



# **Research of R290 application**

**Zhiyong Liu**  
**R&D Center, Midea Group Co.**  
**2013-6-29**





# Contents

1. R290 in Midea
2. Charge mass & performance .
3. Ways to challenge the mass limit
4. Safety design
5. Difficulties
6. Standard update in china
7. Questions about the IEC60335-2-40



# 1. R290 in Midea



## 1. 1 About Midea



# Midea Group

## Overview



- The **most comprehensive** home appliance manufacturer in China.
- **USD 17.7 Billion** revenue in FY2012.
- Midea brand value is evaluated to be 9.7billion USD in 2012, ranked No.5 in China by R&F Global Ranking.
- **20 domestic and 6 overseas** manufacturing bases.
- Over **150,000** employees.

**Corporate Mission:** Create a beautiful life for human beings.

**Core Value:** Care for people, Rational pursuit, Innovative reform, Authorized operation, Cooperating & sharing.

**Spirit:** Open, Harmonious, Practical, Innovative.





# Midea Group

## Business Scale

### Major Appliance

- **Residential AC**
- Commercial RC
- Landry Appliances
- Refrigerator
- Dishwasher



### Small Appliance

- **Microwave Oven**
- **Fans and heater**
- Air purifier
- Cooking applications
- Water dispenser
- ...



### Components

- Motors
- Transformer
- Compressor
- Mould
- ...

### Real Estate

- Shunde
- Gaoming
- Guiyang
- Xuzhou
- Zhuzhou
- Panjin
- Handan



### Others

- Finance
- Logistics
- Lighting
- Red Wine
- ...





# Products





# Midea Group

## Market Leadership

	Residential AC		Commercial AC		Refrigerator		Laundry Appliances		Dishwasher	
Export Market Share	23%	No.1	20%	No.1	7.6%	No.4	11%	No.2	80%	No.1
Domestic Market Share	26%	No.2	12.1%	No.2	13%	No.2	26%	No.2	20%	No.2

	Microwave Oven		Rice Cooker		Induction Cooker		Water Dispenser		Fan		Heater	
Export Market Share	35%	No.1	12%	No.1	19%	No.1	15%	No.1	9%	No.1	6%	No.2
Domestic Market Share	40%	No.2	41%	No.1	40%	No.1	47%	No.1	46%	No.1	33%	No.1

Export data source: China customs export data.

