DEVELOPMENT OF AN INNOVATIVE «SUPER» SEAL WITH IMPROVED ACID CORROSION RESISTANCE AND NEW FEATURE: RESISTANCE TO ALKALI

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MARKET DEMANDS

SOME EXAMPLES:

CAR WASHING
RESISTANCE TO ALKALI DETERGENTS

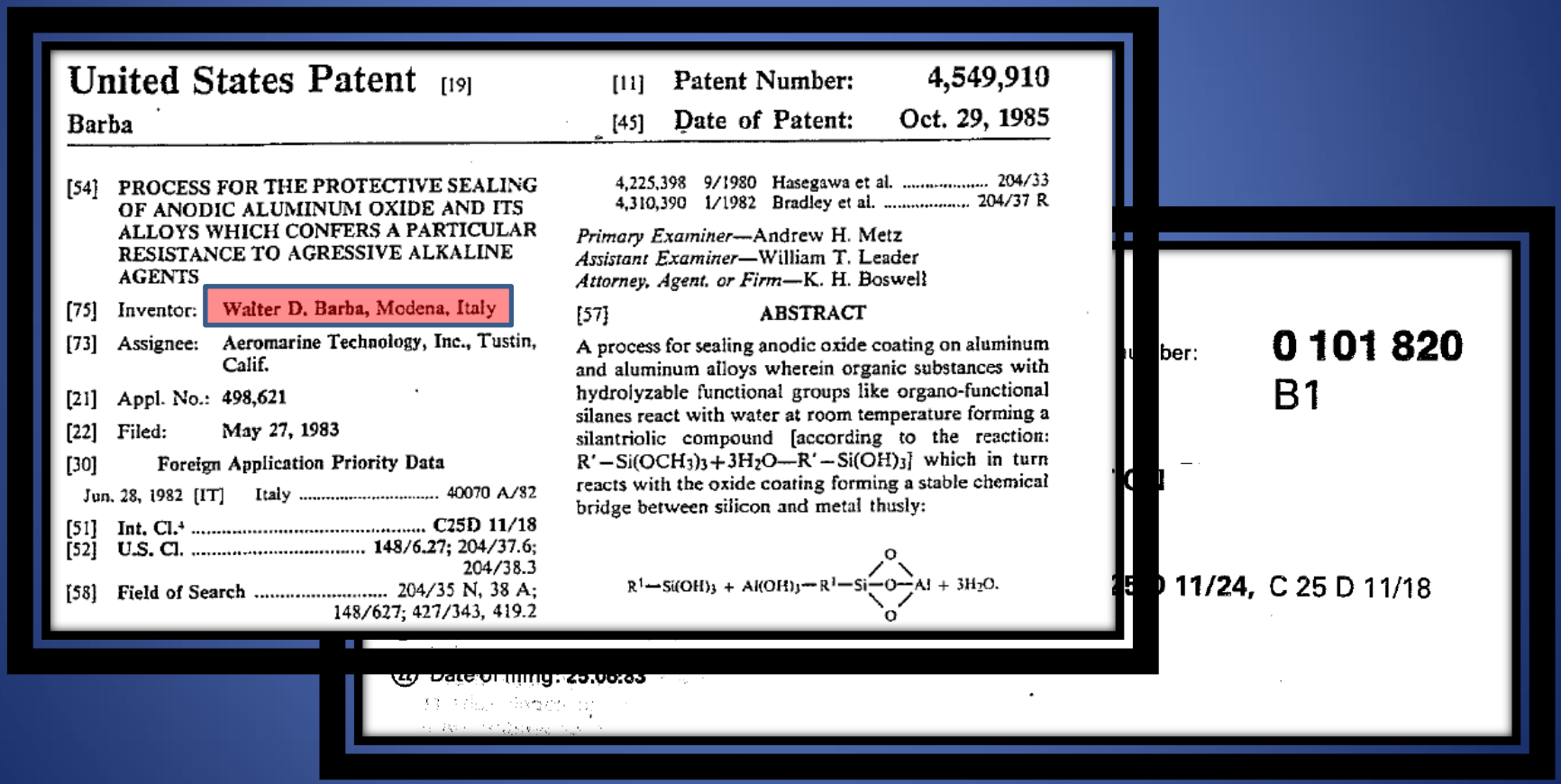
DISHWASHER RESISTANCE TO ALKALI DETERGENTS

