FIA STANDARD GUIDELINES SAFETY RESTRAINT CABLES

Preliminary notices and terms

INTRODUCTION

1. The FIA Standard Guidelines Safety Restraint Cables ("Guidelines") set out general informational guidance and illustrative graphics regarding Restraint Cables approved in accordance with FIA Standards. This document is provided, at the FIA's discretion, to assist drivers and/or competitors taking part in competitions appearing on the FIA International Sporting Calendar and scrutineers ("Third Parties").

2. Provision of the Guidelines to any Third Party is strictly subject to the Third Party's acceptance of and agreement to comply with these Preliminary Notices and Terms.

DISCLAIMER

3. The contents of the Guidelines (including general informational guidance in relation to health and safety, sporting or technical matters) taken in isolation may not be suitable or appropriate for each and every regional and national "Motor Sport Event" (which incorporates all of the following activities i) motor sports competitions, practices, tests, reconnaissance's / "recce's" and demonstrations, ii) any associated entertainment, marketing or commercial activities and iii) any engineering, scrutineering, maintenance or other technical activities, and begins from the time the relevant locations where these activities are taking place are made accessible to any persons, and ends when the relevant locations are closed to access or the activities end, whichever occurs later). This is because the Guidelines relate to FIA Standards created for competitions appearing on the FIA International Sporting Calendar which operate within a regulatory and safety environment that does not apply to Motor Sport Events that do not appear on the FIA International Sporting Calendar.

4. It is the full responsibility of Third Parties to ensure that they understand and comply with any relevant obligations or duties relating to health and safety, product design, construction/manufacturing or consumer law which are placed on them under i) any applicable National Sporting Authority requirements, regulations and safety standards ("ASN Regulations"), ii) FIA requirements, regulations and safety standards ("FIA Regulations") and/or iii) any relevant transnational, national and/or local laws, regulations, directives and decrees passed by the government, a quasi-governmental entity or by any entity which has the same authority as the government in any applicable country or other territory, including all applicable local, state and federal laws, and any industry practices, codes of practice and/or codes of conduct incorporated into any of the foregoing, and all binding court orders, decrees, and any decisions and/or rulings of any competent authority that are relevant ("Applicable Laws"). The FIA assumes no responsibility in relation to such understanding or compliance.

5. The Guidelines do not contain any advice or guidance in relation to Applicable Laws, and the FIA makes no representation or warranty that the general informational guidance within the Guidelines complies with the Applicable Laws applying to a particular Motor Sport Event. Accordingly, it is the full responsibility of Third Parties to i) take appropriate advice and make their own enquiries as to Applicable Laws and any particular local safety requirements or other relevant considerations applying to a Motor Sport Event and ii) to adapt and implement the Guidelines in a suitable and safe manner depending on the circumstances of the particular Motor Sport Event. The FIA assumes no responsibility in this regard.

6. For the avoidance of any doubt, compliance with the Guidelines in isolation does not guarantee the safety of a particular Motor Sport Event.

7. If there is any conflict, or any doubt as to a conflict, between the contents of the Guidelines and Applicable Laws, Applicable Laws always take precedence. If it is possible to comply both with Applicable Laws and the Guidelines (subject to all appropriate adaptations as per paragraph 5), Third Parties should endeavour to do so.

8. The FIA does not make any representation or warranty, express or implied, and does not assume any responsibility as to the quality, suitability or fitness for purpose:

- **a.** of any equipment, products or designs that may be referred to within the Guidelines; nor
- **b.** as to the applicability or suitability of the Guidelines in relation to Motor Sport Events that do not appear on the FIA International Sporting Calendar.

9. All Third Parties are made aware that technology utilised in motor sport vehicles, equipment, structures, installations and products is subject to ongoing change and development, as well as good and best practice evolving over time. As a result, the Guidelines are subject to ongoing review and amendment over time.

10. All Third Parties are made aware of the risks that are inherent in the attendance of any person at or within the vicinity of a Motor Sport Event. Depending on the circumstances of the Motor Sport Event, these risks may include (non-exhaustive): the possibility of incidents (resulting from motor sports or otherwise) resulting in physical and/or mental injury or death; exposure to noise; exposure to / interaction with high voltage or other technical / mechanical equipment; or contracting/spreading communicable diseases.

