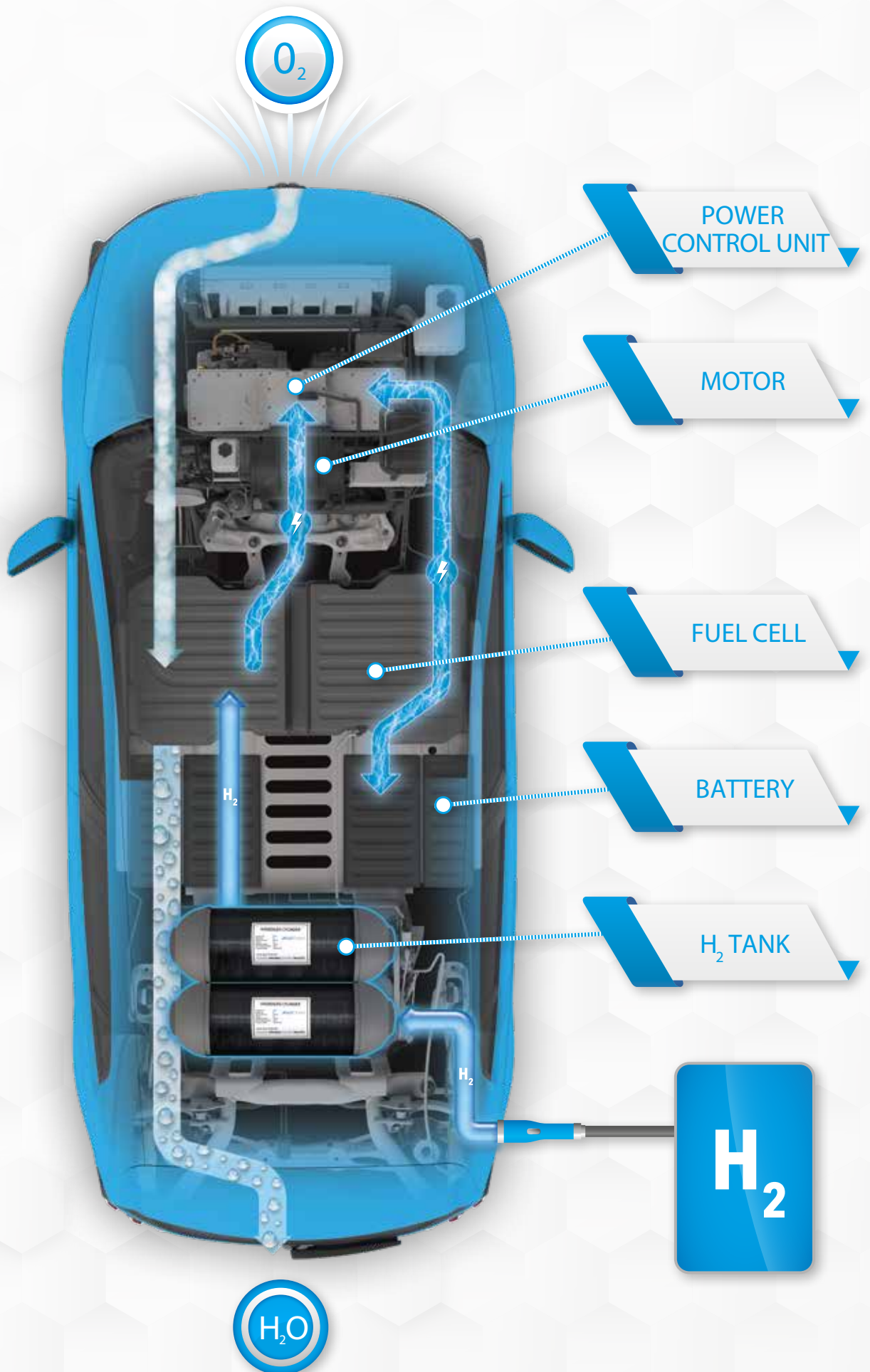


DYHARD[®]
every day, everywhere

Product lines for
Hydrogen Cylinder Manufacturing

DYHARD[®]

DYHARD[®] Fluid system
for hydrogen cylinder in FCEV



DYHARD®

Fluid system based on:

DYHARD® RF2100:

Low viscos modified BPA epoxy resin

DYHARD® Fluid 212:

