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HOBSON NEWS

Hobson Engineering Volume 39

Engineering

HOBSON Celebrating 85 YEARS 1935-2020

Reaction to Fire and **Fire Resistance** as it applies to the ETA of an anchor

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One of the most critical considerations a building designer must review is the flammability of materials and their contribution to fire. The designer must determine how much time the occupants of a building have to escape and not be harmed in the evacuation process. There are two evaluations that are made in European codes that are used in an ETA (European Technical Assessment) and are very similar to Australian requirements, namely **Reaction to Fire** and **Fire Resistance.** Examination of products are completed in specially devised test rooms.

Reaction to Fire

Reaction to Fire is a measure of how a material contributes to the growth of fire. A European classification (**EN 13501-1:2018 - Fire classification of construction products and building elements**) has been established and is described with examples as follows.

Continued ...

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Table 1: A description and examples of materials with the Reaction to Fire Classification.

Reaction to Fire (EN 13501-1:2018)			
Classification	**Description**	**Flashover**	**Examples**
A1	Non-combustible material.	Nil	Concrete, steel, glass, natural stone, bricks, some mineral wools (used for fire proof insulation) and ceramics.
A2		Nil	Specified plasterboards, particle boards, cement, and glass wool.
B	Very limited contribution to fire.	Possible	Plasterboard and fire resistant MDF.
C	Limited contribution to fire.	10 Minutes to flashover	Phenolic foam, foil faced and fire resistant MDF.
D	Medium contribution to fire.	Flashover before 10 minutes	Expanded fire rated foams, materials and wood products without protection, where their reaction depends on their thickness and density.
E	Fuel, causes flashover before 2 minutes.	Flashover before 2 minutes	Low density plywood, laminated timber, fibreboard, or plastic composite insulation systems.
F	Easily flammable.	Immediate	Materials and products not tested and polystyrene.

Note: Flashover is the moment when combustible materials that were not involved in the original fire begin to burn, increasing the temperature in the room and increasing its **speed** of propagation.

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These are sub categorised into 2 groups as follows: **smoke emission** levels and **flaming droplets.** Smoke emission is a measure of the speed and quantity of smoke. Flaming droplets is a measure of the amount of flaming droplets being formed. The standard classifies these into a 's' class and a 'd' class as described below.

Speed of smoke emission		
Class	**Quantity/Speed**	**Description**
s1	Absent or Weak	Little or no smoke
s2	Average intensity	Medium amount of smoke
s3	High Intensity	Substantial smoke

Burning droplets		
Class	**Level**	**Description**
d0	No burning	No droplets
d1	Slow dripping	Non-inflamed droplets
d2	Fast dripping	Inflamed droplets

Note: These sub categories are rarely used for fasteners and metal fixings.

Fire Resistance

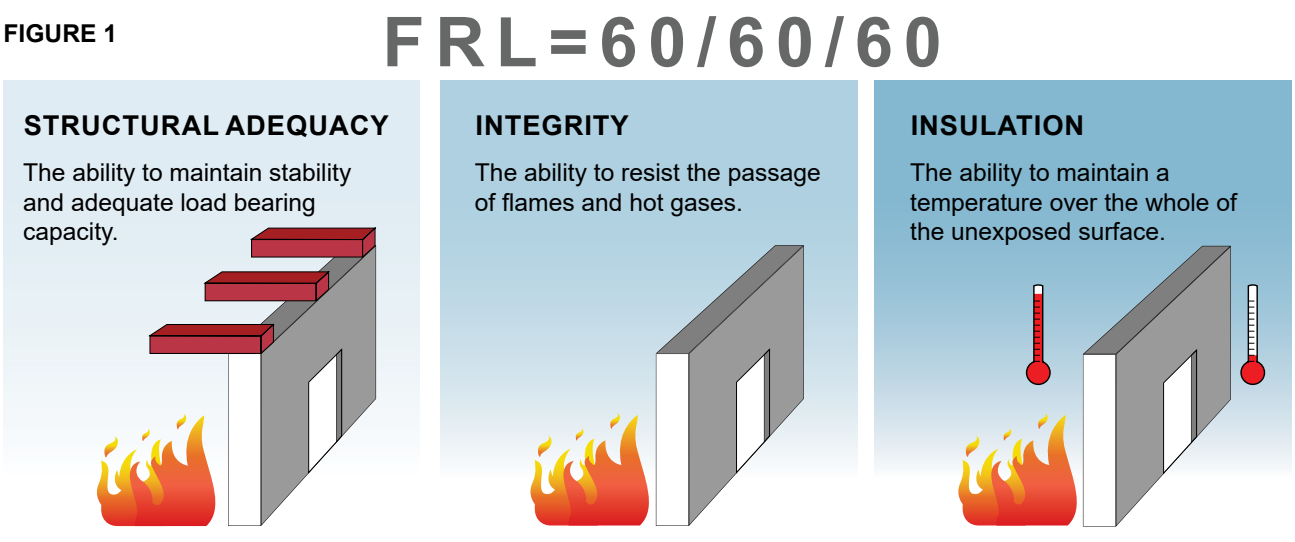
Fire Resistance is a measure of how long a system can protect a load bearing structure such as a beam, column, floor, wall, door or fire barrier. It is a measure of the time (in minutes) the system can resist the effects of fire and maintain **load bearing capacity, integrity** and **insulation** without heat transfer as indicated in figure 1 below. **AS 1530.4** stipulates FRL's (Fire Resistance Levels) for the three categories measured in minutes; **Structural Adequacy, Integrity** and **Insulation** as described in the table below. This system is similar to the European system where they refer to a REI where the same characteristics are expressed namely R = Load Bearing, E = Integrity and I = Thermal Insulation.