SALT SPRAY RESISTANCE WITH ECOLOGICAL PROCESSES

NICKEL-FREE AND ECOLOGICAL PROCESS

Alkaline detergents are the best overall cleaners and can remove most soils

"NEW" TECHNOLOGIES…



United States Patent [19]

Barba

[11] Patent Number: 4,549,910

[45] Date of Patent: Oct. 29, 1985

[54] PROCESS FOR THE PROTECTIVE SEALING OF ANODIC ALUMINUM OXIDE AND ITS ALLOYS WHICH CONFERS A PARTICULAR RESISTANCE TO AGRESSIVE ALKALINE AGENTS

[75] Inventor: Walter D. Barba, Modena, Italy

[73] Assignee: Aeromarine Technology, Inc., Tustin, Calif.

[21] Appl. No.: 498,621

[22] Filed: May 27, 1983

[30] Foreign Application Priority Data

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[51] Int. Cl.⁴ C25D 11/18

[52] U.S. Cl. 148/6.27; 204/37.6; 204/38.3

[58] Field of Search ..... 204/35 N, 38 A; 148/627; 427/343, 419.2

4,225,398	9/1980	Hasegawa et al.	204/33
4,310,390	1/1982	Bradley et al.	204/37 R

Primary Examiner—Andrew H. Metz
Assistant Examiner—William T. Leader
Attorney, Agent, or Firm—K. H. Boswell

[57] ABSTRACT

A process for sealing anodic oxide coating on aluminum and aluminum alloys wherein organic substances with hydrolyzable functional groups like organo-functional silanes react with water at room temperature forming a silantriolic compound [according to the reaction: $R'-Si(OCH_3)_3+3H_2O-R'-Si(OH)_3$] which in turn reacts with the oxide coating forming a stable chemical bridge between silicon and metal thusly:

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EXAMPLE
OF SEALING SEQUENCE

NICKEL FREE
COLD SEALING

- ANODIZING
- RINSING
- RINSING
- COLOURING / ELECTROCOLOURING
- RINSING
- DEMINERALIZED RINSING
- ECOSEAL 6 COLD SEALING 20-25 °C
- RINSING
- SUPERSEAL PROCESS FOR ALKALINE RESISTANCE
- RINSING

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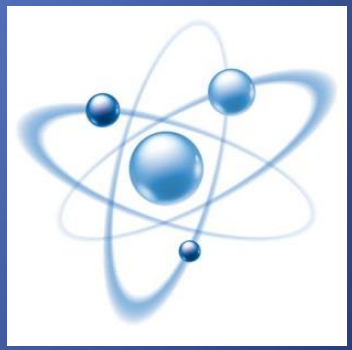
NICKEL-BASED COLD SEALING TECHNOLOGY

Step 1: Nickel-based cold sealing

- Temperature = 25 – 32 °C
- pH = 6.0 – 6.5
- Time min/micron = 1
- HARDWALL 3 Super = 5 g/l



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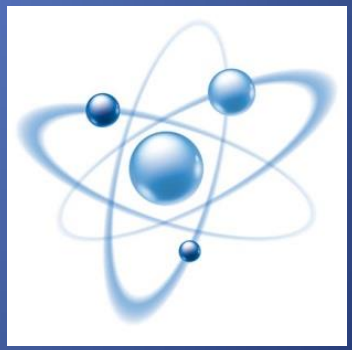
NICKEL-FREE COLD SEALING TECHNOLOGY

Alternative Step 1 or Step 2: Nickel-free cold sealing

- Temperature = 20 – 25 °C
- pH = 4.0 – 5.0
- Time min/micron = 1
- ECOSEAL 6 = 50 g/l



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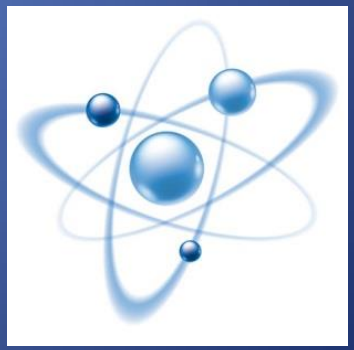
NICKEL-FREE COLD SEALING TECHNOLOGY

