Selection and Specification of Permanent Magnet Materials

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Spontaneous Materials

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Outline

- Motivation
- Basic Considerations
- Advanced Considerations
- Specification
- Checklist
- Conclusions

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Motivation

- Gross oversimplification
- Errors of omission
- Lack of protocol

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Basic Considerations

	Ferrite	Alnico	SmCo			NdFeB	
Property	Ceramic 8	Alnico 5	1-5	1-5 TC	2-17	Bonded	Sintered
B_r (kG)	4.0	12.5	9.0	6.1	10.4	6.9	13.4
α (%/°C)	-0.18	-0.02	-0.045	-0.001	-0.035	-0.105	-0.12
$(BH)_{max}$ MGOe	3.8	5.5	20	9	26	10	43
H_{ci} (kOe)	3.3	0.64	30	30	25	9	15
β (%/°C)	+0.4	-0.015	-0.3	-0.02	-0.3	-0.4	-0.6
H_s (kOe)	10	3	20	40	30	35	35
T_c (°C)	460	890	727	729	825	360	310

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Advanced Considerations

- Physical
- Mechanical
- Corrosion
- Magnetizing
- Assembly
- Adhesives
- Testing

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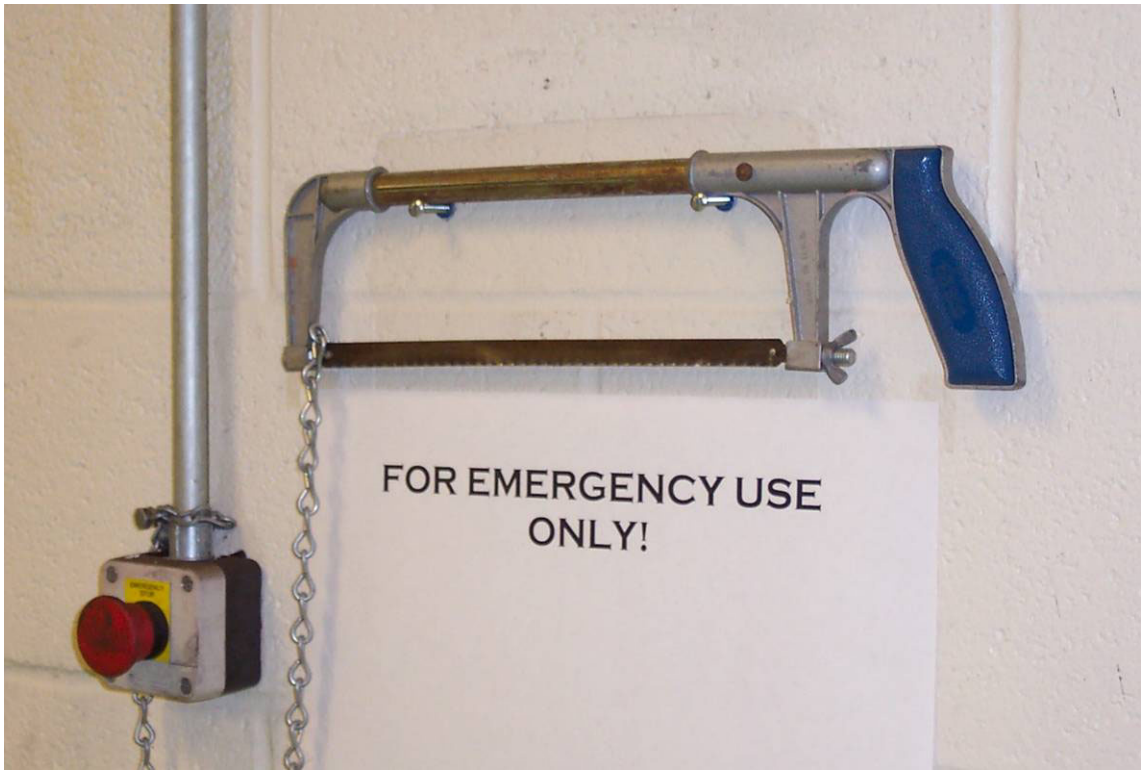
Safety First



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Specification

- Two Approaches
  - What I have 
  - What I need 
- Avoid Contradictions
- Use IMA or IEC standards
- Supplier Reference, or equivalent

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Checklist

- Magnetic parameters
- Flux variations
- Dimensions/Tolerances
- Testing
- Magnetizing

- Coating
- Adhesive
- Assembly
- Others

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Conclusions

- Many things to consider
- Thoroughness is important
- Use the checklist

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