(**AS 1530.4** Methods for fire tests on building materials, components and structures Fire-resistance tests for elements of construction).

AS 1530.4 Fire Resistant Levels (measured in minutes)	
Structural Adequacy	**Load bearing capacity without the loss of structural stability**
Integrity	**Integrity without fire (flame and/or smoke) passage**
Insulation	**Insulation without significant heat transfer**

Figure 1 shows a wall with a Fire Resistance rating of 60/60/60 as per AS1530.4. This means the wall can maintain its designed load bearing capacity for 60 minutes, resist the flow of flames or hot gases for 60 minutes and be able to maintain a consistent temperature over the unexposed surface for 60 minutes.

FIGURE 1



Engineering

Fire Rated Anchors with ETA's

Anchor ETA's will often display results of the performance essential characteristics **(Reaction to Fire and Resistance to Fire)**. For example our **XBolt®** concrete screw anchor – **EXHMSR15M, (ETA 19/0621)** has the following essential characteristics published;

Under section 3.2 Safety in case of fire (BWR2), the characteristics of "Reaction to fire" meets the performance for Class A1: Non-combustible material.

The characteristics of "Resistance to fire" are detailed in Annex D1 and D2. Annex D1 and D2 summarise the mechanical properties of the fastener for periods of 30, 60, 90 and 120 minutes.

Table D1: Characteristic values to fire resistance

Fire resistance duration = 30 minutes		HEC 7.5	HEC 10.5	HEC 12.5	HEC 16.5
Tension loads, steel failure					
$N_{Rk,s,fi,30}$ Characteristic resistance	[kN]	0.23	0.61	1.28	2.90
Pull-out failure					
$N_{Rk,p,fi,30}$ Character. Resistance in concrete C20/25 to C50/60	[kN]	1.50	2.25	3.00	7.50
Concrete cone failure **)					
$N_{Rk,c,fi,30}$ Character. Resistance in concrete C20/25 to C50/60	[kN]	2.06	2.45	3.51	12.35
Shear loads, steel failure without lever arm					
$V_{Rk,s,fi,30}$ Characteristic resistance	[kN]	0.23	0.61	1.28	2.90
Shear loads, steel failure with lever arm					
$M_{Rk,s,fi,60}$ Characteristic bending resistance	[Nm]	0.19	0.66	1.73	5.90

Fire resistance duration = 60 minutes		HEC 7.5	HEC 10.5	HEC 12.5	HEC 16.5
Tension loads, steel failure					
$N_{Rk,s,fi,60}$ Characteristic resistance	[kN]	0.21	0.53	0.96	2.17
Pull-out failure					
$N_{Rk,p,fi,60}$ Character. Resistance in concrete C20/25 to C50/60	[kN]	1.50	2.25	3.00	7.50
Concrete cone failure **)					
$N_{Rk,c,fi,60}$ Character. Resistance in concrete C20/25 to C50/60	[kN]	2.06	2.45	3.51	12.35
Shear loads, steel failure without lever arm					
$V_{Rk,s,fi,60}$ Characteristic resistance	[kN]	0.21	0.53	0.96	2.17
Shear loads, steel failure with lever arm					
$M_{Rk,s,fi,60}$ Characteristic bending resistance	[Nm]	0.17	0.57	1.30	4.42