Latent liquid curing agent

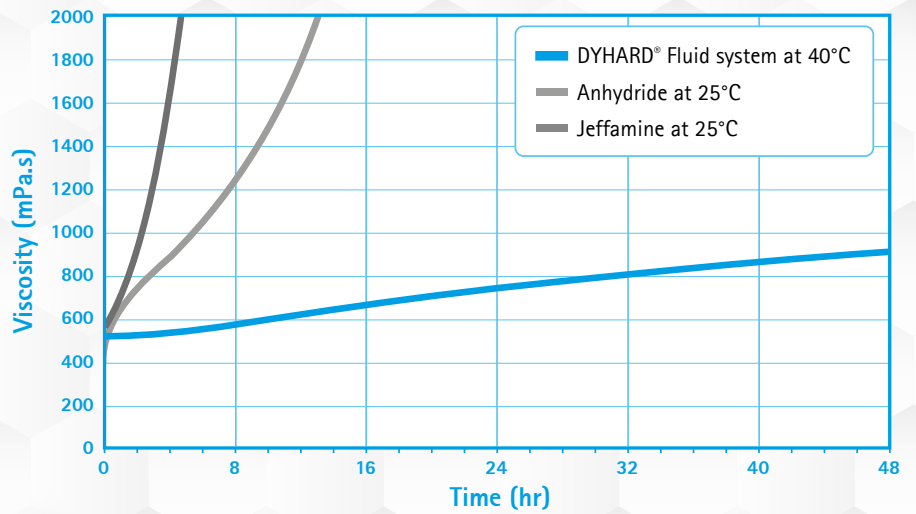
Benefits:

- Extreme long pot life
- Continuous winding operation
- Increased productivity, higher profitability
- Consistent viscosity in summer and winter
- Reduction of cleaning time and resin waste
- Excellent mechanical properties
- Low enthalpy

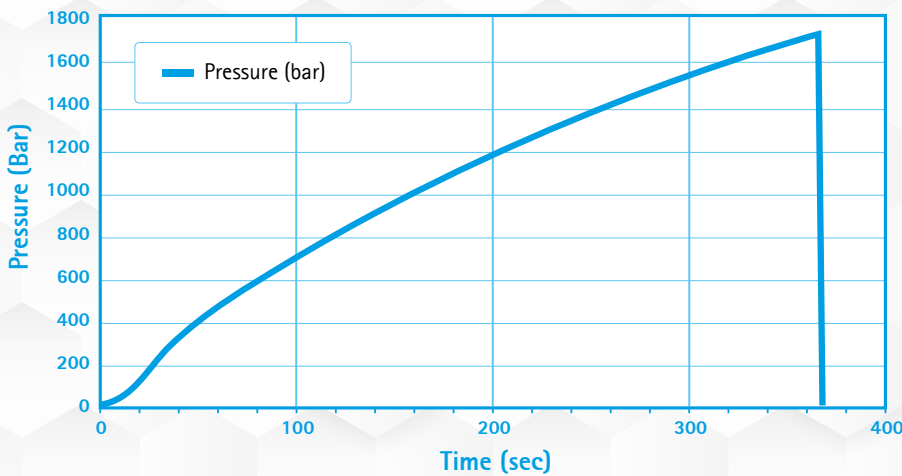
Viscosity versus time comparison:

DYHARD® Fluid system at 40°C

versus competitive Anhydride and Jeffamines systems at 25°C



Hydrostatic burst pressure test



Sample	Resin	Hardener	Carbon fiber	Diameter (mm)	Length (mm)	Weight (g)		Fiber weight %
						Laminate	Vessel	
1905-050-700-009	RF2100	Fluid 212	Hyosung H2550 24k	367.2	852	32100	38400	76

TYPE 4 CYLINDER TESTS

according to ISO 11439:2013 and E/ECE/TRANS/505/Rev.2/Add.133 – 25 June 2015

Properties:

- Hydrostatic burst pressure H2-cylinder: 1727 bar = 2.46 NWP*
- Hydrostatic burst pressure CNG-cylinder: 590 bar = 2.95 NWP*
- Pressure cycle test: Passed; >60.000 cycles
- High-pressure creep test: Passed; 246 hrs. in water at 100°C

(*NWP= Nominal Working Pressure)

		FILAMENT WINDING	
PRODUCT LINE	PRODUCTS	WET FIBER WINDING	TOWPREG
DYHARD® SYS-LINE	DYHARD® RF2100	✓	✓
	DYHARD® FLUID 212	✓	✓
DYHARD® CU-LINE	DYHARD® 100S	-	✓
	DYHARD® 100SF	-	✓
DYHARD® MB-LINE	DYHARD® D50EP	-	✓
	DYHARD® DF50EP	-	✓
DYHARD® CAT-LINE URONS	DYHARD® UR400	-	✓
	DYHARD® UR500	-	✓
DYHARD® LI-LINE	DYHARD® FLUID 111	-	✓

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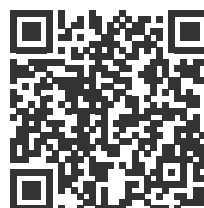
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Edition: 2020 (This publication supersedes all previous publications for this product group.)