LIMITATION & INDEMNITY

11. The FIA disclaims, excludes and limits (to the fullest extent permitted under Applicable Laws) any and all claims, liability, costs, expenses, damages, losses (including but not limited to any direct, indirect, incidental, special, consequential or exemplary damages or losses, property damage, breach of intellectual property rights, breach of contract, loss of profit, loss of reputation or goodwill, use, data or other intangible loss, loss of agreements or contracts, loss of sales of business and all interest, penalties and legal costs) and any personal or mental injury (including nervous shock, disease, disablement and death and any financial losses resulting), sustained by any organisation or person (including Third Parties and their subsidiaries, affiliates, licensors, licensees, agents, co-branders, partners, employees, directors, members, officers, advisors, consultants, representatives, successors and assigns (collectively the "Representatives")), howsoever arising from any use or implementation of, or reliance placed on the contents of, the Guidelines in relation to a particular Motor Sport Event by Third Parties or their Representatives, including in relation to:

- **a.** Statements (including false statements), acts or omissions by the FIA or its Representatives or Third Parties and their Representatives; or
- **b.** Any other negligence, lack of reasonable care, breach of any statutory or other duty or Applicable Laws, careless or wrongful act or wilful default by the FIA or its Representatives or Third Parties and their Representatives.

12. Any use or implementation of, or reliance placed on the contents of, the Guidelines in relation to a particular Motor Sport Event by any Third Party or its Representatives is (to the fullest extent permitted under Applicable Laws) strictly subject to acceptance by the Third Party and its Representatives of the following:

- **a.** The Third Party and its Representatives agree to waive any rights and/or claims, agree to release, hold harmless and not to sue the FIA or its Representatives in relation to any claims, liabilities, costs, expenses, damages and losses (including those referred to in paragraph 11); and
- **b.** The Third Party and its Representatives agree to indemnify the FIA and its Representatives in relation to any and all claims, liabilities, costs, expenses, damages and losses (including those referred to in paragraph 11), and this indemnity shall apply whether or not the FIA has been negligent or is at fault; in each case arising from the use or implementation of, or reliance placed on the contents of, the Guidelines in relation to a particular Motor Sport Event.

GOVERNING LAW & JURISDICTION

13. The Guidelines and any dispute or claim (including non-contractual disputes or claims) arising out of or in connection with the Guidelines or their subject matter or formation, shall be governed by and construed in accordance with the laws of France.

14. The courts of France shall have exclusive jurisdiction to settle any dispute or claim (including non-contractual disputes or claims) arising out of or in connection with the Guidelines or their subject matter or formation.

15. Any matters relating to investigation and enforcement of FIA Regulations are subject to the jurisdiction of the internal judicial and disciplinary bodies of the FIA.

SCOPE

The FIA safety regulations are made up of several different types of documents. Some of the documents, such as FIA Standards, FIA Homologation Regulations for Safety Equipment and FIA labelling guidelines, are targeted at the safety equipment manufacturers. Some regulations aim to ensure that the safety equipment used in competitions registered on the FIA International Sporting Calendar delivers a specified level of safety protection. There are other documents, such as appendices to the International Sporting Code, and Technical and Sporting Regulations, which aim to regulate the use of safety equipment in competitions appearing on the FIA International Sporting Calendar.

The aim of these new Safety Equipment Guidelines (hereinafter "the Guidelines") is to complement the FIA safety regulations and to collect all the relevant regulatory information in one place, including the different Standards recognised by the FIA, the differences between them, the importance of safety equipment, the protection delivered, how to select, use and customise safety equipment, and how to avoid critical mistakes. They also give tips on how to identify non-original products and what to do after an accident.

This document is intended to make the FIA regulations more easily understandable for competitors and scrutineers.

The text written here does not replace the official documents published on the FIA website and has no regulatory value.

This is a living document that can be updated to reflect any new information, updates to regulatory or guidance documents or clarification that the FIA considers relevant to the competitors and officials. Please ensure that you take into consideration the latest available version.

TABLE OF CONTENTS

INTRODUCTION

Figure 1 Restraint cables retaining wheel assembly

Restraint cables are flexible energy-absorbing elements that connect the retained part to the main structure of the car. Their role is to reduce the risk of ejection of a part of the car, such as wheel assembly, rear impact structure or aerodynamic devices. In FIA standard 8864-2013 the restraint cable which restrains the wheel assembly is referred to as "wheel tether" or "tether". Restraint cables are important components in racing vehicles which improve protection for drivers, officials, spectators, etc. within the proximity of the race event.

