonry Veneer	<b>Frame buildings with brick veneer</b> or stone or other masonry veneer
4 -Masonry Joist	Risks in which the walls are of solid brick, stone, concrete block or hollow tile and <b>roofs are of wood joist construction</b> . This class includes mill type construction.
3 -Non Combustible with Non Masonry Walls	Includes steel on <b>steel buildings and asbestos clad buildings</b> with a steel frame
2 -Non Combustible with Masonry Walls	Risks in which the walls, partitions, and structural members are of <b>non-combustible construction</b> which do not qualify as fire resistive. Into this category will fall risks with masonry walls and steel deck roofs and/or other unprotected structural steel.
1 -Fire Resistive	Risks in which the walls, floors, and roof are of <b>masonry, reinforced concrete or other non-combustible material with high fire-resistive insulation</b> . Risks with a steel deck roof do not qualify as fire resistive.

# Austria (industrial tariff)

- **Bauklasse 1**

- bricks and stones (min. 25cm), concrete, reinforced concrete
- reinforced concrete frame filled with materials mentioned above
- reinforced concrete frame with metal sheeting without combustible insulation
- steel frame (coated) filled with bricks, concrete or stone

- **Bauklasse 2**

- wooden constructions and unprotected steel frames
- reinforced concrete frame with metal sheeting and combustible insulation
- steel frame (unprotected)
- wood frame filled with bricks, concrete or stones

- **Bauklasse 3**

- mixed foundation or wooden foundation
- all other building other than 1 or 2

# Switzerland

- **Massive:**  
Construction with walls and floors fire resistant, Framework brick, steel (overall fire resistant protected)
- **Mixed:**  
Constructions not classified under Massive or Wood/ Plastic. Examples are Wood framework filled with noncombustible materials, Steel-/ concrete constructions with walls of non combustible material or low weight planks with non combustible sheeting (Remark: up to 1/3 wood or plastic as part of a wall are accepted)
- **Wood or plastic (> 1/3):**  
Wood constructions with walls of wood or other combustible/ non combustible materials as well as low weight planks



## Other Countries

- Italy, France, Belgium more complicated building classifications based on the evaluation of each individual construction item
- Lot of countries no recommendation any longer, e.g. South Africa, Australia, New Zealand, Denmark, Spain, Portugal use individual company definitions or follow more European or US definitions

## Other Countries

- With the disappearance of insurance tariffs also **recommended building classes by association disappeared**
- **Individual assessment and classification of buildings by Insurer/ Reinsurer** is more evident
- Today professional surveyor more likely to **describe a building in its entire construction features** rather than classifying it to a construction class
  - Framework and wall including insulation and claddings
  - Construction of inner and non-load
  - Roof frame and cladding including insulation
  - No of floors and its construction

# Summary

- There are **different classification systems** for building constructions recommended by national insurance associations
- Finally **each insurance / reinsurance company has developed its own construction classification systems**, often based on recommended classifications systems however adjusted to their own experience
- Most importantly for insurer/ reinsurer is to get known the **combustibility of a material and if a construction/ part is fire resistive**
- It is always a starting point to look onto the demands of national authorities for building constructions, however insurer regard them often only as minimum requirements. **Usually requirements of an insurer/ reinsurer higher than of local authorities**
- Consequentially the recommendation to everyone involved in a construction of a building is to contact **as early as possible the insurer and check with him his requirements and recommendations**