Step 2: Alkaline resistant Superseal

- Temperature = 80 – 85 °C
- Time = 20 – 30 min
- Superseal 2S = 80 – 100 g/l



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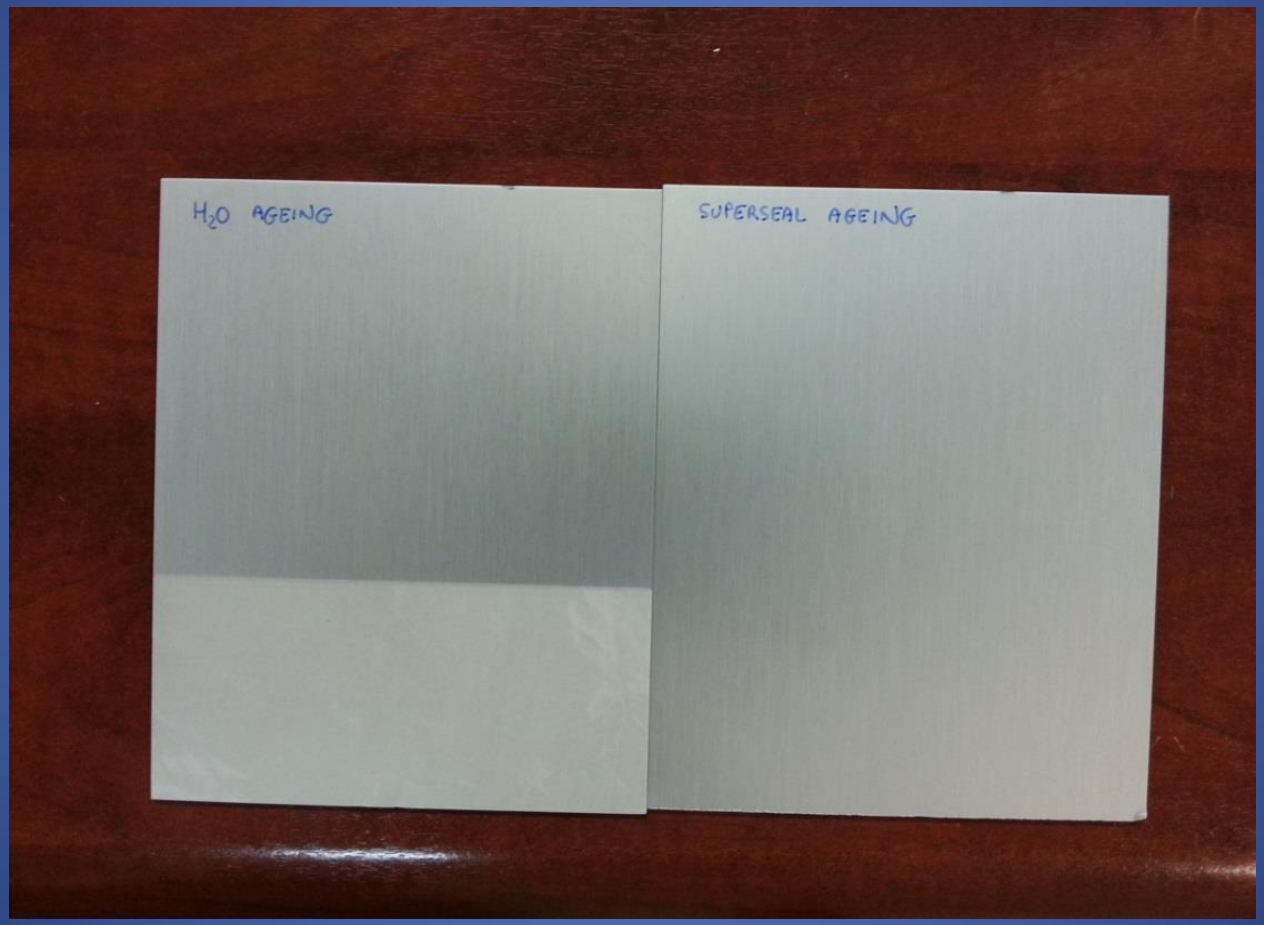
SUPERSEAL 2S

- Resistance to alkaline agents.
- Improved performance to sealing tests.
- Ecological process.
- Easy to use.
- Easy to analyze.
- Consistent process.