The FIA Standards require restraint cables to withstand specific stress to which the cable might be subjected during the accident. During very specific accident conditions, there may be a compromise between object retention and car launching, in which case the performance objectives defined in FIA Standard 8864-2022 aim to prioritise object retention.

The performance of the restraint cables is assessed by dynamic tests prescribed in the FIA Standards to replicate real world stress in a controlled, accurate and repeatable manner.

1/ REGULATION REFERENCES

The Restraint Cables are homologated devices which must adhere to the FIA Safety Standards. There are currently two active FIA Standards for the restraint cables:

- 8864-2013 Wheel Restraint Cables – Standard for wheel assembly restraint cables only
- 8864-2022 Restraint Cables – Standard for restraint cables for various applications such as wheel assemblies, rear impact structures and aerodynamic devices

The use, in a competition appearing on the FIA International Sporting Calendar, of any restraint cable is prohibited unless the device has been homologated according to FIA Standard 8864-2022. Homologated restraint cables are listed in FIA Technical List No. 93.

QR Code 1 - Technical List No. 93 "List of FIA-approved restraint cables according to FIA standard 8864-2022"

The use, in a competition appearing on the FIA International Sporting Calendar, of any wheel tether is prohibited unless the device has been homologated according to FIA Standard 8864-2013. Homologated wheel tethers are listed in FIA Technical List No. 37.

QR Code 2 - Technical List No. 37 "List of FIA-approved wheel restraint cables according to FIA standard 8864-2013"

USER GUIDE & INSTALLATION

1/ RESTRAINT CABLE LENGTH AND MAINTANENCE

LENGTH

The tether must have the correct length, as excessive length can cause compressional effects on yarn or cords during steering of the front tyres. The manufacturer must provide a user manual for the installation of the restraint cables on the vehicle. The user manual prescribes the installation in order to avoid any unnecessary damage potentially caused by sharp edges, brake dust or similar. It is recommended to avoid any high tension around critical edges during installation, as well as keeping the cable ends well aligned. Twisting the tether and fixing it on both sides will cause increased stress in the tether during elongation.

WEATHER AND TEMPERATURE WEAR

FIA Standard 8864-2022 defines the methodology of testing the performance of restraint cables. Before testing the tensile performance of restraint cables, the cables must be conditioned using methods which simulate the extreme weather conditions that the restraint cable might encounter during its lifetime. In order to minimise the negative effects of the weather on the performance of a restraint cable, it is highly recommended to perform a visual inspection of the cable after the race. It is also advised to inspect the parts of the cable that are closer to the brakes as the brakes can get very hot during braking, which can cause thermal stress to the structure of the restraint cable and its protective layer.

FLUIDS AND MOISTURE

Water vapour and direct exposure to sunlight can damage the protective layer of the restraint cable. Brake fluid or other liquids should not come into contact with the cable, which is why inspection of the cables after every race is highly recommended.

ABRASION

Restraint cables are prone to abrasion caused by dust from the surface of the racetrack or brake dust. The protective layer ensures the core integrity of the inner parts of the restraint cable to ensure a consistent level of performance. Protective layers must be inspected thoroughly; penetration of the protective layer will cause damage to the load bearing structure of the restraint cable.

STORAGE

Restraint cables must be stored accordingly to avoid any damage to the structure prior to installation. It is recommended to store the cables on a flat surface with nothing placed on top of them. The temperature for storing should be around room temperature (20°C to 25°C), with humidity levels within the normal range (30% to 60% relative humidity). Improper storage can affect the integrity of the restraint cable.

MODIFICATIONS

Restraint cables can be modified only by manufacturers if the modifications comply with Art. 5.4. of FIA Standard 8864-2022. Any modifications done by the user are strictly prohibited. The restraint cables must be used exactly as provided by the manufacturer and installed following the manufacturer's instructions.

MAINTANANCE

The manufacturer provides the user manual, which must contain information concerning storage, cleaning and maintenance of the restraint cable.