Fire resistance duration = 90 minutes		HEC 7.5	HEC 10.5	HEC 12.5	HEC 16.5
Tension loads, steel failure					
$N_{Rk,s,fi,90}$ Characteristic resistance	[kN]	0.16	0.41	0.83	1.88
Pull-out failure					
$N_{Rk,p,fi,90}$ Character. Resistance in concrete C20/25 to C50/60	[kN]	1.50	2.25	3.00	7.50
Concrete cone failure **)					
$N_{Rk,c,fi,90}$ Character. Resistance in concrete C20/25 to C50/60	[kN]	2.06	2.45	3.51	12.35
Shear loads steel failure without lever arm					
$V_{Rk,s,fi,90}$ Characteristic resistance	[kN]	0.16	0.41	0.83	1.88
Shear loads, steel failure with lever arm					
$M_{Rk,s,fi,90}$ Characteristic bending resistance	[Nm]	0.13	0.44	1.13	3.83

Hobson XBolt®

Performances
Characteristic values for fire resistance

Annex D1

Engineering

As per the ETA:

- The anchor shall be used in dry internal conditions.
- The anchor may be used for fixings with requirements related to resistance to fire.

Fire resistance duration = 120 minutes		HEC 7.5	HEC 10.5	HEC 12.5	HEC 16.5
Tension loads, steel failure					
$N_{Rk,s,\ fi,120}$ Characteristic resistance	[kN]	0.12	0.33	0.64	1.45
Pull-out failure					
$N_{Rk,p,fi,120}$ Character. Resistance in concrete C20/25 to C50/60	[kN]	1.20	1.80	2.40	6.00
Concrete cone failure **)					
$N_{Rk,c,fi,120}$ Character. Resistance in concrete C20/25 to C50/60	[kN]	1.65	1.96	2.81	9.88
Shear loads, steel failure without lever arm					
$V_{Rk,s,fi,120}$ Characteristic resistance	[kN]	0.12	0.33	0.64	1.45
Shear loads, steel failure with lever arm					
$M_{Rk,s,fi,120}$ Characteristic bending resistance	[Nm]	0.10	0.35	0.87	2.95

Fire resistance duration = 60 minutes			HEC 7.5	HEC 10.5	HEC 12.5	HEC 16.5
$S_{cr,N}$	Spacing	[mm]	168	180	208	344
S_{min}	Minimum spacing	[mm]	45	50	60	100
$C_{cr,N}$	Edge distance	[mm]	84	90	104	172
C_{min}	Minimum edge distance (one side fire)	[mm]	84	90	104	172
C_{min}	Minimum edge distance (two sides fire)	[mm]	300	300	300	300
γ_{Msp}	Partial safety factor*)	[-]	1.0	1.0	1.0	1.0

*) In absence of other national regulations

**) As a rule, splitting failure can be neglected when cracked concrete and reinforcement is assumed.

Concrete pry-out failure		HEC 7.5	HEC 10.5	HEC 12.5	HEC 16.5
k factor	[--]	1	1	1	2

According EN 1992-4:2018, these values of k factor and the relevant values of $N_{Rk,c,fi}$ given in the above tables have to be considered in the design.

Concrete edge failure

The characteristic resistance $v^0_{Rk,c,fi}$ in C20/25 to C50/60 concrete is determined by:
$V^0_{Rk,c,fi} = 0.25 \times V^0_{RK,c}$ (≤ R90) and $V^0_{RK,c,fi} = 0.20 \times V^0_{RK,c}$ (R120)
With $V^0_{RK,c}$ initial value of the characteristic resistance in cracked concrete C20/25 under normal temperature according to EN 1992 - 4:2018.

Hobson XBolt®

Performances
Characteristic values for fire resistance

Annex D2

Designers can look up these tables to determine the load capacities of these fasteners for varying fire resistance durations. **An example of this table being used is for determining the compliance of say a pipe suspension system in a building where fasteners are used to hold overhead pipes and cables. The fasteners can be chosen to at least match the reaction to fire and fire resistance of the system being installed.**