SUPERSEAL 2S

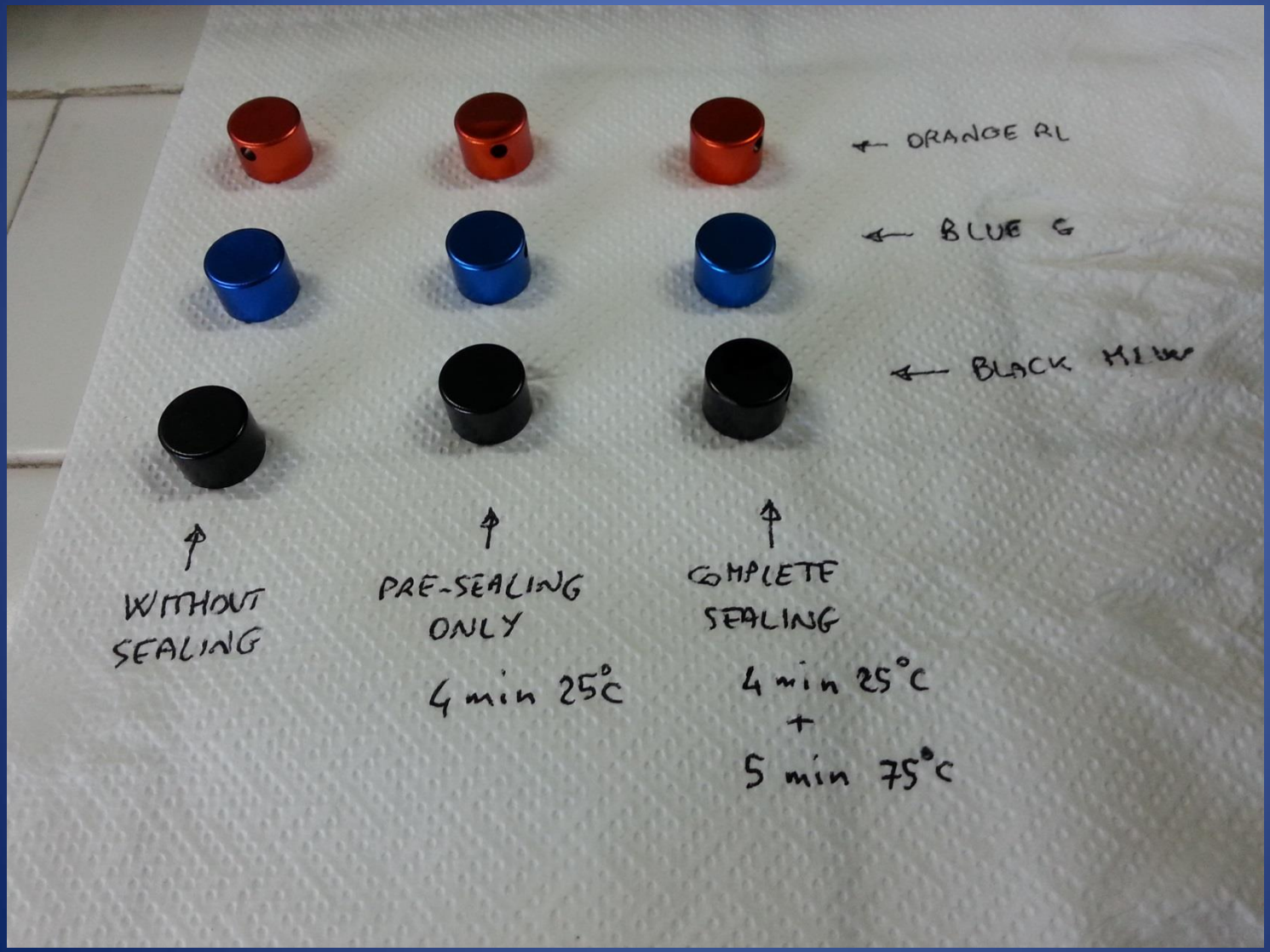


Result of the test of alkaline resistance GMW14665 at pH 13,5. Comparison between a piece sealed with conventional sealing (left) and one sealed with Superseal (right)