LIFE CYCLE

Life cycles for restraint cables may vary depending on the part they are installed on. The most critical part for restraining is the wheel assembly, which is why it is recommended to conduct a thorough service inspection after every race and to replace the wheel tethers after a

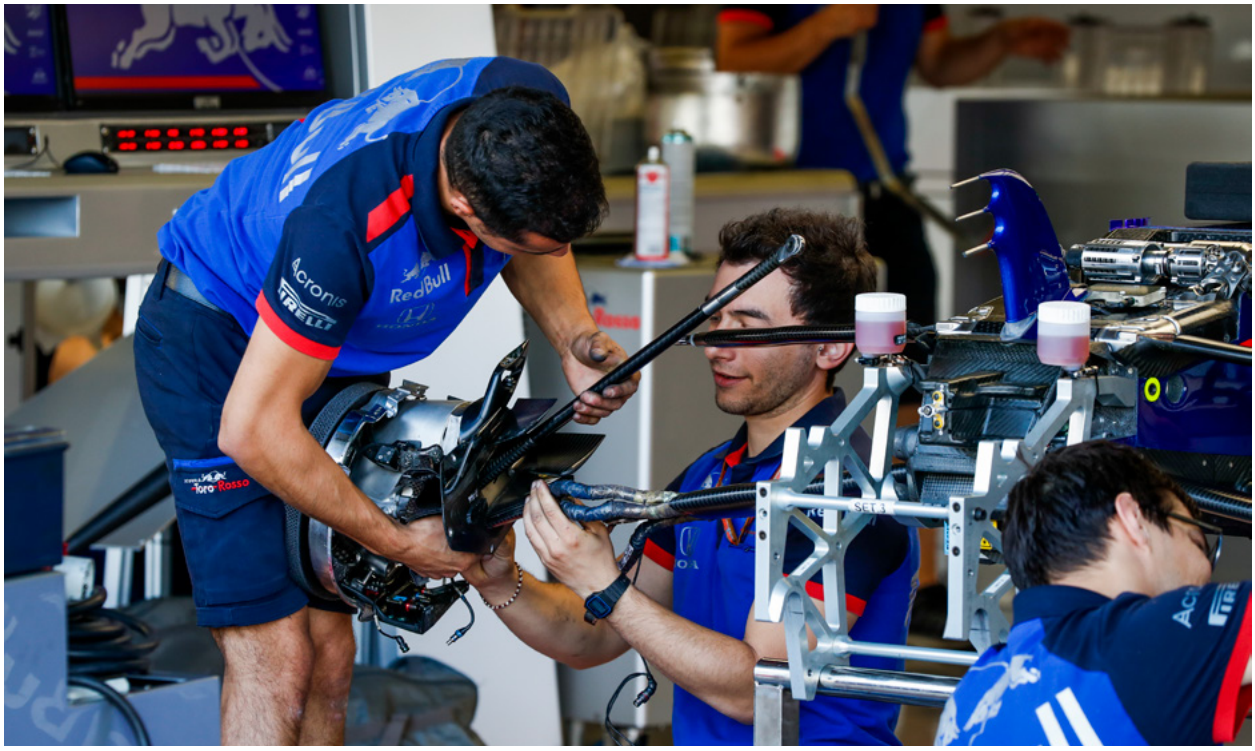


Figure 2 Installation in wishbones

certain distance has been covered by the vehicle. The timeframe for conducting a service inspection and replacing wheel tethers is recommended by the manufacturer. In case of any damage described in the next section, the restraint cables must be replaced.

REQUIREMENT FOR EACH CHAMPIONSHIP

Each Championship's Technical Regulations prescribe the number of restraint cables that must be placed on the vehicle. For example, the 2024 Formula 1 Technical Regulations state: "Each wheel must be fitted with three tethers compliant with FIA standard 8864-2022". For other championships, it is necessary to check the requirements in their technical regulations.

2/ INSTALLATION AND INSPECTION

For every restraint cable, the manufacturer provides a detailed description of its installation which the user must adhere to. During the installation of the device the user should take precautions to ensure that the device does not sustain damage before its use. Stretching the restraint cable during installation will cause pre-loads in the structural part of the device, which reduces the energy a cable is able to absorb. Covers must always be retained on the device and must not be removed, as they serve as protection of the core. Any damage to the protection will compromise the performance of the device. While positioning the restraint cable, it is strongly recommended to avoid placing the restraint cable on or near any sharp edges. It is important to properly align the edges of the restraint cable to avoid any twisting. During