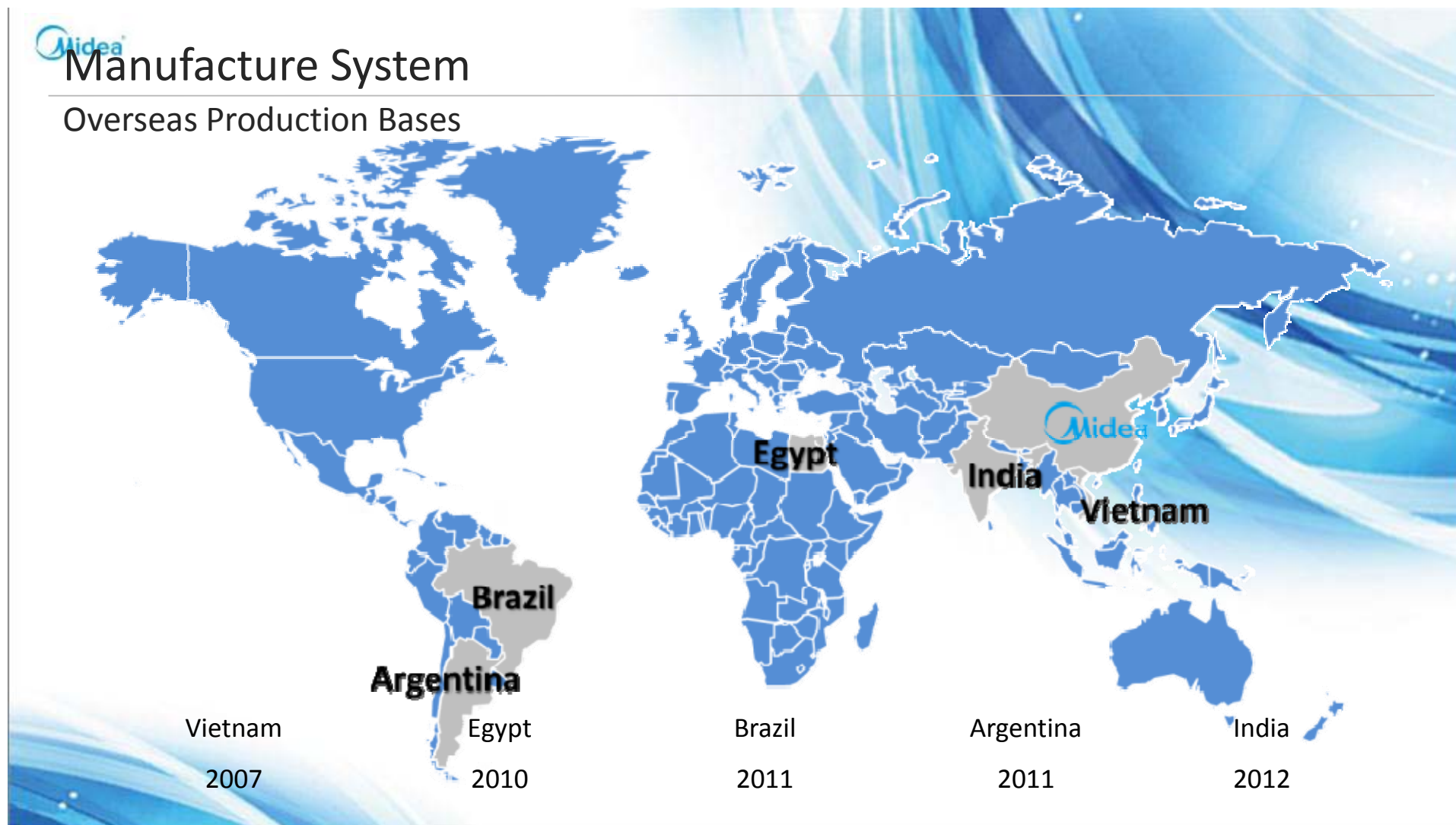
Data period: by the end of 2012.





