Laponite® development products for use in hard water

Rockwood is introducing a two new development products, **Laponite® RXW 7194** and **Laponite® RXW 7196** which are modified to give maximum performance in **hard water** of >350ppm $CaCO_3$, or >20 German degrees of hardness.

Application

Laponite® products are layered silicates manufactured from naturally occurring mineral sources with a proprietary organic modification. It is used to develop shear sensitive structure and improve the stability of a wide range of water based formulated products. Fields of use for Laponite® include household and industrial surface coatings, household and I&I cleaners, ceramic glazes and agrochemical, oilfield and horticultural products.

Using Laponite® products in hard water

High levels of water hardness can cause problems with the performance of many types of additives that are used in water based systems. **Laponite® RD** and **Laponite® RDS** are suitable for use in softer types of water. Development grades **Laponite® RXW 7194** and **Laponite® RXW 7196** have proprietary organic modifications which allow them to be used successfully in water types that are generally classified as **hard water** and **very hard water**. Water hardness is described by several different classification systems around the world. A summary of how these relate to use of specific Laponite® grades is given overleaf

Typical Characteristics of Laponite® RXW 7194 and Laponite® RXW 7196	
Appearance	free flowing white powder
Free moisture	10% max
pH (2% dispersion)	9-11
Bulk Density	900-1000kg/m3
Specific density	2.5
Specifications can be developed to meet individual requirements	

Storage

Laponite® products are hygroscopic and should be stored in original packaging under dry conditions.

For more information - contact the Laponite team on help@laponite.com

Rockwood Additives Limited
Moorfield Road Widnes
Cheshire UK WA8 3AA
Tel: +44 (0)151 495 2222 Fax: +44 (0)151 420 4401

Rockwood Clay Additives GmbH
Stadtwaldstr. 44
85368 Moosburg, Germany
Tel: +49 (0) 8761 72 150-0 Fax: +49 (0) 8761 72 150-334

Rockwood Specialties (Singapore) Pte. Limited
171 Chin Swee Road
Unit No: #10-08 San Centre Singapore 169877
Tel: +65 6532 0676 Fax: +65 6532 0502

Procedure to incorporate Laponite® RXW 7194 and Laponite® RXW 7196 into hard water

1	**Laponite® RXW 7194 and Laponite® RXW 7196 must be pre-dispersed in the hard water before addition of any other ingredients.** • A propeller blade or Cowles blade is sufficient. It is not necessary to use high shear mixers, but this type of mixer can reduce dispersion time.
2	**The water content in the pre-mix should be controlled to ensure that the concentration of Laponite® RXW 7194 and Laponite® RXW 7196 in the pre-mix is at least 2.0%.** • If enough free water is available to make a more dilute pre-mix, this water should be reserved and added later in the formulation procedure. • If a pre-mix concentration of <2% is prepared, dispersion time may be greatly increased.
3	**Laponite® RXW 7194 and Laponite® RXW 7196 should be added to water with rapid stirring. Continue stirring for 20 to 30 minutes.** • The viscosity of the dispersion after this time will depend upon the concentration of Laponite® and also upon the degree of hardness of the water. • Higher Laponite® concentration and harder water will tend to give a higher viscosity pre-mix. • The modifications that have been made to both grades have the effect of reducing the tendency to form gel structure in water, at up to around 3% to 4% Laponite® concentration. • Gel structure will build later in the formulation make-up, when other ingredients are added. • **As with ALL grades of Laponite®, it is NOT necessary to wait for the pre-mix to form a gel structure before other ingredients are added.**
4	**After this time, other formulation ingredients, including any reserved water, can be added into the dispersion of Laponite® RXW 7194 or Laponite® RXW 7196.**

A pre-mix of **Laponite® RXW 7194** and **Laponite® RXW 7196** will form strong gels at 5% concentration or higher in hard water. It can be difficult to disperse strong gels of Laponite products homogenously into formulations. If there is not enough free water available in the formulation to make a pre-mix of these grades at a concentration of <5.0%, then it might be possible to use **Laponite® S482**. Please send an e-mail to the Laponite Team at: help@laponite.com to request further information.

What is hard water?

Hard water is water that has a high dissolved mineral content- mainly calcium as Ca^{2+} ions and magnesium as Mg^{2+} ions- along with carbonate, bicarbonate and sulphate ions. Other ions can also be present, usually in lower quantity and hard water from different locations will have different ratios of ions. The units used to express levels of water hardness have not been unified and several different systems are in common use. These include German (°dH) also called General (°dGH) hardness, English or Clark's hardness (°E) and French hardness (°f). In addition, water hardness is frequently expressed as parts per million of calcium carbonate (ppm $CaCO_3$); in the USA this value is also known as American Hardness.

Water hardness as measured by the different classification systems

ppm $CaCO_3$	German degrees of hardness (°dH)	English degrees of hardness (°E)	French degrees of hardness (°f)	* Approximate conductivity (K in $\mu S.cm^{-2}$)	**Recommended grade(s) of Laponite®**
Up to 175	Up to 10	Up to 12.5	Up to 18	Up to 500	Laponite® RD Laponite® RDS
175 - 350	10 - 20	12.5 - 25	18 - 36	500 to 900	Laponite® RDS
>350	**>20**	**>25**	**>36**	**>900**	**Laponite® RXW 7194** or **Laponite® RXW 7196**

* Note: values are approximate as hard water with different chemical composition will have different conductivity values