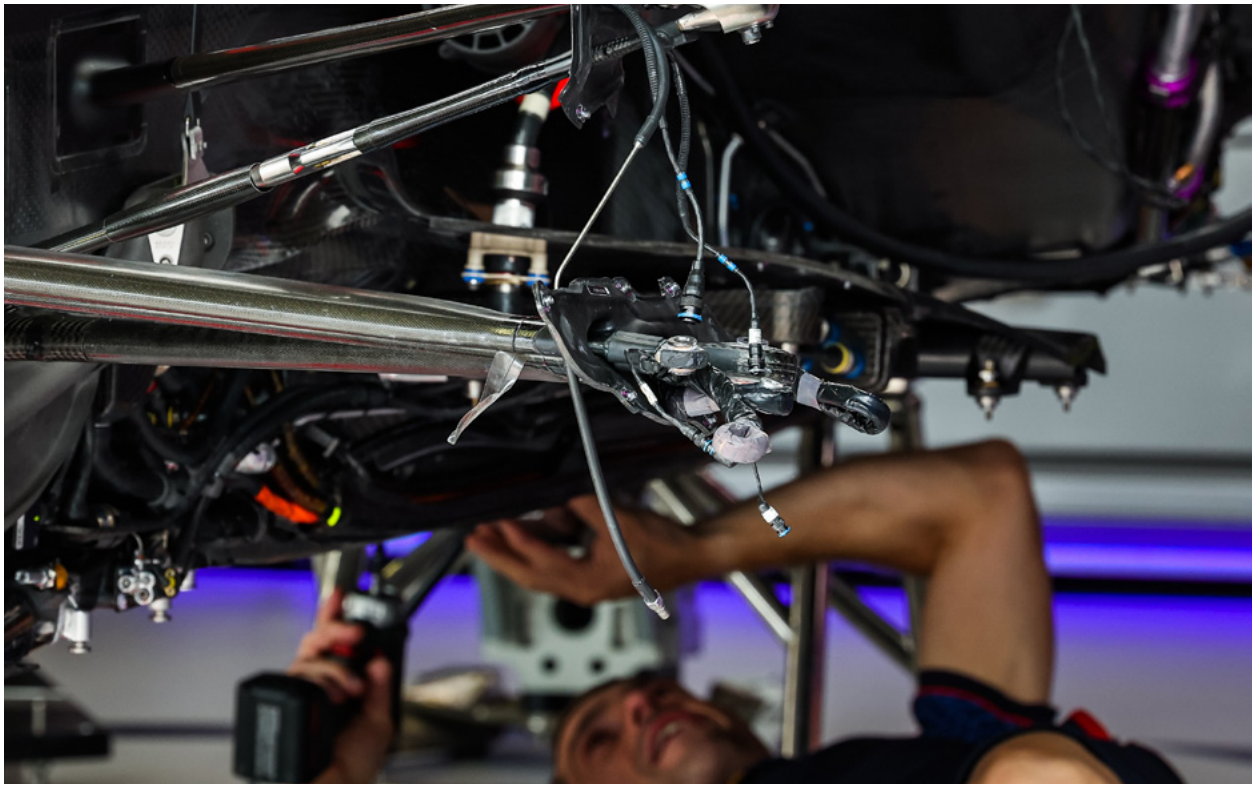


Figure 3 Restraint cables installed in wishbones

installation into the wishbone of the vehicle's suspension, extra caution must be taken as it is easier to damage the protective layer while inserting the cable.

The restraint cables are designed with two end fittings which serve as attachment points to the chassis of the car and to the part which is intended to be restrained. FIA Standard 8864-2022 defines the classes for end fittings measured by peak force registered during the homologation test.

- Class 1. 30 kN
- Class 2. 50 kN
- Class 3. 70 kN
- Class 4. 80 kN

Both end fittings must be designed in such a way that they can withstand a greater load than the maximum load that a restraint cable can withstand. During the fixing of the cable to the end fittings, it is important not to use excessive force as this can result in slippage between fibres and tubing. The mechanics should ensure that the restraint cable cannot in any case be pulled out from its fixture point.

Figure 4 Restraint cable end fittings damage

Figure 5 Valid end fitting

MAINTENANCE & INSPECTION

It is prescribed in the User manual that Restraint cables must undergo an inspection procedure to ensure the integrity of the device. During the assembly and dismantling of parts that are restrained, it is necessary to ensure that the cable is carefully removed without causing any damage to the cable.

During the maintenance and cleaning of parts near the restraint cable, such as wheel assemblies, it is strongly advised to use chemical substances that are less abrasive. Chemicals which are used to clean brakes or brake ducts are often very strong and abrasive on the surface in contact. Such chemicals can easily dissolve the protective layer of the restraint cable, after which the integrity is compromised and the cable should be replaced with a new one.

Any liquid must not be in contact with the protective layer of the restraint cable (Figure 6).