# Manufacture System

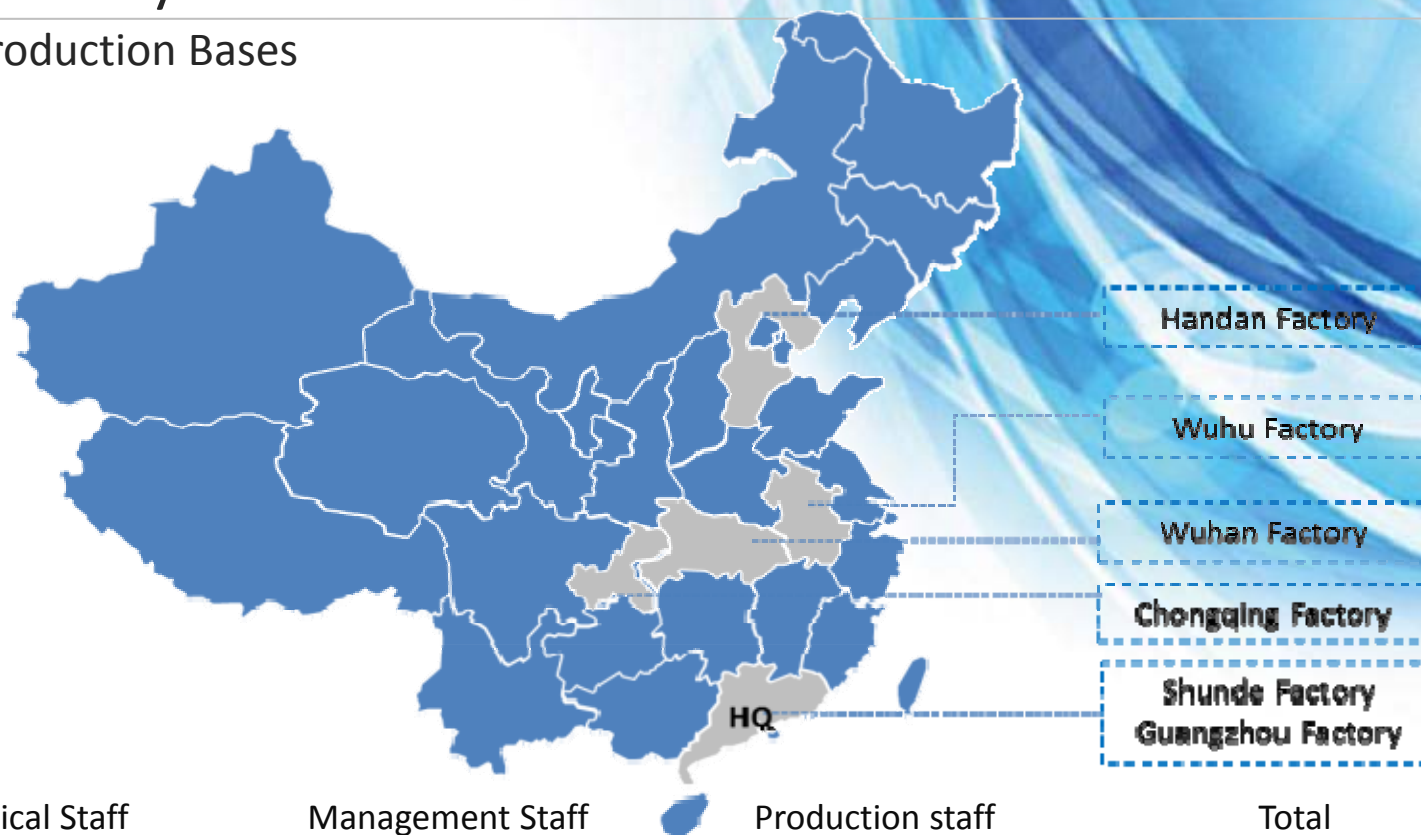
## Overseas Production Bases





# Manufacture System

## Domestic Production Bases



Technical Staff

2,800

Management Staff

1,200

Production staff

39,000

Total

43,000

Data period: By Dec,2012.



# Midea Group

## Organization Structure

Midea Group is the major shareholder of **GD Midea Electric Holding Co., Ltd.**, **Little Swan** and **Welling Holding Ltd.**



Shenzhen:000527



Shenzhen:000418



Hongkong:00382



## 1. 2 The products using R290



MIDEA MID-END AIR CONDITIONER DESIGN  
INDUSTRIAL DESIGN DEPT.



		<b>Ref. Certif. No.</b> JPTUV-049467
IEC SYSTEM FOR MUTUAL RECOGNITION OF TEST CERTIFICATES FOR ELECTRICAL EQUIPMENT (IECEE) CB SCHEME SYSTEME CEI D'ACCEPTATION MUTUELLE DE CERTIFICATS D'ESSAIS DES EQUIPEMENTS ELECTRIQUES (IECEE) METHODE OC		
<b>CB TEST CERTIFICATE</b> <b>CERTIFICAT D'ESSAI OC</b>		
<b>Product</b> Produit	Split Type Air Conditioner	
Name and address of the applicant Nom et adresse du demandeur	GD Midea Air-Conditioning Equipment Co., Ltd. Midea Industrial City, Beijiao, Shunde, Foshan, Guangdong, P.R. China	
Name and address of the manufacturer Nom et adresse du fabricant	GD Midea Air-Conditioning Equipment Co., Ltd. Midea Industrial City, Beijiao, Shunde, Foshan, Guangdong, P.R. China	
Name and address of the factory Nom et adresse de l'usine	GD Midea Air-Conditioning Equipment Co., Ltd. Midea Industrial City, Beijiao, Shunde, Foshan, Guangdong, P.R. China	
Rating and principal characteristics Valeurs nominales et caractéristiques principales	AC 220-240V, 60Hz; Class I; 8.0A, 1670W IP24 (Outdoor unit) Refrigerant: R290	
Trade mark (if any) Marque de fabrique (si elle existe)	Midea	
Model/type Ref. Ref. de type	MS11M-09HRFN7-QRC4 (indoor) MS11M-09HRFN7-QRC4, outdoor : MOB-09HRFN7-QRC4	
Additional information (if necessary) Information complémentaire (si nécessaire)	IEC 60335-2-40:2002+A1+A2 IEC 60335-1:2001+A1+A2 IEC 62233:2005	
A sample of the product was tested and found to be in conformity with Un échantillon de ce produit a été essayé et a été considéré conforme à la	16050493 001	
As shown in the Test Report Ref. No. which forms part of this Certificate Comme indiqué dans le Rapport d'essais numéro de référence qui constitue une partie de ce Certificat		
This CB Test Certificate is issued by the National Certification Body Ce Certificat d'essai OC est établi par l'Organisme National de Certification		
 <div style="float: right;">         TÜV Rheinland Japan Ltd.          Global Technology Assessment Center          4-25-2 Kita-Yamata, Tsuzuki-ku          Yokohama 225-0021 Japan          Phone + 81 45 914-3888          Fax + 81 45 914-3354          Mail: info@jp.tuv.com          Web: www.tuv.com       </div>		
Date: 30.01.2013	Signature: Lily Cai 	