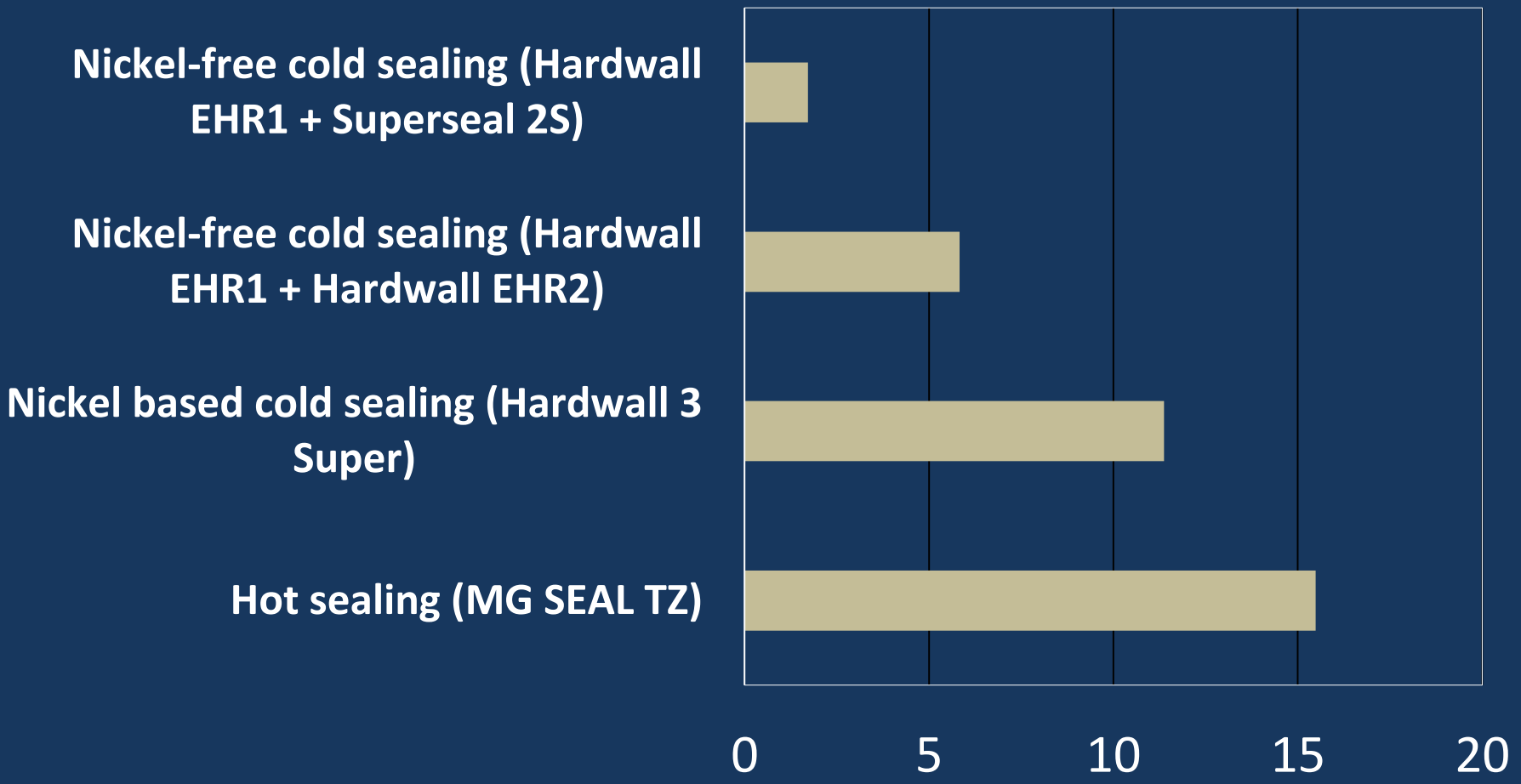
SUPERSEAL 2S for AUTOMOTIVE COMPONENTS

Result of the test of alkaline resistance FIAT 9.57448. Piece sealed with Superseal process (no visible attack)