Figure 6 Liquid in contact with protective layer

During the inspection, it is important to check for cuts in the protective layer (Figure 7). Exposed fibres should always be covered and sealed to prevent dust or liquid ingress.

Figure 7 Exposed fibres

Dust has abrasive properties and can cut the fibres as shown in Figure 8. If the protective layer is broken and fibres are damaged, the cable must be replaced.

Figure 8 Cut fibres

If jacket protection presents any chafing or discontinuity to the protective cover as shown in Figure 9, the tether must be replaced due to possible dust ingress, fibre exposure or subsurface fibre damage.

Figure 9 Damaged jacket of the restraint cable

Both the FIA identification label and the hologram sticker (Figure 9) must be intact and legible with no tears or separation from the tether. It is allowed to add a protective see-through tube over the FIA label and hologram.

Figure 10 FIA labelling


BWT
BWT
JCB
JCB
BOMBARDIER
claro
18
BWT
JCB
telcel

SCRUTINEERING CORNER

1/ PRE-EVENT CONTROL

Please ensure that you have downloaded the latest version of Technical List No. 37 (Wheel restraint cables, FIA standard 8864-2013) and Technical list No. 93 (Restraint cables, FIA standard 8864-2022). It contains very useful information to allow you to check that the safety equipment is in compliance with the FIA Safety Regulations.

QR Code 1 - Technical List No. 93 "List of FIA-approved restraint cables according to FIA standard 8864-2022"

QR Code 2 - Technical List No. 37 "List of FIA-approved wheel restraint cables according to FIA standard 8864-2013"

The FIA-approved label is affixed on the products only if they comply with FIA safety requirements. The FIA hologram and label indicate that the product has undergone the stringent tests defined in the FIA Standard.

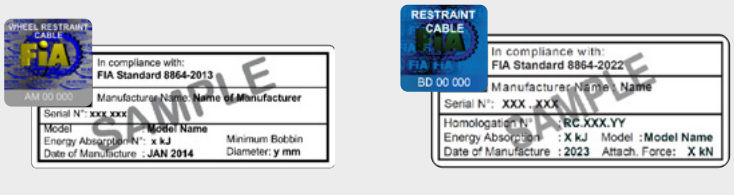
Use the below example of labels to check conformity with the technical list and prove the authenticity of the equipment. In case of doubt, contact your ASN or the event officials.

Alternatively, compare the label/hologram with another product which you are confident complies with the regulations.

8864-2013

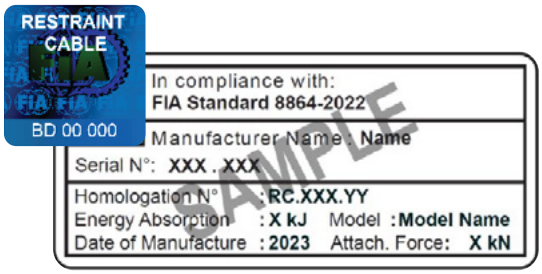
8864-2022

New labelling with hologram from 01.01.2013



CHECKLIST TO IDENTIFY RESTRAINT CABLE COMPLIANCE WITH FIA REGULATIONS

1. Compare the FIA label and hologram affixed on the restraint cable with the label template shown in the relevant technical list.



2. The way the information is displayed, the font and the use of bold type must be the same as on the template.
3. The standard, manufacturer's name, homologation number, model name and validity date must always be presented and printed according to the font style and size of the label.

Figure 11 restraint cable labelling

4. Compare the information shown on the FIA label with the information shown in the relevant technical list.

Figure 12 Restraint cable label with hologram

Homologation number	Manufacturer	Model	Length Class [mm]	Minimum Vehicle Pickup Force [kN]	Maximum Energy absorbed [KJ]	Homologation validity	
						Starting	End [1]
RC.002.23	CORTEX	C/5kJ/2330	Class c. 800–999 mm	50	5	10.2023	10.2028

5. Compare the date of manufacture with the homologation date. The validity of FIA Standards 8864-2013 and 8864-2022 is five years.

2/ POST-ACCIDENT ANALYSIS

After every impact on the vehicle, it is necessary to check the integrity of the restraint cables which could have been affected by the impact. Make sure that there has been no elongation of the restraint cables. Elongated restraint cables have reduced capacity to absorb energy and must be replaced. The protective layer and end fittings must remain intact. In case of damage to any part of the restraint cable, it is necessary to replace the cable with a new one.

QR CODES - SUMMARY

Technical List 93

Technical List 37

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