<b>CERTIFICATE</b> of Conformity EC Council Directive 2004/108/EC Electromagnetic Compatibility		
<b>Registration No.:</b>	AE 50247371 0001	
<b>Report No.:</b>	16050499 001	
<b>Holder:</b>	GD Midea Air-Conditioning Equipment Co., Ltd. Midea Industrial City, Beijiao, Shunde Foshan, Guangdong P.R. China	
<b>Product:</b>	Air Conditioner (Split-type Air Conditioner)	
<b>Identification:</b>	MS11M-09HRFN7-QRC4 (indoor: MS11M-09HRFN7-QRC4, outdoor: MOB-09HRFN7-QRC4)  Serial No. : n.a. Remark : Refer to test report 16050499 001 for details.	
<b>Tested acc. to:</b>	EN 55014-1:2006+A1+A2 EN 55014-2:1997+A1+A2 EN 61000-3-2:2006+A1+A2 EN 61000-3-3:2008	
This certificate of conformity is based on an evaluation of a sample of the above mentioned product. Technical Report and documentation are at the Licence Holder's disposal. This is to certify that the tested sample is in conformity with all provisions of Annex I of Council Directive 2004/108/EC. This certificate does not imply assessment of the production of the product and does not permit the use of a TÜV Rheinland mark of conformity. The holder of the certificate is authorized to use this certificate in connection with the EC declaration of conformity according to the a.m. Directive.		
Date: 04.02.2013		
TÜV Rheinland LGA Products GmbH - Tillystraße 2 - 90431 Nürnberg		
The CE marking may only be used if all relevant and effective EC Directives are complied with.		

passed the strict test,  
certification from TÜV.