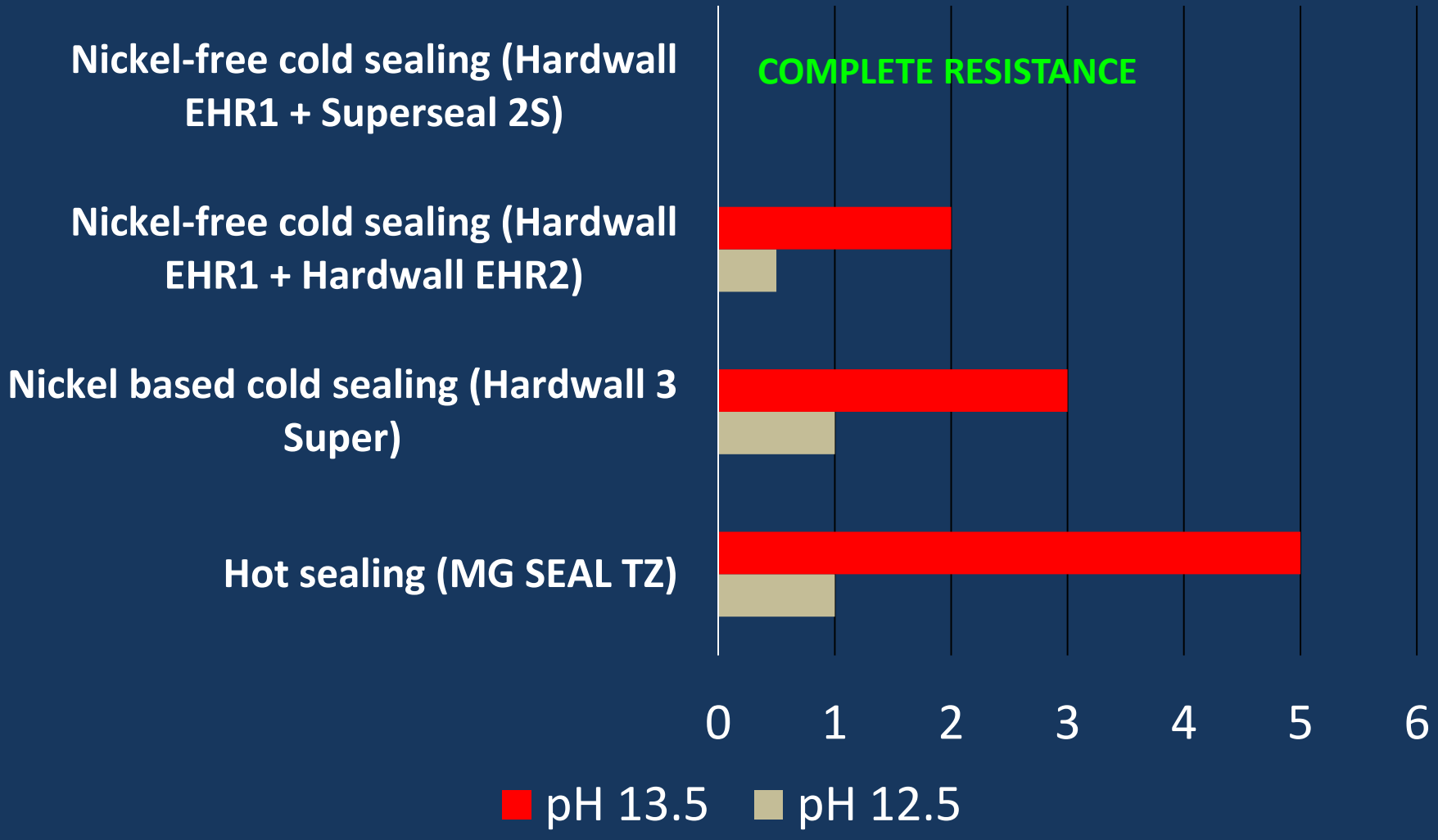
New cold sealing, nickel-free, with Superseal



Weight Loss Test according to ISO 3210 (mg/dm²)



Resistance against alkaline agents



Customer	BMW	VW	AUDI	PSA	FORD	GM	DAIMLER
Standard	GS 90010	TL 212	TL 182	B15 3200 / B28 3370	WSB-M4P9-B2	GMW 14665	DBL 9201
Thickness	5-10 microns	5-10 microns	5-10 microns	8-12 microns	7.5-15.0 microns	7.5-15.0 microns	5-10 microns
Neutral Salt Spray Test	240 h	480 h	480 h	---	480 h	480 h	---
CASS test	---	---	---	24 h	---	12 h	---
Humidity Resistance	480 h	---	---	---	---	240 h	---
SO2 Condensate Alternating Test	---	5 cycles	---	---	---	5 cycles	5 cycles
High Temperature Resistance	95 degree Celsius alternating	100 degrees Celsius 1 h	160 degrees Celsius 24 h	---	---	90 degrees Celsius 24 h	80 degrees Celsius 1 h
Acid/Alkali Resistance	pH=1 + pH=13.5 10 min, at RT	pH=1 + pH=12.5 10 min, at RT	pH=1 + pH13.5 10 min, at RT	pH=13.5 10 min, at RT	---	pH=12.5/13.0/ 13.5 10 min, at RT	---
Acid Dissolving Test	---	---	---	---	6 max **	6 max **	---
Aspect Requirement	Gloss > 500	Matt anodizing	---	Gloss>530	Gloss>470	Gloss>330	---

