



Request for Drawing Question / Interpretation No. 9A

of

AC Class Rule Version 1.4: December 8th 2015

Preamble:

Interpretation No 9 was issued by the Measurement Committee on January 7, 2016. Following discussions with industry representative and the Teams the Measurement Committee felt that the interpretation went a little too far and prevented standard hydraulic components being used and requiring more complicated and expensive systems to be used in place of these industry components. In particular this revised interpretation permits the use of single-acting gas spring return hydraulic cylinders. The limitations as to the use of these cylinders are set out in this interpretation:

On this basis Interpretation No 9 is rescinded and replaced with this Interpretation No 9 A.

Rule References:

This interpretation relates to Rules 15 and 16. Particular attention is drawn to rules 16.2 (a) and 16.2 (c) below:

16.2 The use of stored energy and non-manual power is prohibited, except for:

- (a) small springs (or collections thereof), shock cords (or collections thereof), and similar passive devices that deliver less than:
 - (i) 50 J of energy;
 - (ii) 500 N of force; and
 - (iii) 10 Nm of torque.

 - (c) low pressure hydraulic or gas accumulators of less than 6 bar which provide back pressure to a hydraulic system to prevent cavitation, but do no significant work themselves;
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Questions:

By way of example, a single-acting gas spring return hydraulic cylinder is used to control the car on a self-tacking jib track of an AC Class Yacht. The body is attached to the yacht platform, and the rod end is attached to a rope which is led to the jib car.

When oil is supplied to the cylinder, the cylinder retracts and the jib car moves towards the center of the track. When the return valve on the cylinder is opened, the cylinder will extend due mainly to the force from the jib. However, if the jib is not loaded, for example during a pre-start, the rope will be slack but the cylinder will still extend due to the gas pressure in the gas side of the cylinder.

This arrangement allows the cylinder position to be adjusted whether or not the jib is loaded, avoiding the overheads of using a double-acting cylinder, and is typical of systems used in previous America's Cup campaigns.

With reference to Rule 16.2 (a), the energy stored in the gas side of the cylinder, when retracted, would typically be greater than 50J. However, the energy *delivered* to any other part of the yacht is effectively zero, because the rope that the rod end is attached to cannot take compression.

With reference to Rule 16.2 (c), the purpose of the gas spring is *not* to prevent cavitation.

Does Rule 16.2 (a), or any other Rule, allow single-acting gas spring return hydraulic cylinders to be used on an AC Class Yacht if the energy stored in the gas may exceed 50J, provided that the gas spring is not delivering energy to any part of the yacht outside of the cylinder itself?

Interpretation:

Yes. The following criteria shall be met for such cylinders:

1. Pressure measured anywhere in the system, including the gas in such a cylinder, shall not exceed 350 bar.
2. Any hydraulic fluid released from such a cylinder shall be isolated from the pressurized side of the hydraulic system and shall only flow via low pressure lines to the reservoir in such a way that the flow does not perform any useful purpose other than returning the fluid to the reservoir.
3. When actuation of the cylinder is such that energy is being stored by the gas spring, the requirements of all provisions of Rule 15 and Rule 16 shall remain in effect.
4. When actuation of the cylinder is such that energy is being released by the gas spring, the adjustment of any associated **control surface** shall be strictly limited to those sources of power permitted by Rule 16.1(c) or 16.2(a).

Issued by the America's Cup Measurement Committee on April 11, 2016