## 1.3 Labs

### International-level Labs and Equipments



Midea







## Work shop







## Work shop



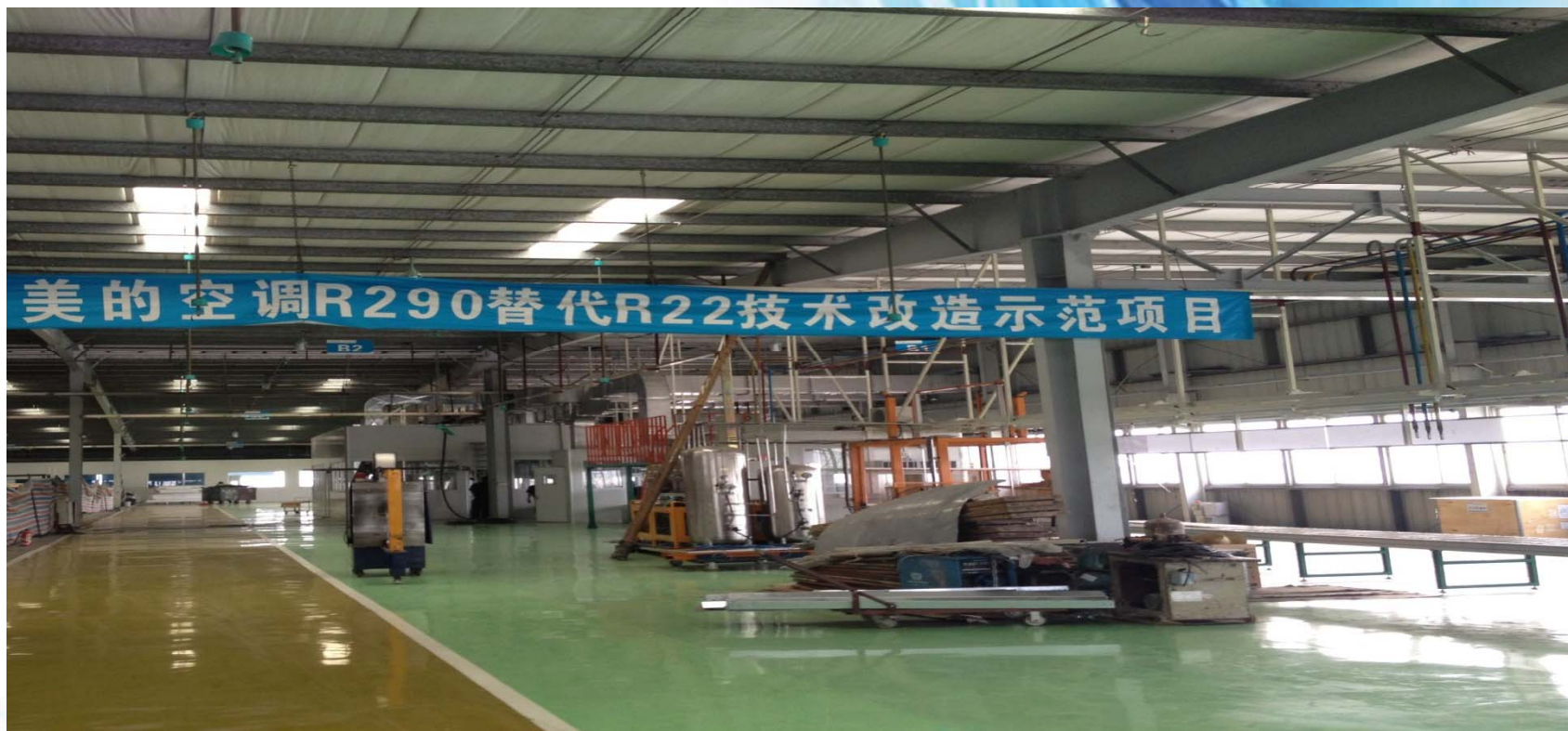


## Life test room





## 1.4 Production line







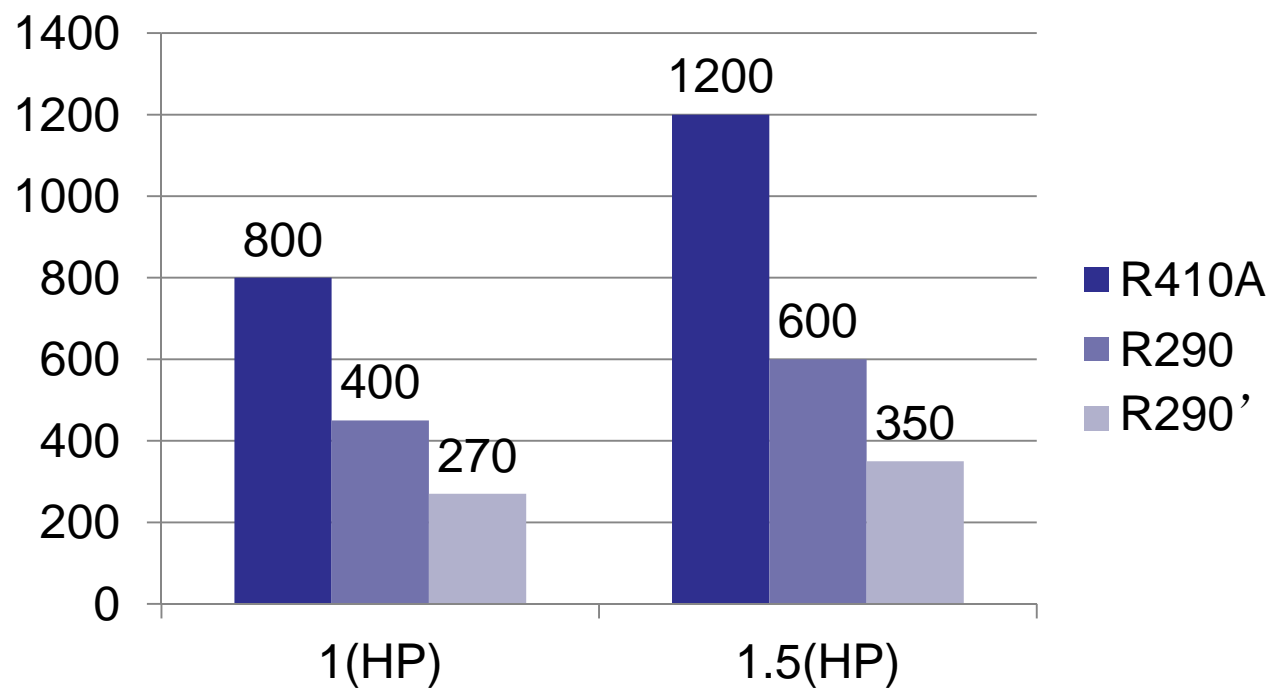






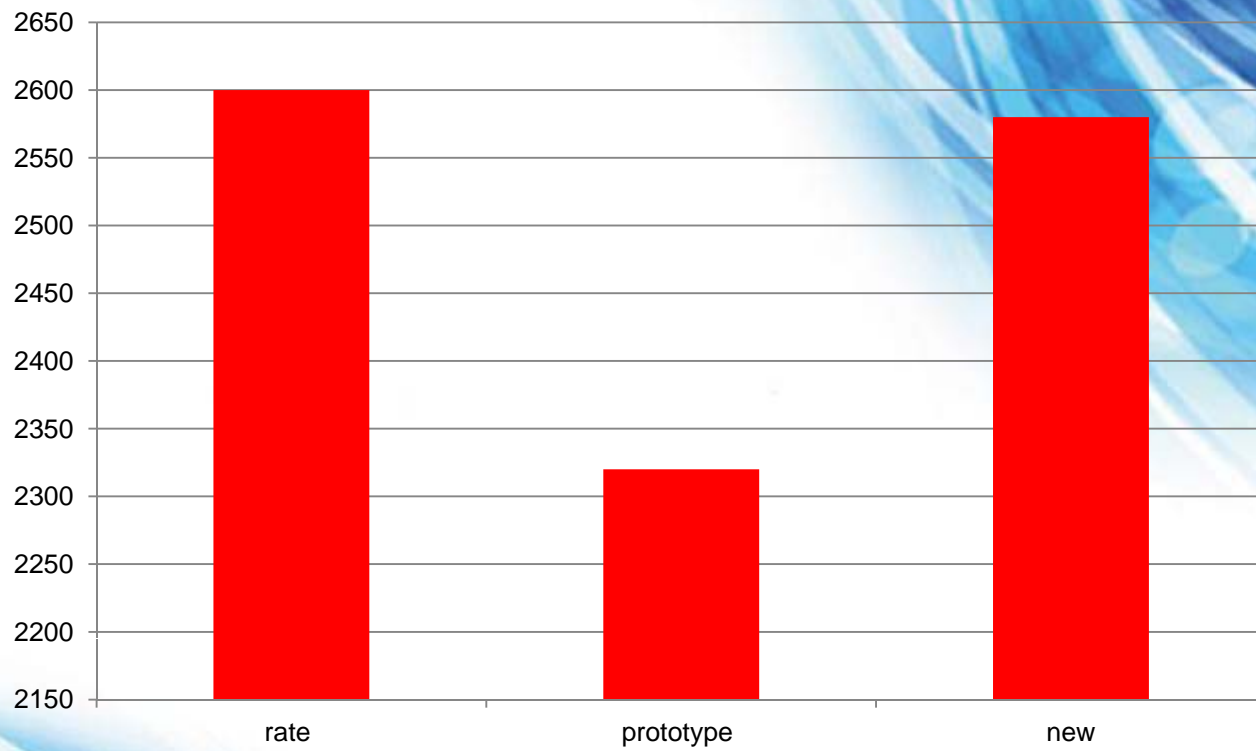
## 2.Charge mass & performance

## 2.1 Requirement & standard limit



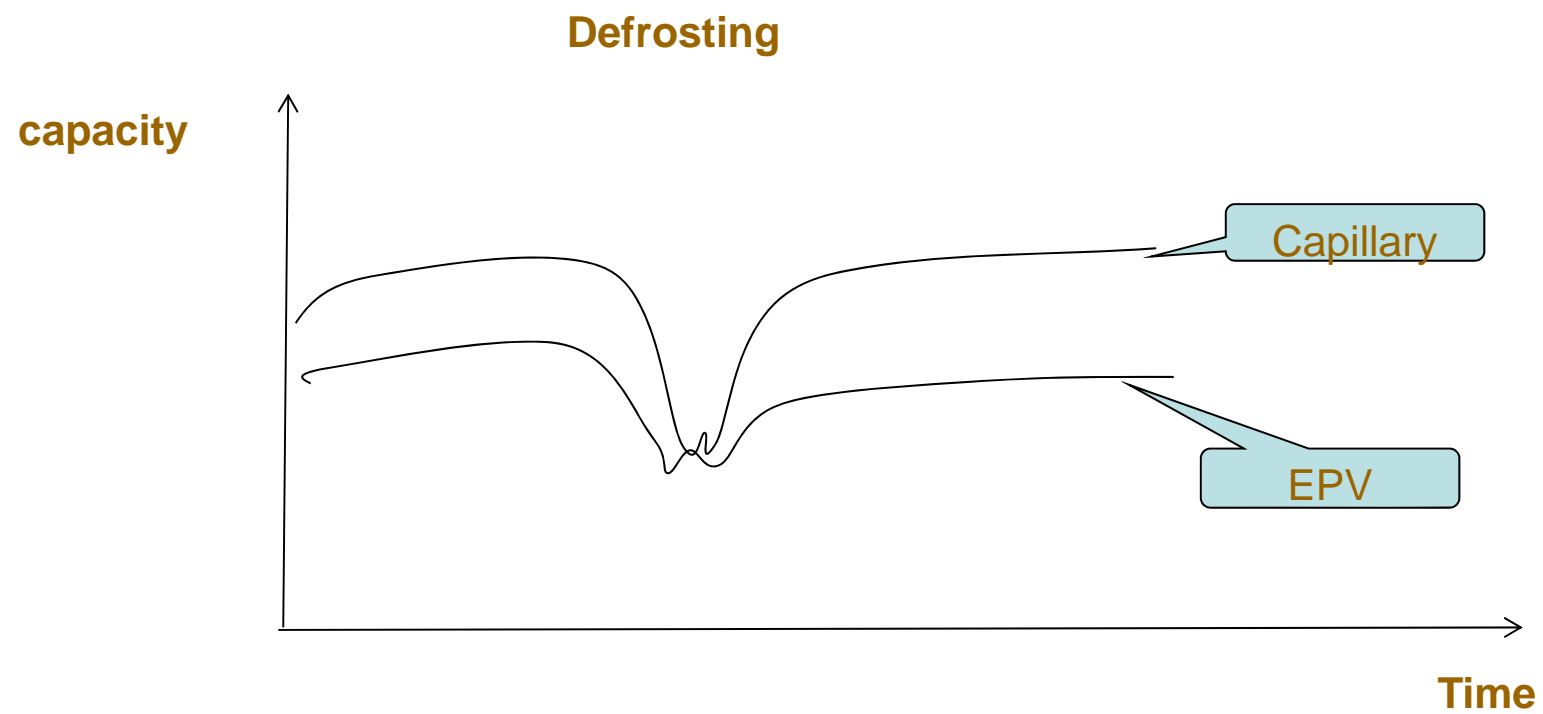


# Cool capacity



# Other influence

- Heat capacity
- Low temperature capacity
- APF
- Defrosting (EPV SYSTEM)



### 3. The ways to decrease charge mass

Decrease the inner volume

- Use more efficient (MHX, Mix-tube, Wide-fin)
- Compressor (oil , volume )
- Pipe , accumulator, flow-path



#### 4. Safety design

- Change the direction of leaking gas
- Open some lower in bottom plate , avoid of gas gathering
- Sealed the electric case
- Use lower power electric component .

## 5. Difficulties

- Manufacture efficiency
- Production cost
- Equipment investment
- Heat capacity
- Higher APF system

## 6. Standard update in china

- The national standard of GB4706 has published in 1<sup>st</sup>,May
- The national standard of installation maintain is reviewing
- Certification (3C) not issued , and no sales.

## 7. Questions about the IEC60335-2-40

- Identify ignition source (not clear )
- Installation height (1.8 vs 2.2)
- Vacuum valve (no need )



## 7. Conclusion

- ① Charge mass greatly influence the AC performance .
- ② There are many ways to optimize the charge mass , but lead to additional cost and expensive investment .
- ③ Standard should not be too strict , otherwise it will Hinder R290 in the popularization and application of air conditioning products.



**Thank you !**



# Q&A