INDUSTRIAL EXPERIENCE WITH SUPERSEAL IN NORTH AMERICA

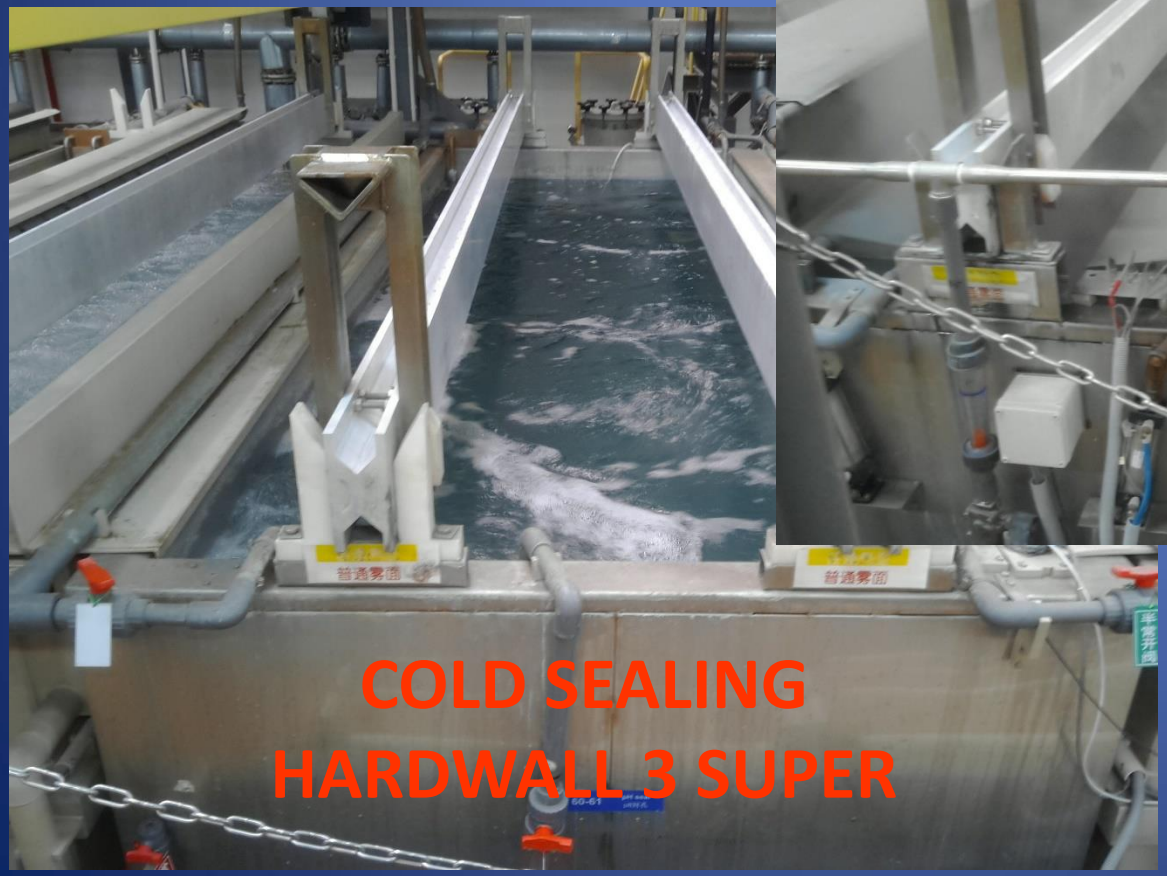
INDUSTRIAL EXPERIENCE WITH SUPERSEAL IN NORTH AMERICA

COLD SEALING
HARDWALL 3 SUPER

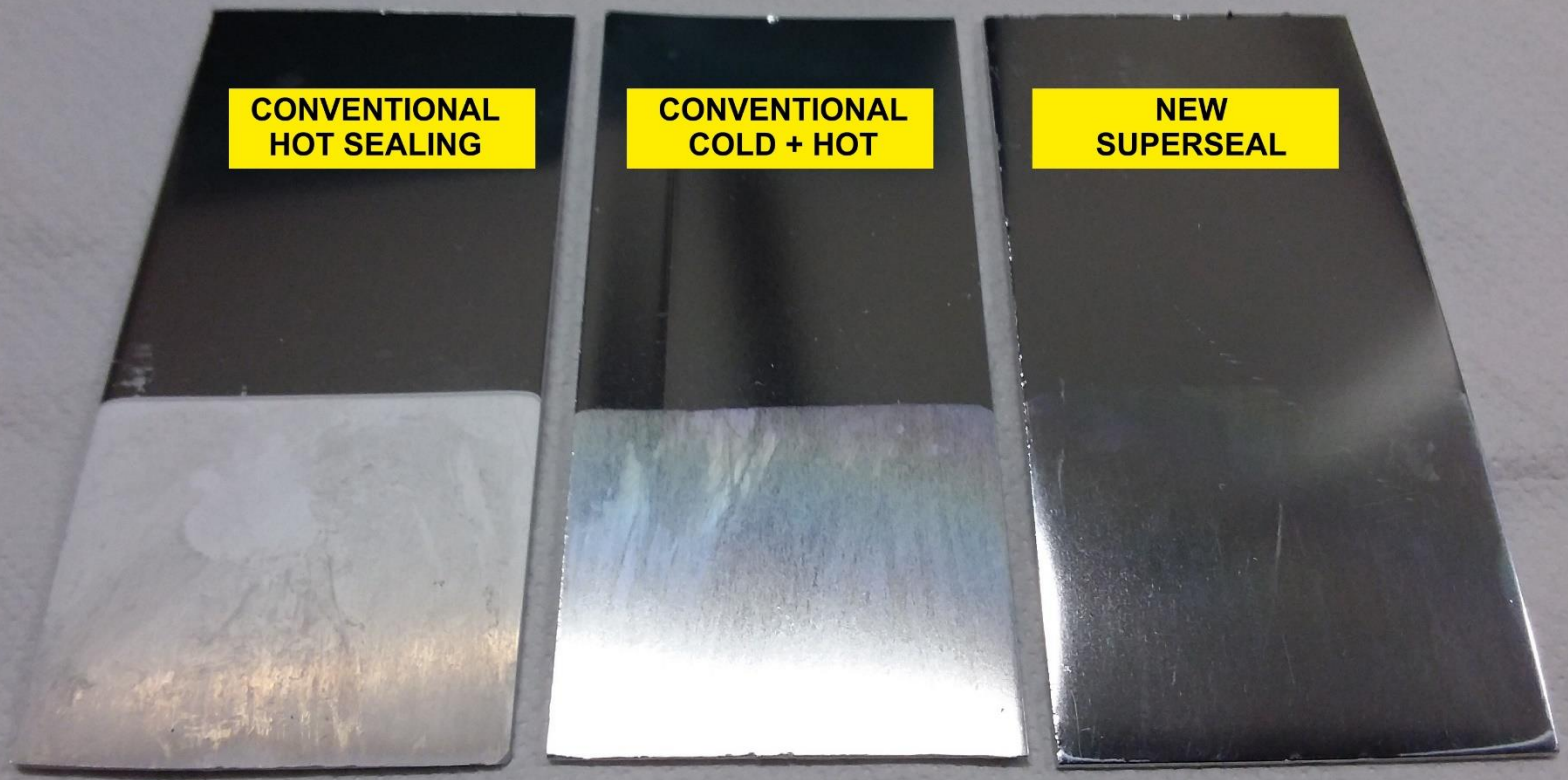
HOT SEALING
SUPERSEAL 2S

INDUSTRIAL EXPERIENCE WITH SUPERSEAL IN FAR EAST

INDUSTRIAL EXPERIENCE WITH SUPERSEAL IN FAR EAST



ALKALINE CORROSION TEST
pH 1 + pH 13.5



CONCLUSIONS

NICKEL-FREE PROCESS

- ✓Cold sealing
- ✓Nickel-free
- ✓Passes all Qualanod and standard quality tests
- ✓Passes many specific requirements (automotive)
- ✓Approval and patent pending

CONCLUSIONS

- Resistance to alkaline agents according to the main automotive standards.
- Improved performance to sealing tests up to weight loss < 5 mg/dm^2!
- Better resistance to salt spray test.
- Ecological process, nickel-free available.
- Easy to use.