Application

Drill Diameters

Selection Chart

	TYgaBolt®	Clawbolt®	XBolt®	Drop In Anchor	H-IT™ Anchor	MHP-D Drill Bit 2 Cutter SDS-PLUS				MHP-T Drill Bit 3 cutter SDS-PLUS			
Anchor Size	(mm)	(mm)	(mm)	(mm)	(mm)	Drill Bit Size	QFind	Length (mm)	Working Length (mm)	Drill Bit Size	QFind	Length (mm)	Working Length (mm)
Ø5			30		25	Ø5	2150505	110	50	Ø5	2140505	110	50
			50		32								
					38								
					50								
					65		2150510	160	100		2140510	160	100
					75								
					100								
Ø6		45	30		40	Ø6	2150605	110	50	Ø6	2140605	110	50
			50										
		55	60				2150610	160	100		2140610	160	100
		60	65										
		85	75										
		100	80										
			100										
		120					2150615	210	150		2140615	210	150
		150											
				25		Ø8	2150805	110	50	Ø8	2140805	110	50
Ø6.5	25				25	Ø6.5	2156510	160	100	Ø6.5	2140655	110	50
	35				38								
					50								
	55				63		2156515	210	150		2146515	210	150
					75								
					100								
Ø8	40	50	50			Ø8	2150805	110	50	Ø8	2140805	110	50
	45												
	60	60	55				2150810	160	100		2140810	160	100
	70	68	60										
	80	75	65										
	90	80	75										
		90	90										
		95	95										
			100										
		115	110				2150815	210	150		2140815	210	150
		120	120										
		130	130										
		135											
		165	160				2150820	260	200		2140825	310	250
		170											
				30		Ø10	2151005	110	50	Ø10	2141005	110	50

Application

	TYgaBolt®	Clawbolt®	XBolt®	Drop In Anchor	H-IT™ Anchor	 SDS-PLUS MHP-D Drill Bit 2 Cutter				  SDS-PLUS MHP-T Drill Bit 3 cutter MHP-Y Drill Bit Y cutter* (Ø20)			
Anchor Size	(mm)	(mm)	(mm)	(mm)	(mm)	Drill Bit Size	QFind	Length (mm)	Working Length (mm)	Drill Bit Size	QFind	Length (mm)	Working Length (mm)
Ø10	40					Ø10	2151005	110	50	Ø10	2141005	110	50
	45												
	50												
	55	65	60		75		2151010	160	100		2141010	160	100
	60	70	75										
	65	75	85										
	75	80	100										
	80	90											
	95	100											
	100	105	105		100		2151015	210	150		2141015	210	150
	110	115	120										
	120	120	125										
	130	135	140										
		140	150										
		155	160				2151020	260	200		2141020	260	200
		160	195										
		165	200										
		175											
		185											
		245					2151040	460	400		2141025	310	250
				30		Ø12	2151210	160	100	Ø12	2141210	160	100
				40									
Ø12	60	75	75			Ø12	2151210	160	100	Ø12	2141210	160	100
	65	80	100										
	75	90											
	80												
	100	100	100				2151215	210	150		2141215	210	150
	105	110	118										
	110	120	138										
	120	125	150										
	130	140											
		145											
		150											
		170					2151220	260	200		2141220	260	200
		180											
		200											
				50		Ø15	2151510	160	100	Ø15	2141510	160	100
Ø16	65	90	100			Ø16	2151610	160	100	Ø16	2141610	160	100
	75												
	105	105	150				2151615	200	150		2141615	200	150
	110	115											
	145	125											
		140											
		145											
		170					2151620	250	200		2141620	250	200
		175											
		185											
		190											
		220					2151625	300	250		2141625	300	250
		250											
				65		Ø20	2152015	200	150	Ø20	2142025*	300	250
Ø20	75	120				Ø20	2152015	200	150	Ø20	2142025*	300	250
	100	125											
	160	160					2152025	300	250		2142025*	300	250
		170											
		200											
				80		Ø25	2152520	250	200				

TygaBolt® XBolt® CLAWBOLT® H-IT™

On Location

Hobson in Tassie Special

MONA

BERRIEDALE, TAS

Hobson bolts feature at the Museum of Old and New Art, located within the Moorilla Winery on the Berriedale Peninsula.

Beachside

BRUNY ISLAND, TAS

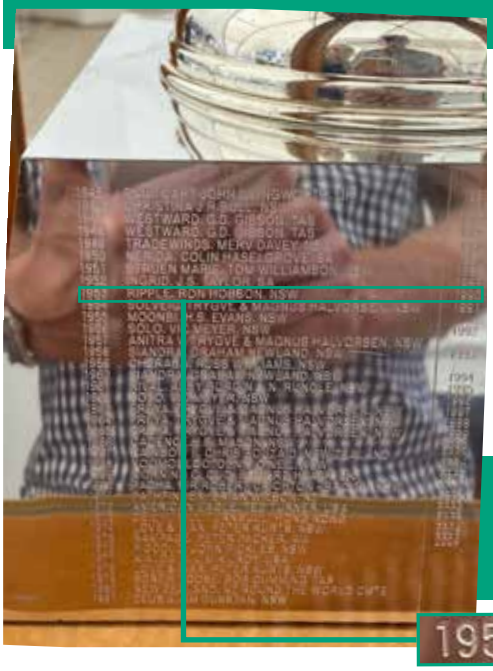
A beautiful view is the perfect location for Hobson screws, located on the beachside at Bruny Island.

On Location

Brooke Street Pier

HOBART, TAS

The floating pontoon at Sullivan's Cove, Brooke Street Pier showcases Hobson's finest.



Sydney To Hobart Trophy

Featuring Peter's father, Ron Hobson, winner of the 1953 Sydney to Hobart.

Constitution Dock

HOBART, TAS

This harbour-side parking lot in Hobart features sturdy Hobson bolts that can withstand the elements.

On Location

Hello Newcastle

IN **NEWCASTLE** WE ARE LOCATED AT 50 ELWELL CLOSE, BERESFIELD, NSW 2322

HOBSON
Celebrating
85 YEARS
1935-2020

From the desk of Peter Hobson;

This year of 2020 is certainly one that none of us will forget. Apart from the horrible social dysfunctions, it also represents Hobson Engineering's 85th year in business. Started in 1935 by my father, with only the one employee making roller skates, to now; arguably the most successful Fastener Business in Australia.

We are still a family owned business, driven by the same philosophies as my father; ethics, financial conservatism, innovation in all facets of the business and a culture of constant improvement. Our success is a result of many long term dedicated staff over the years who themselves have the goal of self-growth and doing a better job, and being a better person today, than they achieved the day before.

Over the years, we have succeeded where many other great Fastener Companies have fallen, and I believe this is a result of our ability to adapt to changing markets and a willingness to take the path less travelled. Making informed decisions, not being afraid to change those decisions when circumstances change and leading. I have lost count of the number of times in my younger days, I was told by the "old guard" I wouldn't last a year and I would destroy my father's business. Obviously at the age of 23 it was a daunting and stressful time.

However, I have always been confident in the direction I have steered the Company, feeling that our innovative direction was the correct one. It is for others to commentate on the way we have changed the market and the way fasteners are now distributed in Australia. Perhaps our most proud achievement is our systems relating to Quality Control, and our unending efforts to ensure we sell quality products. With over 80 million parts sold a month, it is obviously impossible to inspect every piece, but we are very focused on a rigorous and extensive batch testing system that is evidenced by Independent ILAC reports available on line.

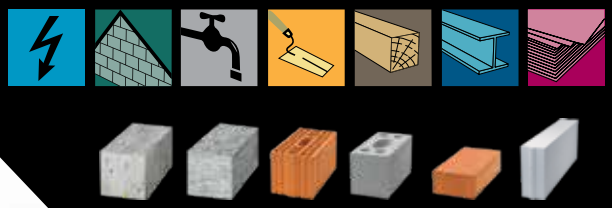
There are no guarantees in life nor in business, but all we can do is continue in the same fashion as we have for the last 85 years, and with great staff I am sure we will continue to achieve our goals. In ending this article, I would just like to sincerely thank all our distributors, many of whom have been with us from my first year in 1987, for their loyalty and belief in us.

Swiss Quality

Proudly distributed by Hobson Engineering

Mungo® Drill Bits

SDS-Plus 2-Cutter, 3-Cutter, Y-Cutter



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- Hammer drilling
- Concrete and reinforced concrete
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- Optimum extraction of drill dust promotes high drilling performance
- With recessed carbide tip for extreme resilience in reinforcement steel
- No jamming with reinforcement hits
- High speed
- Low vibration
- No signs of fatigue due to a low surface pressure
- Long life
- Excellent break resilience

MUDMHPDO

MHP-D DRILL BIT- SDS-PLUS 2-CUTTER

- The fastest SDS-Plus hammer drill bit in concrete
- Slim head and large drilling dust grooves for fastest possible drilling dust removal
- Will also survive impact on reinforcement

MUDMHPTO

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- The best SDS-Plus hammer drill bit
- Durable and faster than a 4-cutter thanks to cutters with equal heights on same circumference
- More robust than a 2-cutter thanks to multiple cutter head
- No snagging on reinforcements due to cutters with reverse curvature
- Lowest price per hole drilled thanks to long service life
- Large drilling dust grooves optimise drilling dust removal

MUDMHPYO

MHP-Y DRILL BIT SDS-PLUS Y-CUTTER

- The fastest SDS-Plus hammer drill bit in concrete
- Slim head and large drilling dust grooves for fastest possible drilling dust removal
- Will also survive impact on reinforcement

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